

**Triangular Cooperation for Agricultural Development of  
the Tropical Savannah in Mozambique**

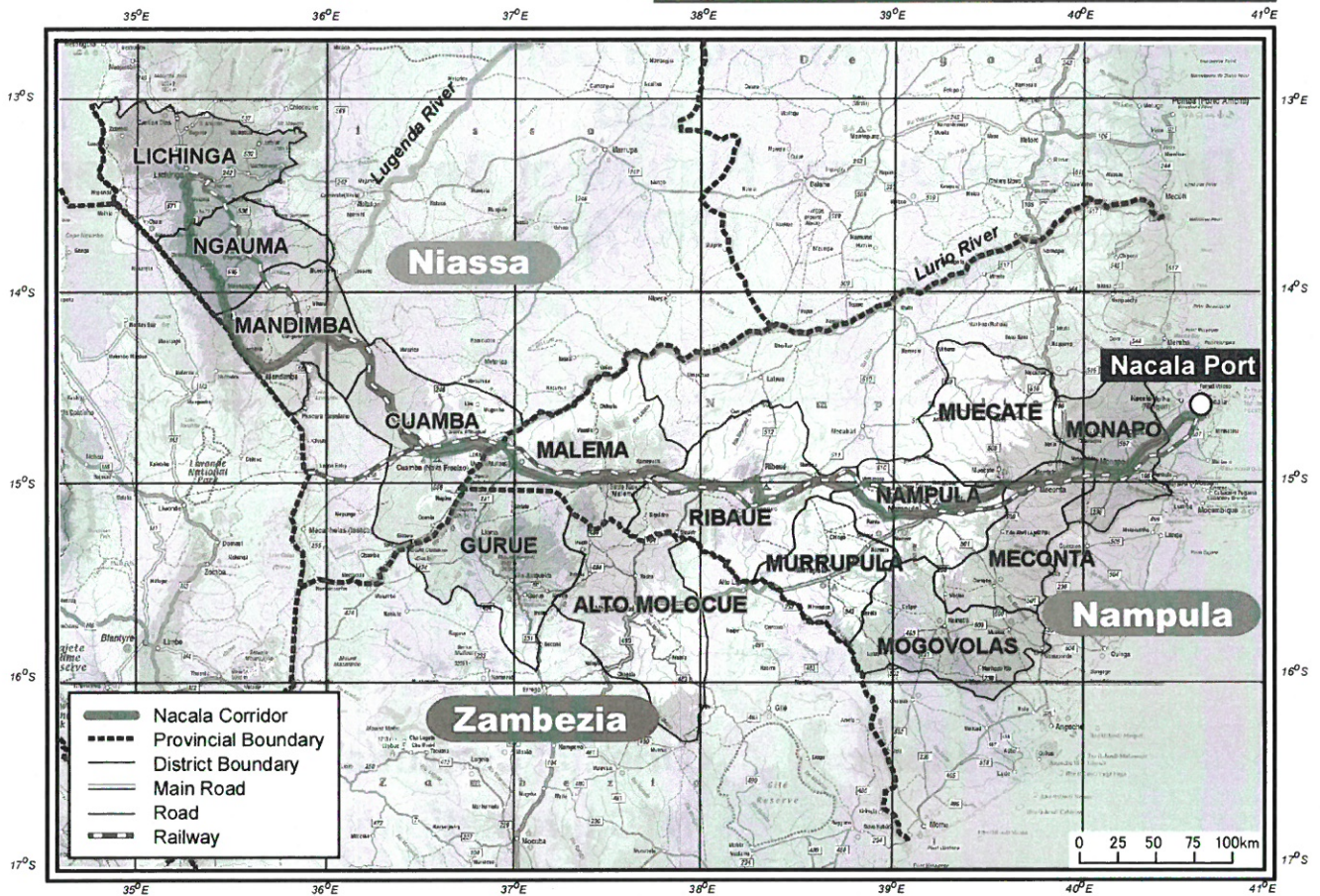
**SUPPORT  
AGRICULTURE DEVELOPMENT MASTER PLAN  
IN  
THE NACALA CORRIDOR IN MOZAMBIQUE  
(PROSAVANA-PD)**

**REPORT  
on  
Data Collection and Analysis of Agriculture  
in Nacala Corridor  
and  
Drawing of Overall Picture of Development Plan  
(DRFAT)**

**November 2012**

**For Mozambique: MINAG, DPAs**

**For Japan: Oriental Consultants Co. Ltd.  
NTC International Co. Ltd.  
Task Co. Ltd.**



Location Map

The opinions and findings comprised in these documents were for study purposes and are not binding or reflecting the position of the coordinating institutions, nor the implementation of the strategies described therein.

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## Abbreviation

	English / Inglês	Portuguese / Português
<b>ABC</b>	Brazilian Cooperation Agency	Agência Brasileira de Cooperação
<b>AIDS</b>	Acquired Immune Deficiency Syndrome	Síndrome de Imuno Deficiência Adquirida
<b>AIFM</b>	Integrated Assessment of Forest in Mozambique	Avaliação Integrada das Florestas de Moçambique
<b>ANE</b>	National Agency of Roads	Administração Nacional de Estradas
<b>ARA</b>	Basin Water Management Agency	Administração Regional de Águas
<b>AU</b>	African Union	União Africana
<b>BAD</b>	African Bank of Development	Banco Africano de Desenvolvimento
<b>CAMPO</b>	The company of Agricultural Promotion	Companhia de Promoção Agrícola
<b>CPAC</b>	Cerrado Agricultural Research Center	Centro de Pesquisa Agropecuária dos Cerrados (EMBRAPA Cerrados)
<b>CENACARTA</b>	National Center of Cartography and Remote Sensing	Centro Nacional de Cartografia e Teledetecção
<b>CEPAGRI</b>	Center for the Promotion of Agriculture	Centro de Promoção da Agricultura
<b>C/P</b>	Counterpart	Contraparte
<b>CPI</b>	Investment Promotion Centre	Centro de Promoção de Investimentos
<b>CSR</b>	Company's Social Responsibility	Responsabilidade Social da Empresa
<b>CTV</b>	-	Centro Terra Viva
<b>DAF</b>	Directorate of Administration and Finance	Direcção de Administração e Finanças
<b>DE</b>	Economics Directorate	Direcção de Economia
<b>DNA</b>	National Directorate of Water	Direcção Nacional de Águas
<b>DNAIA</b>	National Directorate of Environmental Impact Assessment	Direcção Nacional de Avaliação do Impacto Ambiental
<b>DNAPOT</b>	National Directorate of Territorial Planning and Arrangement	Direcção Nacional de Planeamento e Ordenamento Territorial
<b>DNEA</b>	National Directorate of Agrarian Extension	Direcção Nacional de Extensão Agrária
<b>DNTF</b>	National Directorate of Land and Forestry	Direcção Nacional de Terras e Florestas
<b>DPA</b>	Provincial Directorate of Agriculture	Direcção Provincial da Agricultura
<b>DPCA</b>	Provincial Directorate for the Co-ordination of Environmental Action	Direcção Provincial para Coordenação da Acção Ambiental
<b>DPEC</b>	Provincial Directorate of Education and Culture	Direcção Provincial de Educação e Cultura
<b>DUAT</b>	Land Use Rights	Direto de Uso e Aproveitamento da Terra
<b>EIA</b>	Environment Impact Assessment	Estudo de Impacto Ambiental
<b>EMBRAPA</b>	Brazilian Agricultural Research Corporation	Empresa Brasileira de Pesquisa Agropecuária
<b>EPDA</b>	Environmental Pre-viability Report and Scope Definition	Estudo de Pré-Viabilidade Ambiental e Definição do Âmbito
<b>FAO</b>	Food and Agriculture Organization	Organização para Agricultura e Alimento
<b>FDD</b>	Fund of District Development	Fundo de Desenvolvimento Distrital
<b>FFS</b>	Farmer Field School	Escola na Machamba do Camponês
<b>FGV</b>	Getulio Vargas Foundation	Fundacao Getulio Vargas
<b>F/S</b>	Feasibility Study	Estudo de Viabilidade
<b>FUNAB</b>	Environment Fund	Fundo do Ambiente
<b>GAP</b>	Good Agricultural Practice	Boas Práticas Agrícolas
<b>GAPI</b>	Office to Support Small Scale Industries	Gabinete de Consultoria e Apoio à Pequena Indústria
<b>GAZEDA</b>	Cabinet of Accelerated Economic Development Zones	Gabinete das Zonas Económicas de Desenvolvimento Acelerado
<b>GDP</b>	Gross Domestic Product	Produto Interno Bruto
<b>GIS</b>	Geographic Information System	Sistema de Informação Geográfica
<b>GOM</b>	Government of Mozambique	Governo de Moçambique
<b>GPS</b>	Global Positioning System	Sistema de Posicionamento Global
<b>ICM</b>	Cereals Institute of Mozambique	Instituto de Cereais de Moçambique
<b>ICT</b>	Information and Communication Technology	Tecnologias da Informação e da Comunicação
<b>IDA</b>	International Development Association	Associação Internacional para o Desenvolvimento
<b>IFAD</b>	International Fund for Agricultural Development	Fundo Internacional para o Desenvolvimento Agrícola

<b>IAM</b>	Cotton Institute of Mozambique	Instituto do Algodão de Moçambique
<b>IIAM</b>	Agriculture Research Institute of Mozambique	Instituto de Investigação Agrária de Moçambique
<b>IIED</b>	International Institute for Environment and Development	Instituto Internacional para o Meio Ambiente e Desenvolvimento
<b>INAM</b>	National Institute of Meteorology of Mozambique	Instituto Nacional de Meteorologia de Moçambique
<b>INCAJU</b>	Institute of Promotion of Caju	Instituto de Fomento do Caju
<b>INE</b>	National Statistic Institute	Instituto Nacional de Estatística
<b>INIA</b>	National Institute of Agriculture Research	Instituto Nacional de Investigação Agronómica
<b>ISRIC</b>	International Soil Reference and Information Centre	Referência Internacional de Solo e Centro de Informação
<b>IUCN</b>	International Union for Conservation of Nature	União Internacional para a Conservação da Natureza
<b>JCC</b>	Joint Coordinating Committee	Comité de Coordenação Conjunta
<b>JICA</b>	Japan International Cooperation Agency	Agência de Cooperação Internacional do Japão
<b>JIRCAS</b>	Japan International Research Centre for Agricultural Sciences	Centro de Pesquisa Internacional do Japão para as Ciências Agrárias
<b>MAE</b>	Ministry of the State Administration	Ministério da Administração Estatal
<b>MEC</b>	Ministry of Education and Culture	Ministério da Educação e Cultura
<b>MF</b>	Ministry of Finance	Ministério das Finanças
<b>MICOA</b>	Ministry for Coordination of Environment Action	Ministério para Coordenação da Acção Ambiental
<b>MINAG</b>	Ministry of Agriculture	Ministério da Agricultura
<b>MITUR</b>	Ministry of Tourism	Ministério de Turismo
<b>MOPH</b>	Ministry of Public Works and Housing	Ministério das Obras Públicas e Habitação
<b>NGO (ONG)</b>	Non Government Organisation	Organização Não Governamental
<b>PAPA</b>	Action Plan for Food Production	Plano de Ação para a Produção de Alimentos
<b>PARPA</b>	The Action Program for Reduction of Absolute Poverty	Programa de Ação para Redução de Pobreza Absoluta
<b>PCM</b>	Project Cycle Management	Gestão de Ciclo de Projeto
<b>PD</b>	Master Plan	Plano Director
<b>PDUT</b>	District Land-Use Plan	Plano Distrital de Uso da Terra
<b>PEDSA</b>	The Strategic Plan for the Agricultural Sector Development	Plano Estratégico para o Desenvolvimento do Sector Agrário
<b>PROAGRI</b>	National Program for the Agrarian Development	Programa Nacional de Desenvolvimento Agrário
<b>PRONEA</b>	National Program for Agrarian Extension	Programa Nacional de Extensão Agrária
<b>ProSAVANA-JBM</b>	Triangular Cooperation Program for Agriculture Development of the African Tropical Savannah among Japan, Brazil, and Mozambique	Programa de Cooperação Triangular para o Desenvolvimento Agrícola da Savana Tropical de Moçambique – Japão, Brasil e Moçambique
<b>QIP</b>	Quick Impact Project	Projetos de Rápido Impacto
<b>RAI</b>	Responsible Agricultural Investment	Investimento Agrícola Responsável
<b>RAP</b>	Resettlement Action Plan	Plano de Ação de Reassentamento
<b>RAS</b>	Simplified Environment Report	Relatório Ambiental Simplificado
<b>R/D</b>	Record of Discussion	Registro da Discussão
<b>SADC</b>	Southern African Development Community	Comunidade de Desenvolvimento da África Austral
<b>SDAE</b>	District Services of Economic Activities	Serviços Distritais de Actividades Económicas
<b>SDPI</b>	District Service of Planning and Infrastructure	Serviço Distrital de Planeamento e Infraestruturas
<b>SEACAM</b>	Secretariat for Eastern Africa Coastal Area Management	Agência de Gestão Costeira e Marina da África Oriental
<b>SER</b>	Simplified Environmental Report	Estudo Ambiental Simplificado
<b>SEZ</b>	Special Economic Zone	Zona Económica Especial
<b>SOTER</b>	Soil and Terrain Database	Banco de Dados de Terras e Solo
<b>SPFFB</b>	Provincial Service of Forest and Wildlife	Serviço Provincial de Floresta e Fauna Bravia
<b>SPGC</b>	Provincial Service of Geography and Cadastre	Serviço Provincial de Geografia e Cadastro
<b>TAC</b>	Technical Assessment Commission	Comissão Técnica de Avaliação
<b>TICAD</b>	Tokyo International Conference on African Development	Conferência Internacional de Tokyo para o Desenvolvimento Africano
<b>TOR</b>	Term of Reference	Termo de Referência
<b>UN</b>	United Nations	Nações Unidas

<b>UNCTAD</b>	United Nations Conference on Trade and Development	Conferência das Nações Unidas sobre Comércio e Desenvolvimento
<b>UNCDF</b>	United Nations Capital Development Fund	Fundo de Desenvolvimento de Capital das Nações Unidas
<b>UNEP</b>	United Nations Environment Programme	Programa das Nações Unidas para o meio Ambiente
<b>WB-OP</b>	World Bank Operational Policy	Política Operacional do Banco Mundial
<b>WRB</b>	World Reference Base	Base de Referência Mundial



# CHAPTER 1 INTRODUCTION

## 1.1. Background of the Study

### 1.1.1. Background of the Study

The basic framework for the Program on Triangular Cooperation for Tropical Savannah Agricultural Development in Mozambique (ProSAVANA-JBM) was signed by Japan International Cooperation Agency (JICA), Brazilian Cooperation Agency (ABC) and the Ministry of Agriculture (MINAG) in 17th September 2009 aiming to create new models of sustainable agricultural development in the tropical savannah region of Mozambique with due considerations of human security, food security, and poverty reduction for local population, as well as protection of wildlife and preservation of the environment. And target area of the Program selected the Nacala Corridor area, located in the northern part of the country.

Based on the framework, the Preparatory Study on Triangular Cooperation Program started at the same time. As a result of the preparatory study three technical cooperation programs, 1) Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development, 2) Support of Agriculture Development Master Plan for the Nacala Corridor, and 3) Project for Improvement of Agricultural Extension, were proposed.

Based on the Minutes of Meeting on ProSAVANA signed on 26th April 2011, the mission of JICA, ABC and MINAG jointly visited the Nacala Corridor area of the second program of “Support of Agriculture Development Master Plan in the Nacala Corridor” (hereinafter referred to as the Study) and discussed the scope of work for the Study. As a result, three parties signed the Minutes of Meeting on 28th July 2011. This Minutes of Meeting was approved at the first Joint Coordination Committee (JCC) of ProSAVANA held on 29th August 2011. In addition, the Triangular Agreement, Record Discussion and Supplementary Agreement were signed on 24th November and 2nd December 2011.

Based on these agreements, JICA dispatched a Japanese Study Team led by Mr. Keiji Matsumoto of Oriental Consultants from 3rd March 2012 and ABC dispatched a Brazilian Study Team led by Mr. Giuliano Senatore FGV PROJETOS from 15th July 2012.

### 1.1.2. Objectives of the Study

**Goal of the Proposed Plan** is “to promote economic and social development through agricultural development in the Nacala Corridor”.

**Objective of the Study** is “to formulate an Agricultural Development Master Plan that contributes to social and economic development by engaging private investment to promote a sustainable production system and poverty reduction in the Nacala Corridor”.

## 1.2. Study Area

### 1.2.1. Study Area

The Study covers the Nacala Corridor area in the north part of Mozambique. Based on the request of the Mozambique side, the following 14 districts were selected as the Study Area.

- Province of Nampula: Malema, Ribáuè, Murrupula, Nampula, Meconta, Mogovolas, Muecate and Monapo
- Province of Niassa: Lichinga, Ngauma, Mandimba and Cuamba,
- Province of Zambezia: Gurue and Alto Molocue.

The total area of the Study Area is 65,907 km<sup>2</sup> and the population is 2,562,413 (Population Census 2007).

### 1.2.2. Recent Development of the Nacala Corridor

Recently, rapid infrastructure development works have been started in the Nacala Corridor area in Mozambique. They are as follows

- Establishment of the Nacala Special Economic Zone under the management of the Office for Economic Zones of Accelerated Development (GAZEDA)
- Improvement works of National Road No.13 between Nampula and Cuamba (348 km) started 2011 and expected to be completed in February 2015, and design of National Road No. 13 between Cuamba and Lichinga (310 km) has been completed and waiting for early implementation
- Construction of Nacala Airport is expected to be completed in 2013
- Rehabilitation and/or widening of strategic portions of No. 1 National Highway, Namialo – Rio Lurio (150km) and Nampula – Rio Ligonha (103km), started in 2011 under Millennium Challenge Corporation (MCC).
- Also MCC, together with World Bank, supporting the rehabilitation of Nacala Dam, Nampula and Nacala rural water supply since 2011
- Four pilot projects for verification the contract farming/outgrowers system between service providers and small scale farmers in the Study Area have started under this Study applying the counterpart fund of Ministry of Agriculture (MINAG) under Japan's Food Aid Project since the signing MOU between MINAG, JICA, ProSAVANA Headquarter and GAPI (Sociedade de Investimentos, SA) on 13th September 2012.



### 1.3. Period and Scope of the Study

The Study is being implemented from the beginning of March 2012 to the end of August 2013 for eighteen months. The scope of the study is summarized as follows.

**Table 1.3.1 Scope of the Study**

Outputs	Major Activities	Submission of Report
[Output 1] Data collection and information analysis	1-1 Analysis of the current invest environment in the agricultural sector in Mozambique (legislation and framework on labor, land tenure, environmental regulation and taxes)	March 2012 <u>Inception Report</u>
	1-2 Review of socioeconomic census, existing overall economic development plans and agricultural development plans for Nacala Corridor	Work Plan
	• <u>Supporting the stakeholder meeting</u>	
	1-3 Study on social, gender and environment aspects	
	1-4 Information gathering for functions and interventions of the governments, NGOs, donors and private sector (including financing institutions) for agricultural development	
	1-5 Zoning of Nacala Corridor area based on the agricultural environment	
	1-6 Study on current agricultural value chains and overall infrastructures in Nacala Corridor	Middle of August 2012
1-7 Survey on current situation of land use in Nacala Corridor	<u>Interim Report (1)</u>	
[Output 2] Drawing of an Overall Picture	2-1 Drawing an overall plan (blueprint) of agricultural development in Nacala Corridor	Output 1 & 2 End of November 2012
• <u>Supporting the 2<sup>nd</sup> stakeholder meeting</u>		
[Output 3] Quick Impact Projects (QIPs) planning	3-1 Characterization of selected areas which have agricultural development potential based on basic survey	Output 3 Middle of February 2013
	3-2 Formulation of QIPs and expected immediate effects for target areas	
	3-3 Prioritization of QIPs	
	3-4 Attract investors for the implementation of prioritized QIPs	
[Output 4] Engagement stimulation of stakeholders focusing on investment promotion	• <u>Environmental impact assessment for the development projects. Supporting the formulation of resettlement plan if required for QIPs</u>	Draft Final Report and Investment Data Book Middle of June 2013
	• <u>Supporting the 3<sup>rd</sup> stakeholder meeting</u>	
	4-1 Elaboration and presentation of Data Book to private investors	
4-2 Holding seminars and workshops for stakeholders		
Preparation of draft final report and Investment data book	Finalization of Agricultural Development Master Plan for the Nacala Corridor	
Preparation of final report	Preparation of Final Master Plan Report and Data Book for Investor	Final Report Mid-August 2013

Note: Underlined activities are additional scope of study for JICA Study Team.

### 1.4. Study Team and Counterparts

The Study is conducted through triangular cooperation among the study teams of Japanese (JICA), Brazilian (FGV), and Mozambican counterparts of the Ministry of Agriculture (MINAG), Provincial Directorate of Agriculture of Nampula, Niassa and Zambezia.

## 1.5. The Report (Draft)

According to the Minutes of Meeting (MM) of the detailed planning survey and BRA/04/44 JBPP/PCJ/011 on the Study, agreed and signed among 3 countries on 28<sup>th</sup> July, 2011 and 11<sup>th</sup> November 2011, the outputs of the Study is defined as follows:

- (Output 1): Data collection and analysis of agriculture in Nacala Corridor
- (Output 2): Drawing of an overall picture of development Plans
- (Output 3): Planning of quick impact projects fro selected areas in Nacala Corridor
- (Output 4): Engagement stimulation of stakeholders focusing on investment promotion

At the initial stage of triangular study started middle of July, representative of the Study made the discussion on the triangular work plan. As a result of discussion, MM signed among representative of three countries for the Study on 17<sup>th</sup> July 2012. The major topics of submission of Triangular Reports are stated in the MM as follows:

- End of November 2012: Data Collection and Analysis of the Agriculture in Nacala Corridor and Drawing of an Overall Picture of Development Plans
- Middle of February 2013: Planning of Quick Impact Projects for selected areas in Nacala Corridor
- Middle of June 2013: Draft Master Plan Report and Preliminary Data Book fro Investors
- Middle of August 2013: Final Master Plan Report and Data Book for Investors

Based on the above definitions of outputs, this report is prepared as the output of “Data Collection and Analysis of the Agriculture in Nacala Corridor and Drawing of an Overall Picture of Development Plans”.

Chapter 2 of this Draft Report shows the results of present constraints and development potential of agriculture in the Nacala Corridor as the Output 1. And Chapter 3, 4 are the study on overall picture of development plan (naming used as the draft master plan) as the Output 2.

## CHAPTER 2 ANALYSIS OF PRESENT CONSTRAINTS AND DEVELOPMENT POTENTIAL OF AGRICULTURE

### 2.1. Potential Agricultural Land

#### 2.1.1. Definition and Classification of Land Cover and Agricultural Land

Land cover is defined in the FAO/UNEP Land Cover Classification System (LCCS) as the “(bio) physical features one can observe on the surface of the Earth” (Di Gregorio and Jansen, 2000). The JICA Study Team used the land cover map provided by “Integrated Assessment in Mozambique Forest” (AIFM) in 2006 using mainly LANDSAT images acquired in 2004 for evaluating potential agricultural land. The classification of land cover in this land cover map follows that of LCCS.

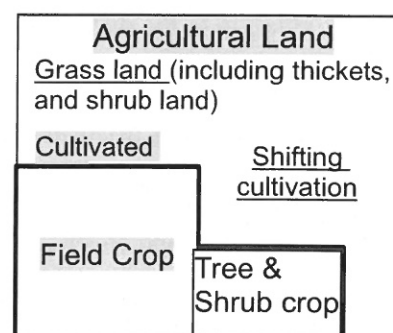
The land cover classification of the map is grouped as in Table 2.1.1

**Table 2.1.1 Grouping of Land Cover Classification**

Groups	Land Cover Classification in the Map <sup>*1</sup>
<b>Cultivated area</b>	Tree crops / Forest plantation, Shrub crops, Field crops
<b>Shifting cultivation area</b>	Shifting cultivation with open to closed forested area, Close to open forested areas with shifting cultivation
<b>Grassland &amp; Shrubs</b>	Thickets, Shrub lands, Grass lands
<b>Forest</b>	Evergreen forest, Deciduous forest, Evergreen woodlands, Deciduous woodlands
<b>Others</b>	Flooded and aquatic areas (Cultivated aquatic or regularly flooded areas, Mangrove dense, Aquatic or regularly flooded woodlands, Aquatic or regularly flooded shrub land, Aquatic or regularly flooded herbaceous vegetation) Built-up areas, Bare areas, Artificial water bodies Natural water bodies

\*1: Satellite image interpretation of land-cover types in Manica and Maputo provinces at nominal scale of 1:250,000 and at the national level at nominal scale of 1:1,000,000 Technical Report, February 2006 (Source: JICA Study Team)

The classification of agricultural land is shown in Figure 2.1.1. Cultivated area in this report means the area cultivated by field crops, tree and shrub crops. Agricultural land includes cultivated area, grassland and shifting cultivation area. Shifting cultivation is a common farming style in the Study Area so the total amount of area is hard to estimate. The area of shifting cultivation and tree crops is sometimes difficult to distinguish.



**Figure 2.1.1 Classification of Agricultural Land**

## 2.1.2. Present Condition of Land Cover and Land Use

### (1) Occupied Area by Local Farmers, Concessions, and DUAT

The cultivated area is estimated roughly at 1,000,000 ha. The total agricultural land including the shifting cultivation area is presumed to be two or three times the cultivated area. According to the detailed land cover and land use map prepared by the consultant implementing a Land Component Project funded by Millennium Challenge Account Mozambique, the agricultural land including shifting cultivation is estimated to be around 2.5 times the cultivated area. On the other hand, in high population density areas like Monapo district, farmers do not implement shifting cultivation, due to the limitation of space. The shifting cultivation area might vary depending on population density.

Considerable area is also occupied by protected areas and registered areas (Concession and DUAT). These areas in the Study Area (14 districts) are shown in Table 2.1.2.

**Table 2.1.2 Concession and DUAT Area (14 districts of the Study Area)**

Protected area	Mining concession	Forest concession	Agriculture DUAT	Community DUAT	Unknown DUAT <sup>*1</sup>	Others <sup>*2</sup>	Total
453,295	399,035	689,176	200,224	270,111	293,487	85,907	1,937,940

Source: DNTF and three provinces

\*1: Unknown means the DUAT, for which the purpose of land use is not recorded in the provincial database.

\*2: Others contains industry, inhabitants DUAT, and so on

To find large contiguous area, it is necessary to find free land without protected areas, mining and forest concession areas, other DUATs, or the need to negotiate with farmers to relocate to other areas. The land development potential will be discussed in 2.1.3.

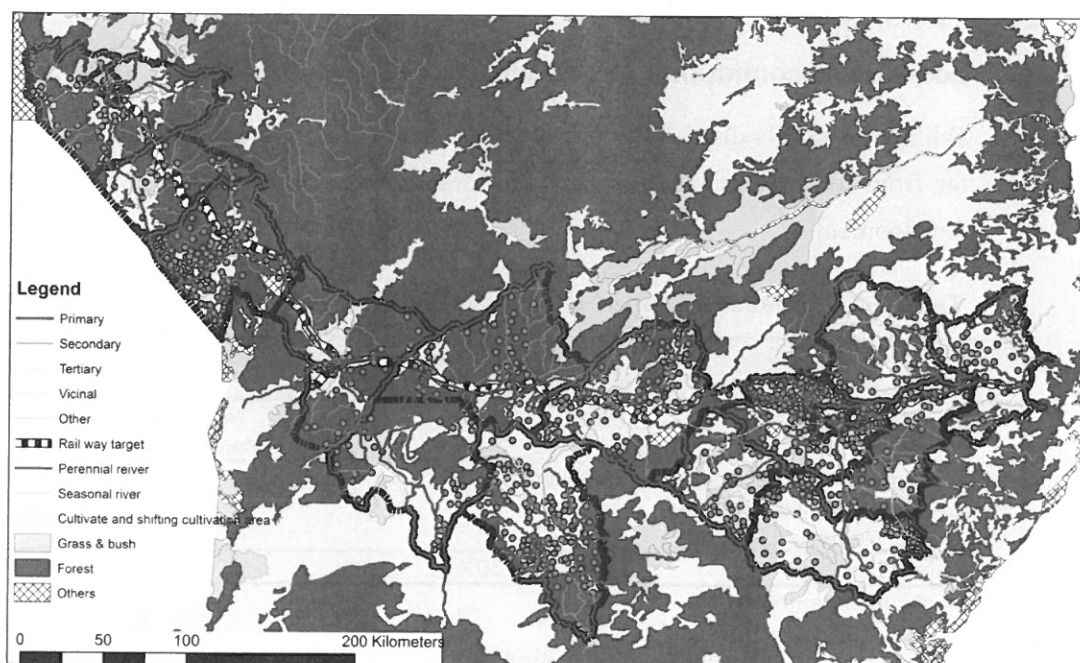
### (2) Present Conditions of Communities in Relation to Land Use, Rivers, and Roads

Figure 2.1.2 shows the land cover around communities and the location of communities in relation to the distance from rivers and roads. The situations by districts are evaluated in the following sections.

#### 1) Land cover around rivers and communities

Table 2.1.3 shows district classifications in relation to land covers around rivers. The river length by land cover classification and by district is estimated on a GIS map.

The land cover around river courses varies from forest to cultivated area in accordance to the location shifting from west to east. The situation regarding forest area will be explained in detail in (3) of this section.



Source: JICA Study Team, original data of land cover map (1:1,000,000) from AIFM in DNTF, village points from Special Development Initiative, river courses, railway from CENACARTA, and road from ANE

**Figure 2.1.2 Land Cover around Communities and Location of Communities in Relation to Distance from Rivers and Roads**

**Table 2.1.3 Classification of Districts by Land Covers around Rivers**

Districts	Land Covers around Perennial Rivers
Monapo, Muecate	Almost the entire area around the perennial river course is covered by cultivated area.
Nampula	Around 40 % of the area around perennial river course is cultivated area.
Mogovolvas, Murrupula, Ribaue, Alto Molocue	A large area around the perennial river course is covered by shifting cultivation area.
Malema, Gurue, Cuamba, Mandimba	A medium-sized area is covered by cultivated and shifting cultivation area, although a large area around the perennial river is covered by forest.
Ngauma, Lichinga	A large area around the perennial rivers is forest.

Source: JICA Study Team

Table 2.1.4 shows classification of districts by land covers around communities. The number of communities by land cover by districts is counted on a GIS map. The land cover around communities also varies from forest to cultivated area in accordance to the location shifting from west to east. Table 2.1.4 also shows that many communities are located in forest areas. In those areas, forest area faces the hazard of deforestation by human activities.

**Table 2.1.4 Classification of Districts by Land Cover around Communities**

Districts	Land Cover around Communities
Monapo, Muecate, Mogovolvas,	High concentration of cultivated area (or almost the entire area around communities are cultivated)
Nampula, Mandimba, Ribaue	Many communities are located in cultivated areas and shifting cultivation area.
Meconta, Cuamba, Gurue	Many communities are located in both cultivated areas and forest.
Murrupula, Alto Molocue	Many communities are located in shifting cultivation, and grassland & shrub area.
Malema, Ngauma, Lichinga	Many communities are located in forest areas.

Source: JICA Study Team

## 2) Location of communities in relation to distance from rivers, roads and railway

Table 2.1.5 shows district classification in relation to the percentage of communities located far from roads. This classification provides an idea to consider the priority of rural road development.

**Table 2.1.5 Classification of Districts in Relation to Community Distance from Roads**

Districts	Percentage of Communities, far from Roads*	Potential and Obstruction
Monapo, Muecate, Gurue	High	Necessity for rural road construction
Mogovolas, Nampula, Murrupula, Ribae, Malema, Alto Molocue, Mandimba, Ngauma, Lichinga	Medium	
Meconta, Cuamba	Less than 50%	

\*: At least 2 km from roads

Table 2.1.6 shows district classification in relation to the percentage of communities located close to rivers. Malema and Mandimba have many communities near rivers. Those districts have the potential for irrigation development using river water.

**Table 2.1.6 Classification of Districts in Relation to Communities near Rivers**

Districts	Percentage of Communities near River*	Potential and Obstruction
Malema, Mandimba	High	Potential for irrigation development
Ribae, Alto Molocue, Gurue, Cuamba, Lichinga	Medium	

\*: Within 2 km of rivers

The classification of districts in relation to communities near roads and rivers is also estimated on the GIS map. Malema and Cuamba districts have high a percentage of communities nearby both roads and rivers. Those districts have high potential for vegetable production using irrigated water. On the other hand, Malema, Alto Molocue, Mandimba, and Lichinga districts have a high percentage of communities near rivers but far from roads. Development of rural roads is needed in these districts.

## (3) Current Forest Situation

Table 2.1.7 shows the distribution of forest in the Study Area. The definition of forest here is given as “stands of trees with canopy cover greater than 10% and height taller than 5 m” according to *Integrated Assessment of Mozambican Forests* (AIFM: MINAG 2007). The figures do not include mangroves, regularly flooded woodlands, tree plantations or tree crops. Forests affected by shifting cultivation are also excluded since AIFM classifies them as different land cover.

**Table 2.1.7 Distribution of Forests in the Study Area**

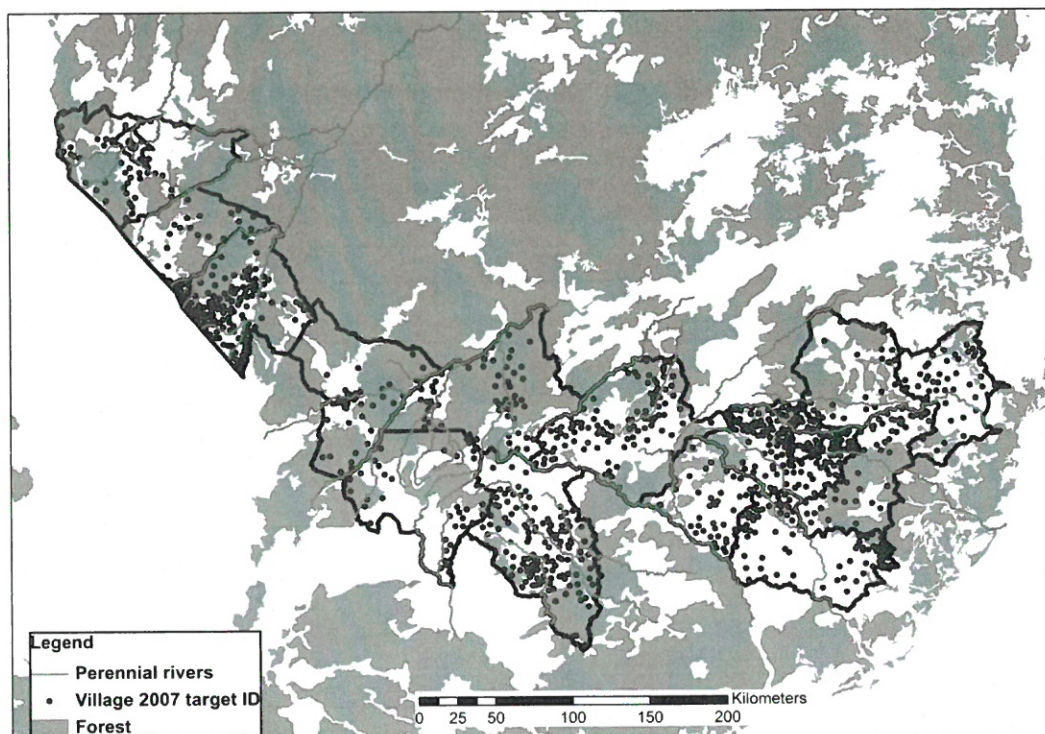
District	Territory Area (km <sup>2</sup> )	Forest Area (km <sup>2</sup> )	Percentage of Forest (%)	Population Density (hab./km <sup>2</sup> )
Monapo	3,528	738	20.9	97.2
Muecate	4,121	2,032	49.3	25.6
Meconta	3,690	1,963	53.2	47.3
Mogovolas	4,728	312	6.6	70.0
Nampula	3,675	630	17.1	66.4
Nampula City	331	0	0.0	1,672.8
Murrupula	3,104	875	28.2	51.2
Ribaue	6,271	2,292	36.5	35.1
Malema	6,075	4,535	74.7	30.0
Alto Molocue	6,363	1,973	31.0	50.3
Gurue	5,664	2,385	42.1	61.9
Cuamba	5,363	3,895	72.6	40.3
Mandimba	4,698	2,481	52.8	33.9
Ngauma	3,016	1,969	65.3	27.0
Lichinga City	257	0	0.0	692.2
Lichinga	5,438	3,162	58.1	20.4
TOTAL	66,322	29,242	44.1	-

Source: JICA Study Team

A general tendency of decreasing forest cover with increasing population density can be seen. Looking at Figure 2.1.3 from west to east, some typical relations among geographical location of forests, communities and river courses can be described as follows:

- In Lichinga and Ngauma districts, perennial rivers are still surrounded by massive forest stands but many communities exist inside or on the edge of forest.
- In Cuamba and Gurue districts, forest stands around perennial rivers become less massive and are replaced by shifting cultivation or agricultural fields. Communities tend to be located on agricultural fields as well as inside forests.
- In Alto Molocue and Murrupula districts, forest stands are more fragmented and shifting cultivation dominates along perennial rivers. Communities are concentrated in shifting cultivation areas as well as in shrub or grassland areas.
- In Muecate and Monapo districts, perennial rivers run mostly through agricultural fields and have little interaction with forest stands. Communities are concentrated in agricultural fields.

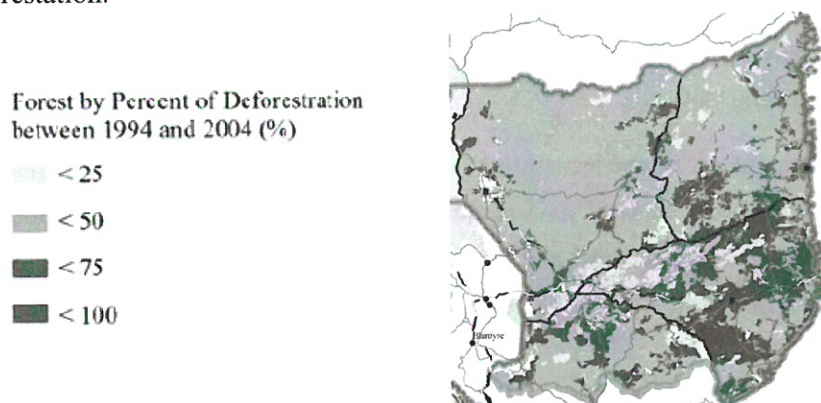
The encroachment on the remaining forests by communities in the western and central parts of the Study Area, as well as fragmentation of forest stands in the upper catchment of perennial rivers in the central and eastern parts of the Study Area, are particularly worrying factors for sustainable development of the Nacala Corridor.



Source: JICA Study Team, original land cover map from AIFM, rivers from CENACARTA, village location from Spatial Development Initiatives

**Figure 2.1.3 Geographical Location of Forests, Communities and Perennial Rivers**

The deforestation rate from 1990 to 2002 was mathematically estimated by AIFM to be 1.18%, 0.71% and 0.22% per annum for Nampula, Zambézia and Niassa provinces respectively, based on an exponential regression model between population density and percentage of forest area. The situation in Nampula province is particularly worrying, since the PEDEC study revealed an elevated magnitude of deforestation between 1994 and 2004 (see Figure 2.1.4). It should be noted that deforestation occurred even inside the legally protected forest reserves. Forest fires associated with shifting cultivation, forest clearance for farmland reclamation, excessive or illegal logging, encroachment by increasing demand for firewood and charcoal, and insufficient reforestation are principal factors that contribute to deforestation.



**Figure 2.1.4 Deforestation around the Study Area**

Source: PEDEC Progress Report (MPD/JICA 2012, originally adapted from AIFM and CENACARTA)



#### (4) Restrictions on the Conversion of Forest into Farmland

It is important to understand that in Mozambique natural forests are protected by different legal instruments (Table 2.1.8), especially in view of the rural communities' dependence on forest resources such as firewood, charcoal, timber, fiber, medical plants, bush meats, honey, etc. for their livelihood. According to official estimates, 80% of the energy consumed in Mozambique originates from biomass as firewood or charcoal<sup>1</sup> (*Strategy for Reforestation*, MINAG, 2009) and nearly 80% of the rural population depends on bush meats and inland fish as the principal source of animal protein (*Food and Nutritional Security Strategy and Action Plan*, SETSAN, 2007). Forests are also culturally important for traditional communities as sacred areas, ritual places or graveyards.

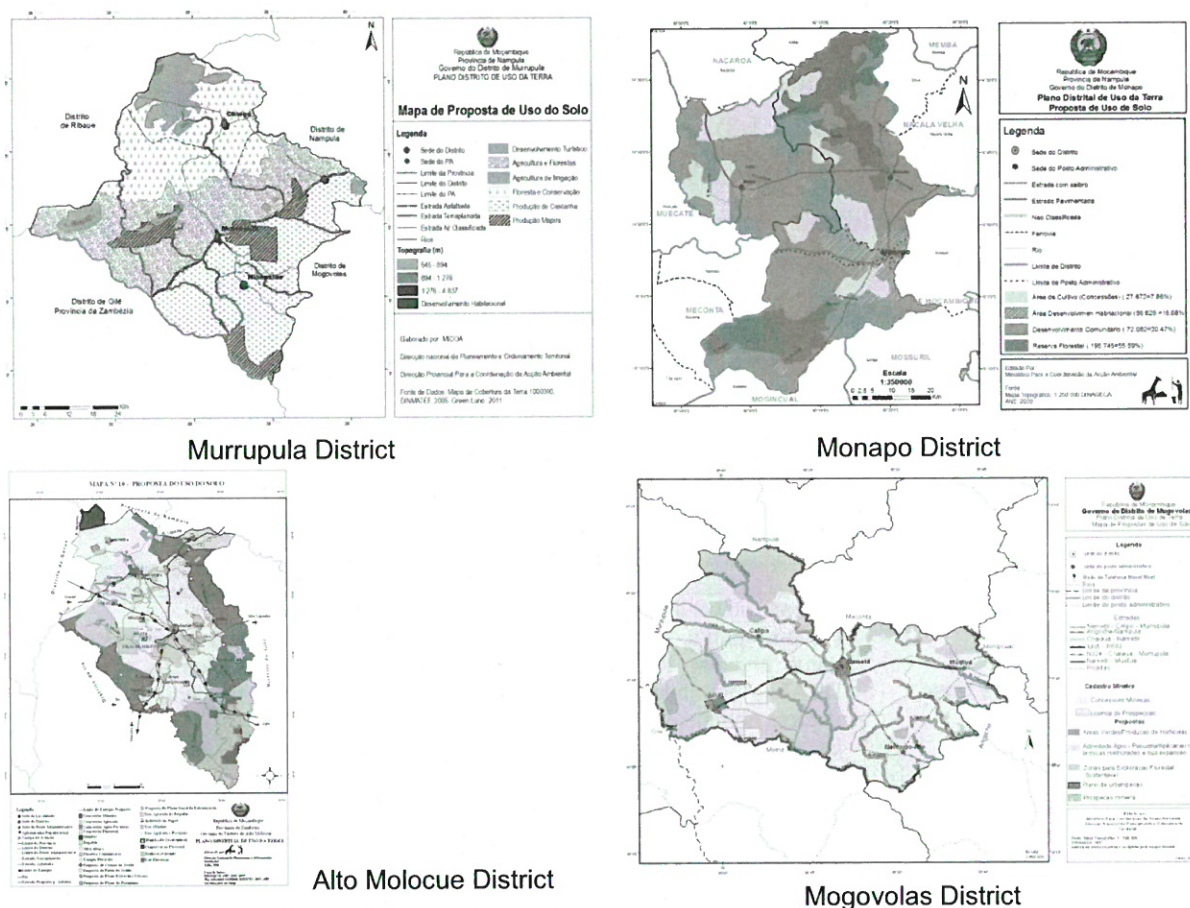
**Table 2.1.8 Legal Framework for Protection of Forest**

Legal instrument	Stipulations
<b>Forest and Wildlife Law (Law no. 10/99)</b>	<ul style="list-style-type: none"> <li>◇ Forest and wildlife resources are property of the State.</li> <li>◇ National parks, National reserves, Buffer zones and Zones of historical cultural value and use are protected. Most human activities as well as acquisition of DUAT is prohibited or strictly restricted, except for the traditional communities' access rights.</li> </ul>
<b>Forest and Wildlife Law Regulations (Decree no. 12/2002)</b>	<ul style="list-style-type: none"> <li>◇ Exploitation of forest resources requires either 'Simple license' or 'Forestry concession contract', except for the customary exploitation by communities for self-consumption.</li> <li>◇ Forest clearance requires no objection of MICOA and DUAT holders, followed by authorization by SPFFB.</li> <li>◇ Forest burning is severely punished, except for duly authorized cases.</li> <li>◇ Deliberately provoked forest degradation shall be restored by the violator.</li> </ul>
<b>EIA Process Regulations (Decree no. 45/2004)</b>	<ul style="list-style-type: none"> <li>◇ Following activities are classified in Category A which requires a full EIA to obtain an Environmental License:               <ul style="list-style-type: none"> <li>- Reclamation, parceling and exploration of indigenous vegetative cover with individual or cumulative area greater than 100 ha;</li> <li>- Deforestation over 50 ha.</li> </ul> </li> </ul>
<b>Territorial Arrangement Law (Law no. 19/2007)</b>	<ul style="list-style-type: none"> <li>◇ District Land Use Plan (PDUT) establishes not only spatial structure but also norms and rules to be observed for its materialization. PDUT can be altered, reviewed or suspended when due reasons exist.</li> <li>◇ Citizens are required to respect PDUT with environmental responsibility. Any license, work or land-use against PDUT is punished, and such works can be terminated or demolished.</li> </ul>
<b>Territorial Arrangement Law Regulations (Decree no. 23/2008)</b>	<ul style="list-style-type: none"> <li>◇ Land expropriation for public interest, necessity or utility according to ratified PDUT can be justified together with proper compensation.</li> </ul>
<b>Ratification of SADC Protocol on Forestry Activities (Resolution no. 1/2009)</b>	<ul style="list-style-type: none"> <li>◇ Member states shall adopt, reinforce and implement such measures as:               <ul style="list-style-type: none"> <li>- Control of human activities that may threaten the forests, including unsustainable use of land or natural resources.</li> <li>- Implementation of forest conservation strategies.</li> </ul> </li> </ul>

Source: Study Team

Only a few districts of the Study Area possess a ratified District Land Use Plan (PDUT); however, it is worth mentioning that all the cases propose an increase in forest coverage or at least maintenance of current forest areas (Figure 2.1.5). These PDUTs have a period of legal effectiveness for ten years. Other districts such as Meconta, Muecate, Nampula and Ribaue have almost finalized the PDUTs, while Malema, Gurue, Cuamba, Mandimba, Ngauma and Lichinga districts are yet to start its elaboration.

<sup>1</sup> Annual per capita consumption of firewood and charcoal is estimated to be 695 and 1,360 (kg air-dry wood / person / year) for rural dwellers (all people) and urban dwellers (limited to firewood users), respectively. (AIFM wood energy component, final report draft, MINAG 2008)



Source: Study Team (courtesy by DNAPOT-MICOA)

Figure 2.1.5 Examples of PDUT

Although official strategies of forest conservation in Mozambique do not yet exist at national, provincial or watershed levels, MINAG through DNTF is currently undertaking two important studies: “National Forest Plan” and “Study on the Conversion of Natural Forests into Plantations,” both of which are expected to be published shortly. According to some interviews held with DNTF officials, conversion of natural forest into farmland was regarded as infeasible because all the natural forests would be protected for future forestry concessions and transformation into potential tree plantations.

Recent initiatives by the government toward creation and restoration of forest, such as *Strategy for Reforestation* (MINAG, 2009; see Table 5.10.2 for details), *Community Forest Program* (MICOA, from 2010) and *REDD: Reduced Emissions from Deforestation and Degradation* (MINAG/MICOA, a special decree that is being drafted as of October 2012) indicate support of forest conservation and hold a negative view regarding indiscriminate forest clearance for other land uses.

Taking into consideration all the facts and arguments described above, conclusive suggestions for ProSAVANA-PD will be the following:

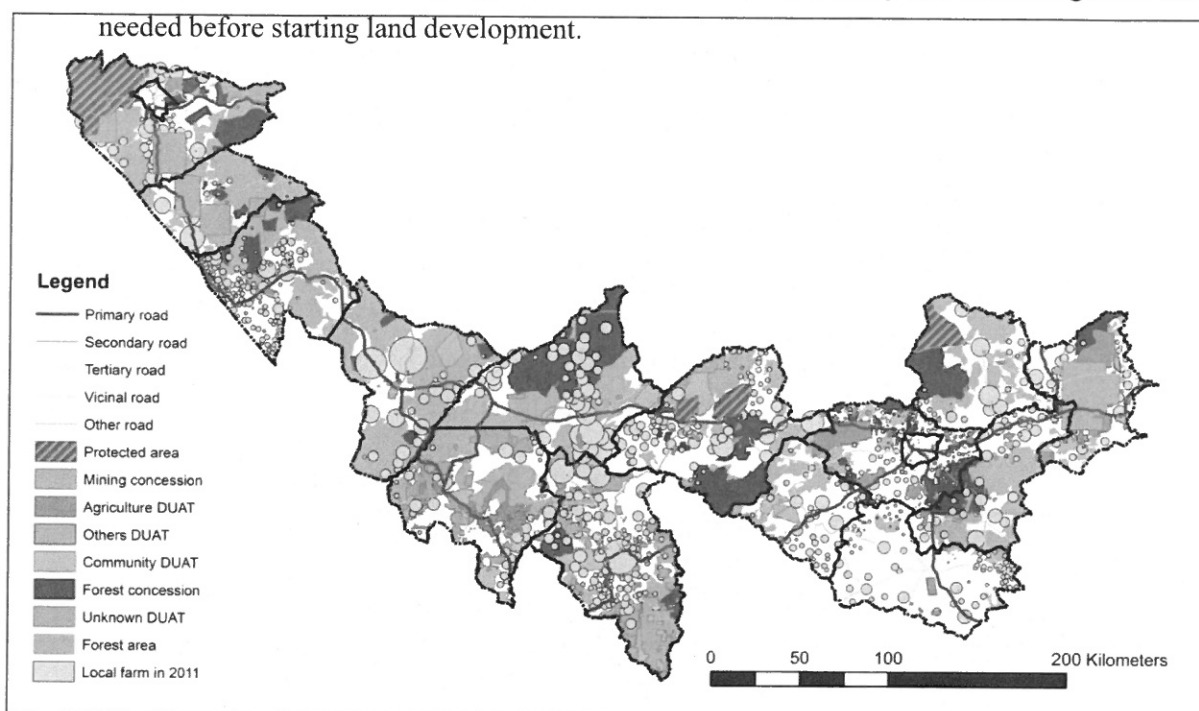
- Forest clearance for the purpose of large-scale commercial farming shall be avoided.

- When inevitable and justifiable for the development of small- to medium-scale farming, forest clearance could be allowed at a minimum level and negative impacts shall be properly mitigated or compensated.

### 2.1.3. Potential Available Land

#### (1) Potential Area for Land Development

Figure 2.1.6 shows the occupied area including protected areas, mining and forest concession areas, agriculture and other DUAT areas, and forest areas. Forest area is not included in the potential area for land development, for reasons mentioned in the above section. The blank area shows the available land excluding protected areas, concession and DUAT areas, and local farm areas from the entire area, which has the potential to be developed. Even though there is some available land unoccupied by protected areas, concession and DUAT areas, negotiations with local farmers living and cultivating there are needed before starting land development.



Source: JICA Study Team, originally adapted from DUAT data collected from DNTF and each DPA, and village points collected from Spatial Development Initiatives

**Figure 2.1.6 Distribution of Local Farmers' Agricultural Land, Agriculture DUAT, Forest Concession, Mining Concession, and Reserve Area**

Soybean is one of the most suitable crops for corporate farmers. The climate in Mogovolas is not suitable for cultivating soybean, although a large blank area is found there as shown in Figure 2.1.6. The other large blank areas are found in Ribaué and Cuamba. Soybean is cultivable in those areas.

Large forest area covers Gurue district and the west side of Niassa. As discussed in the previous section, large-scale farm development should be avoided in those areas.

As mentioned in Section 2.1.1, a considerable area is covered by shifting cultivation. In Alto Molocue, for example, a large area is covered by local farm area. In order to investors a find contiguous area easily, the following two countermeasures should be implemented.

- Dissemination of incentive cultivation and converting from shifting cultivation to cultivation in the fixed area.
- Supporting small-scale farmers in applying for a DUAT for their farmland.

## (2) Potential Available Area in 2011 and 2030

The value of the potential area in the 14 districts of the Study Area is estimated in this section at the condition as follows:

- Potential available area: Remaining area excluding protected areas, concession and DUAT areas, and local farm areas from the entire area
- Local farmers' area: Sum of the agricultural land at each village point  
Agriculture area of village point = population of each village point X household number by district X average farm size by district X shifting cultivation (value in relation to district population density)
- Protected area, Concession, and DUAT: Estimating the area by GIS

### 1) Potential available area in 2011

The present local farm area is estimated to be about 1.5 million ha. The present potential available land in the Study Area is estimated to be 1.07 million ha as shown in Table 2.1.9.

**Table 2.1.9 Potential Available Land in 2011**

Total area (000 ha)	Protected area and inactive area *1	DUAT Area excluding agriculture *2	Forest area without Concession *3	Agriculture DUAT	Local farm	Remaining land
6,553	1,190	1,146	1,439	230	1,481	1,067

Source: JICA Study Team based on Land Cover Map by CENACARTA, DUAT data by DNTF and each province, village points and population by Spatial Development Initiatives

\*1: Protected area by the government and the area with a slope above 12%

\*2: DUAT Area includes Mining Concession, Forest Concession, Industry DUAT, Residential etc.

\*3: Forest area without applying for Concession

### 2) Potential available land in 2030 with ProSAVANA projects

The average farm size by household is assumed to become 1.32 times the present one due to the effect of ProSAVANA projects, i.e., developing leading farmers (middle-scale farmers), promotion of investment by private sectors, and so on. The shifting cultivation area will be decreased by dissemination of intensive cultivation. With this condition, the local farm area is estimated to be about 1.95 million ha, which is less than 1.5 times of 1.48 million ha in Table 2.1.9., caused by the effect of conversion to intensive cultivation from shifting cultivation, as shown in Table 2.1.11. The remaining land is estimated to be 0.6 million ha .

**Table 2.1.10 Potential Available Land in 2030 with ProSAVANA Projects**

(thousand ha)						
Total Area	Protected Area and abandoned area	DUAT Area excluding agriculture	Forest area without Concession	Agriculture DUAT	Local farm	Remaining land
6,553	1,190	1,161	1,439	230	1,954	580

Source: JICA Study Team

The potential area for new development is estimated to be about 0.3 million ha corresponding to half of the remaining land. The area to be used for agricultural production is as shown in Table 2.1.11.

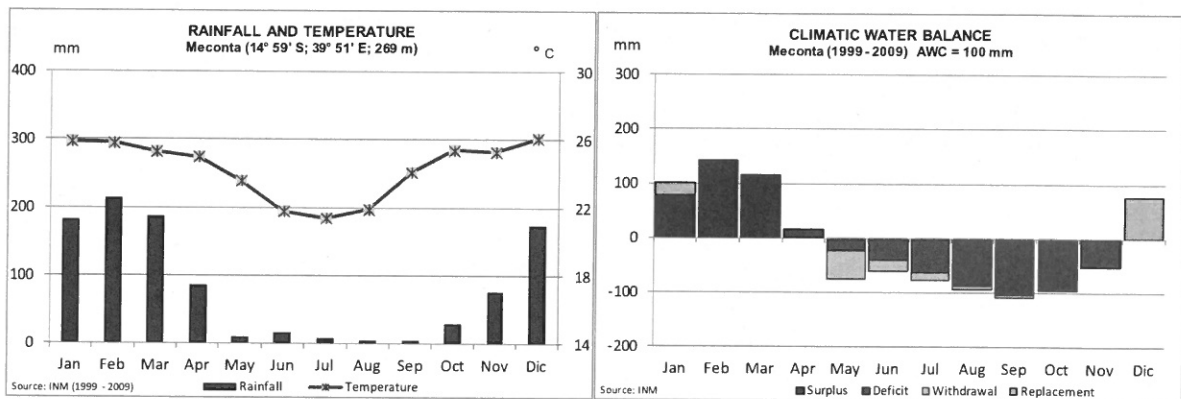
**Table 2.1.11 Agricultural Production Area in 2030**

(thousand ha)			
Agriculture production area	Local farm	Agriculture DUAT	Potential for newly development
2,484	1,954	230	300

## 2.2. Agricultural Production and Farm Management

### 2.2.1. Climatic Water Balance

CWB (Climatic Water Balance) is calculated for five locations along the Nacala Corridor (Meconta, Nampula, Guruè, Cuamba and Lichinga, with rainfall of 997 mm, 1,193 mm, 1,114 mm, 1,884 mm and 1,165 mm, respectively), considering the Available Water Capacity (AWC) as 100 mm, with climatic data provided by the National Meteorological Institute (INM), as shown in the following figures. The CWB calculation is made, according to the methodology established by Thornthwaite and Mather (1955), by using data of Precipitation and evapotranspiration to calculate real evapotranspiration, hydric deficit and water surplus.



**Figure 2.2.1 Temperature x Rainfall and CWB of Meconta**

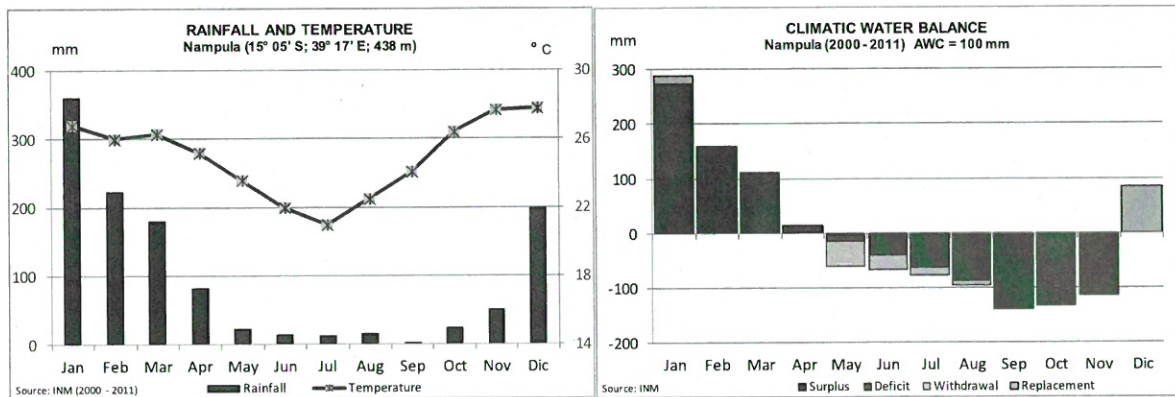


Figure 2.2.2 Temperature x Rainfall and CWB of Nampula

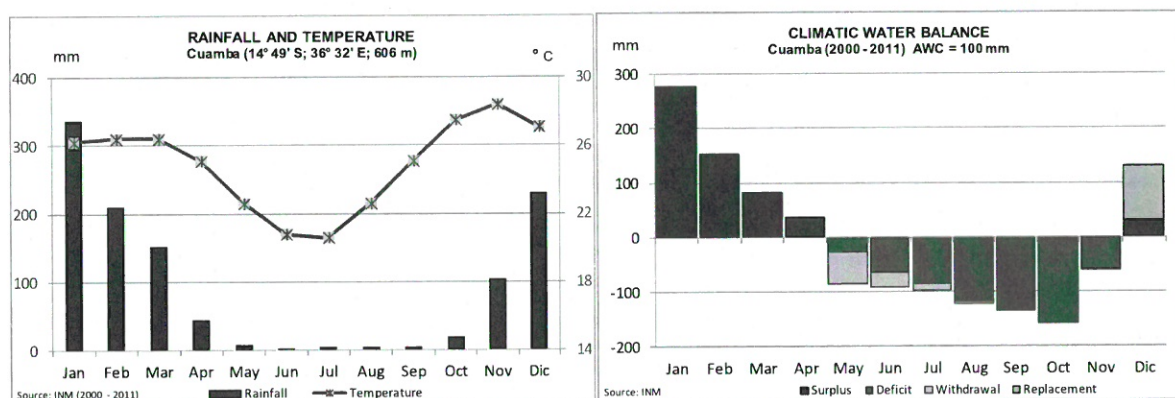


Figure 2.2.3 Temperature x Rainfall and CWB of Cuamba

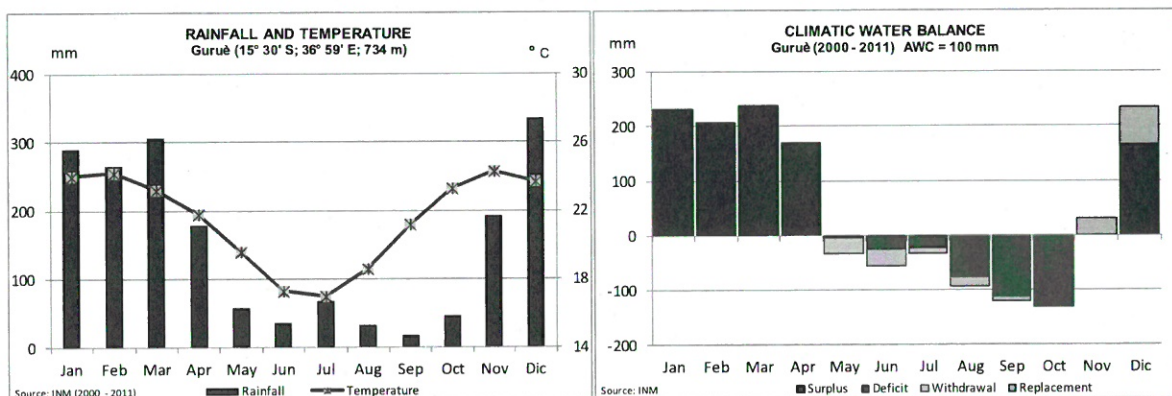


Figure 2.2.4 Temperature x Rainfall and CWB of Guruè

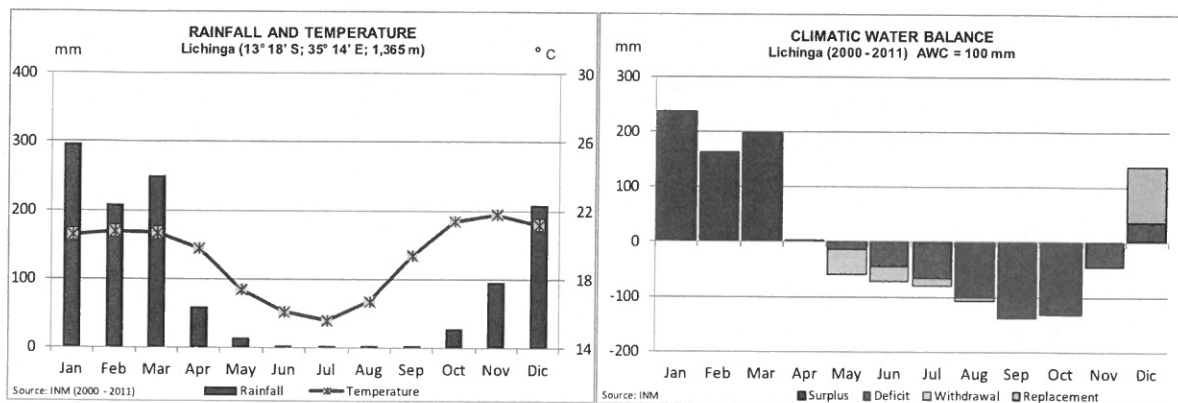


Figure 2.2.5 Temperature x Rainfall and CWB of Lichinga

As shown in the figures above, except for Gurúè, which has six months of water deficit, the other locations have seven months of water deficit. The period with water surplus in soil is five months in most of the Study Area. This means that there is water availability in the soil during the five months for cultivating crops. In grain production areas in the Brazilian Cerrado, usually the water availability period ranges from six to seven months, or even longer in some regions. The figure below shows CWB of Diamantino/MT, which is the soybean production center in the Brazilian Cerrado.

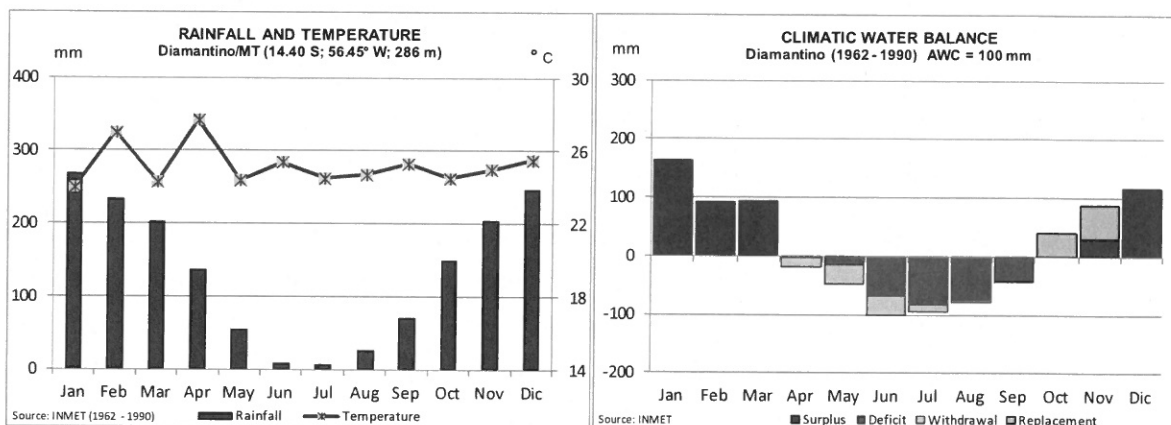


Figure 2.2.6 Temperature x Rainfall and CWB of Diamantino/MT

A 5-month period of water availability in soil, in principle, would be sufficient to produce most annual crops. However, farmers need a certain period for land preparation and planting in addition to the minimum required period for crop growing. A longer period of water availability in soil contributes to improved economic performance of farm management, especially through the efficient use of tractors and/or labor inputs. In other words, the shorter period impedes the economic performance of farmers. Thus, the 5-month period could be a marginal period, considering experiences in some regions bordering the Caatinga (semi-arid) or in the northern state of Roraima in the Brazilian Cerrado, which also have a 5-month period.

### **2.2.2. Scale of Cultivation Area and Farming System**

Mozambican agriculture is characterized by small-scale farming. It is generally considered that the major reason for the small-scale farming in the country is the lack of manpower and/or means of cultivation, with the understanding that Mozambique is blessed with vast arable land that is not in use now. This perception is also shared by most farmers in the Study Area. Population pressure, however, might be a latent reason for the small-scale farming at present. The average farming size of Nampula and Zambézia provinces, which have the highest population density in the country, are 1.25ha and 1.29ha respectively. These are significantly smaller than national average of 1.47ha. The size for Niassa province, 1.82ha, is much bigger than the national average, since the province has a lower population density.

According to the National Statistic Institute (INE), it is categorized that small-scale farmer has less than 10ha rain-fed field, medium scale has less than 50ha and large scale has over it.

Because of extensive farming with shifting cultivation, farmers in the Study Area require a land area bigger than the actual cultivated area in order to continue their farming on a sustainable basis. According to the field survey results, many farmers in the area shift their farmland every 3-5 years, when they feel that soil fertility of the cultivated land is getting poor. If they allow enough time for fallowing for 10-15 years in order to recover the soil fertility of the abandoned land, they theoretically need reserved fallow land 2-5 times bigger than the actual cultivated area in addition to the existing farmland. This means that there must be a vast area of reserved fallow land used for the rotation of shifting cultivation in addition to the actual farmland in use now.

Considering the present population density in the Study Area, a substantial number of farmers in the area may face difficulty in continuing their familiar farming practice on a sustainable basis. It is interesting that fire occurrence before the planting season in the eastern Nampula province, where has a high population density, is less than in other areas. It is assumed that many farmers in the area have already shifted to settled-farming because of high population pressure. In some areas in the Study Area, population pressure on land has already started to appear, and causes land conflicts between people, especially in the areas that are fertile and have an easy access to the main roads.

Farmers in the area are at a crucial point to change their familiar farming practice to survive. Even though most of the farmers don't recognize the present situation well, their existing farming practice may trigger a serious environmental destruction like that experienced in other parts of the world. They should understand that there will be no vast areas of remaining land for farming in the Study Area if they continue the present extensive farming practice.

Considering the present situation mentioned above and future prospects, the farmers should transform their present extensive farming practice with full support of the government. They can expect the following benefits after they shift to settled-farming.



- 1) An increase in crop productivity through intensive farming practices
- 2) Expansion of actual farmland area by reclaiming the reserved fallow land
- 3) Conservation of environment conditions in order to protect their farming bases

### 2.2.3. Cropping Technology

Subsistence farmers are dominant in the Study Area. Most small-scale farmers produce crops only for consumption, and are characterized by low yields and modest returns. Those who manage around 1-2 ha or less generally concentrate on their staples, such as maize, cassava, sorghum, groundnut, and several kinds of beans. These crops are usually grown mixed together in the same field. Farmers, who cultivate a larger acreage, around 5 ha, grow diversified crops in addition to the staples. They are sometimes out growers of cotton and tobacco in the Study Area, and usually grow vegetables and other cash crops in settled farmland that is accessible to a water source for irrigation. However, farmers who cultivate more than 5 ha of farmland represent less than 6 % of the total farm-households in Mozambique (Agriculture Census in 2009-2010, INE).

One of the main problems of agriculture in the Mozambique is low productivity. Table 2.2.1 shows a productivity (ton/ha) of major staple food crops in the Study Area and in relatively advanced countries such as, Brazil, South Africa and Kenya. The table implies that farmers in the Study Area still have a lot of room for improvement regarding productivity of many crops.

**Table 2.2.1 Productivity of Crops in the Study Area and Some Countries in 2010**

Crops	Productivity (ton/ha)			
	Study Area	Brazil	S. Africa	Kenya
Maize	1.3	4.4	4.7	1.6
Cassava	7.2	13.7	NA	5.3
Sorghum	0.9	2.3	2.3	0.7
Paddy, rice	1.0	4.2	2.6	4.0
Groundnuts, with shell	0.7	2.7	1.5	1.0
Beans	0.7	0.9	1.2	0.6

Source: DPA Nampula (Study Area) & FAOSTAT (Brazil, S. Africa and Kenya)

This is due to combined factors including the extensive farming practices and the low use of inputs. The majority of farmers in the Study Area, except for the eastern part, still depend on farming techniques such as slash and burning cum shifting cultivation. As long as this slash and burning cum shifting cultivation continues, farmers don't need farm inputs. They also use only simple hand tools, such as hoes, machetes and axes, which are typical tools for slash and burning farming.

Considering the present uncertain rainfall conditions and unclear rights to farmland, it is reasonable that farmers choose a steady farming strategy of low-inputs and low-return ensuring stable production by shifting cultivation. Under this strategy, increased crop production can be obtained through expanding cultivated land with every available labor

force, with the perception that there are still vast areas of land surrounding them for shifting cultivation. Therefore, the introduction of intensive farming aimed at improving crop productivity will be realistic to farmers only after converting shifting cultivation to settled farming.

#### 2.2.4. Promising Crops

Promising crops in the Study Area were examined from the view-point of supply and demand. Prior to the examination, 24 crops were selected based on the Minutes of the Meeting on Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique on September 17, 2009 and the familiarity of crops in the Study Area. Then, scoring of the crops was done according to the 7 criteria as shown below.

- (1) Government's key policy (IIAM & PEDSA's Priority in the Study Area)
- (2) Popularity in the Study Area
- (3) Potential productivity
- (4) Farm-gate price
- (5) Food supply contribution (kcal/capita)
- (6) Market demand
- (7) Cluster/Agro-industry development potential

Table 2.2.2 shows the scoring results.

**Table 2.2.2 Scoring of Crops**

Crops	IIAM/PEDSA Priority in Study Area	Popularity in Study Area	Potential Productivity	Farm-Gate Price	Food Supply (cal/capita)	Market Demand	Cluster/Agro industry	Total Score	Crops in Minutes of Meeting
Maize	3	3	1	0	3	3	3	16	Yes
Cassava	3	3	1	0	3	0	3	13	Yes
Sorghum	1	3	1	1	1	0	0	7	No
Millet	1	0	0	3	0	0	0	4	No
Paddy (Rice)	1	1	1	0	1	3	1	8	Yes
Wheat	3	0	1	0	1	3	0	8	Yes
Ground nut	3	3	1	1	1	1	1	11	No
Haricot beans	3	3	0	3	3	1	0	13	No
Cowpea	1	3	0	1	3	1	0	9	No
Mungbean	1	0	0	3	0	1	0	5	No
Pigeon pea	1	0	0	3	1	1	0	6	No
Soybean	3	0	1	3	3	3	3	16	Yes
Sweet potato	1	0	3	0	1	0	0	5	No
Potato	3	0	3	1	1	1	1	10	No
Vegetables	1	0	3	3	0	1	1	9	Yes
Sesame	1	1	0	3	0	1	0	6	No
Sunflower	0	0	0	1	1	1	1	4	No
Cashew-nut	1	3	0	3	0	1	1	9	Yes
Banana	0	1	3	1	1	1	0	7	Yes
Sugarcane	0	0	3	0	3	0	3	9	Yes
Castor oil seed	0	0	0	3	0	0	1	4	Yes
Jatropha	0	0	1	3	0	0	1	5	Yes
Cotton	3	1	1	3	1	1	3	13	Yes
Tobacco	3	0	1	3	0	1	1	9	Yes

Legend: High/Good: 3 points, Fair: 1 point, Low/Bad: 0 points  
Source: The Study Team

The following crops got relatively high scores.

(1) Basic food crops

Maize, Cassava, Haricot beans, Groundnut, Cowpea

(2) Cash crops

Soybean, Potato, Vegetables, Sugarcane, Cashew, Cotton, Tobacco

### 2.2.5. Balance Sheet of Major Crops

Cost-benefit calculation was done for major crops based on the available data in DPA of Nampula province and from other sources collected by the Study Team. Since available data is limited, the Study team could only do the calculations for limited crops as shown in Table 2.2.3.

The calculation was basically done for two cases, namely the present case and the improved case, for comparison. In the present case, except for several crops, all inputs application except for seeds was omitted from the costs calculation in accordance with prevailing farming practices in the Study Area. In the improved case, costs were calculated based on recommendations from Nampula DPA, IAM, INCAJU and other authorities. The total sales were calculated based on the productivity (ton/ha) of the Study Area in 2010/11 and the average market price during March to September in 2012 collected by the Study Team.

**Table 2.2.3 Balance Sheet of Promising Crops**

Crop	Farming Practices	Production Costs (MT/ha)							Sales (MT/ha)	Balance (MT/ha)
		Labor	Tractor	Seeds	Fertilizers	Pesticides	Others	S-total		
Maize	Present (1.3 t/ha)	2,360	0	175	0	0	0	2,535	5,460	2,925
	Improved (4.5 t/ha)	2,280	2,000	875	13,100	48	0	18,303	18,900	597
Cassava (dry)	Present (2.2 t/ha)	2,040	0	500	0	0	0	2,540	5,280	2,740
	Improved (4.1 t/ha)	1,520	1,500	2,500	0	249	0	5,769	9,840	4,071
Sorghum	Present (0.9t/ha)	2,480	0	84	0	0	0	2,564	4,410	1,864
	Improved (2.3 t/ha)	2,280	1,500	420	6,550	171	0	10,921	11,270	349
Paddy	Present (1.0t/ha)	2,880	0	1,080	0	0	0	3,960	4,200	240
	Improved (4.2 t/ha)	2,840	2500	5,400	8,300	59	0	19,099	17,640	-1,459
Haricot beans	Present (0.7 t/ha)	2,720	0	1,020	0	0	0	3,740	13,650	9,910
	Improved (1.5 t/ha)	2,360	2,500	5,100	6,305	1383	0	17,648	29,250	11,602
Ground nut (with shell)	Present (0.7 t/ha)	2,120	0	520	0	0	0	2,640	4,130	1,490
	Improved (2.7 t/ha)	1,760	1,500	2,600	4,800	1,378	0	12,038	15,930	3,892
Soybean	Present (0.75 t/ha)	3,520	0	540	0	0	0	4,060	9,075	5,015
	Improved (1.5 t/ha)	3,000	2,000	2,700	0	250	300	8,250	18,150	9,900
Cotton	Present (0.5 t/ha)	4,660	0	188	0	340	1,775	6,963	7,500	537
	Improved (1.5 t/ha)	3,040	3,500	188	1,000	425	3,857	12,010	22,500	10,490
Sesame	Present (0.6 t/ha)	3,400	0	51	0	0	0	3,451	13,800	10,349

	Improved (1.0 t/ha)	2,520	2,000	255	7,200	26	0	12,001	23,000	10,999
Potato	Present (13.8 t/ha)	3,080	0	4,667	12,000	0	0	19,747	66,240	46,493
	Improved (33.0 t/ha)	1,960	3,000	23,333	43,700	1,206	0	73,199	156,400	85,201
Tomato	Present (7.1 t/ha)	4,720	0	3,000	4,800	0	7,523	20,043	50,410	30,367
	Improved (29.0 t/ha)	4,400	2,000	15,000	13,100	884	7,523	42,907	205,900	162,993
Onion	Present (10.0 t/ha)	5,120	0	12,960	9,600	0	7,523	35,207	150,000	114,797
	Improved (20.0 t/ha)	4,840	2,000	64,800	19,200	1,761	7,523	100,124	300,000	199,876
Cabbage	Present (12.0 t/ha)	3,720	0	2,400	7,200	0	7,523	20,843	105,600	84,757
	Improved (31.3 t/ha)	3,320	2,000	12,000	14,400	96	7,523	39,339	275,440	236,101
Cashew (30 years)	31.4 t/ha	105,740	2,000	1,020	0	43,243	20,578	172,581	401,921	229,339
(Annual average)	1.05 ton/ha	3,525	67	34	0	1,441	686	5,753	13,397	7,645

Source: The Study Team

### 2.2.6. Animal Husbandry and Inland Fisheries

The activity of animal husbandry is characterized by extensive growing except for the intensive commercial poultry industry, which uses inputs and technology in the production system. Essentially, the breeding methods used are quite rudimentary, resulting in low yield and production. Over the last three decades for herd and meat production in the country a significant increase in the sheep and goat herds between 1984 and 2001 was seen, while cattle and pigs had no growth in effective herds or meat production. Even after the pacification, the herds of cattle and pigs, as well as meat production has remained almost stagnant.

In the Study Area, there is a slight growth tendency in animal husbandry activity in recent years according to data from concerned DPAs. Regarding cattle, a number of factors described below can be listed as causes of the low level of development.

- (1) The region is endemic to the tsetse fly, a cyclic transmitter of bovine trypanosomiasis, despite some assertions that this vector was not observed in surveys conducted recently in Nampula district (Cattle rising provincial services of Nampula, 2007 and 2008).
- (2) The herds in this region have low productive potential, are genetically heterogeneous, and quite an interbred among creole race with some zebu and dairy breeds.
- (3) The native pastures are essentially poor, with low animal support capacity, not exceeding 0.2 head/ha during the dry season.
- (4) The management conditions are very precarious, with scattered pastures and no fences to insulate animals while they are grazing.
- (5) There is almost no basic supporting system for livestock farmers, e.g., animal quarantine, veterinary service, artificial insemination, etc.

The significant development of small ruminant can be explained by the fact that these animals have a certain resistance to the protozoan that causes trypanosomiasis, in addition to

the relative easiness of management. In swine, the restrictive factor in Mozambique, as well as throughout Africa, is the occurrence of the endemic African Swine Fever - ASF, a viral, highly contagious disease, that is deadly and difficult to control. ASF is present in the Study Area and cause severe losses to farmers.

The recent highlight on development of the poultry industry is an indication that constraint factors are being gradually solved. Agribusiness companies with vertical and intensive farming systems, also providing their products to market, such as chicks and feed, are boosting growing activity and allowing small producers to entering in the production system. On the other hand, the development drives the demand for feed and raw materials, expanding the cropping area of soybeans and maize.

In fishing activity the main constraint factor is the low potential for fishing in existing rivers the Study Area. The exception is Lake Niassa. According to the National Institute for Fisheries Research (IIP), the potential of sustainable production is 20.8 thousand tons per year, using the mathematical model of FAO. However, the fishing sector has problems such as lack of infrastructure of refrigeration and transportation logistics of production to the consumer market.

Regarding the development of inland fish farming, the Provincial Fishery Department (DPP) of Nampula indicates the following obstacles.

- (1) Lack of studies to investigate potential areas for inland fish farming
- (2) Lack of research works for adaptability of potential species
- (3) Lack of ponds for fish farming
- (4) Lack of production and distribution system of juvenile fish to fish farmers
- (5) Lack of operational structure and staff, and numbers of technicians to disseminate knowledge to those interested in fish farming

With the exception of commercial poultry and possible fishery exploitation in Lake Niassa, the development potential of animal husbandry and fisheries in the Study Area, as described above, is quite limited. It is also assumed that it will take a long time to overcome a lot of very basic constraints that impede the engagement of general farmers.

### **2.2.7. Land Holding System**

The land holding system is a highlighted issue for promoting agricultural development in Mozambique. Land issues are not only issues of investors who need to acquire the DUAT (right to use and exploit land) for broad area, but also issues of emerging individual farmers who want to convert their farming practices to settled-farming.

As indicated in many concerned materials to land issues in Mozambique, the majority of farmers cannot get a bank loan. Agricultural land cannot be used as collateral under the present legal system. The Mozambican Land Law of 1997 confirms that land is state property as stated in the Constitution.

In fact, land in community areas is managed by traditional leaders according to customary rules. The inharmoniousness of the Land Law and the actual land managing system prevailing in most rural communities has sometimes caused serious conflicts between investors and concerned community people when a large-scale agricultural or forest development project is put into operation. Many investors actually get confused about acquiring the DUAT. The investors usually respect the traditional leaders, with the understanding that they represent the target community regarding land management subjects, when the investors negotiate for DUAT acquisition. According to the principle in the Land Law, investors should deal with local communities in return for using land with respect to the customary occupation. However, an agreement with the leaders to allocate a certain area for a project is not legally valid if the community is in question, because the Land Law doesn't recognize the traditional leadership system. Some of the leaders actually don't enjoy confidence from community members due to their behavior against the interests of the members or power conflicts in and between the communities. Under this situation, community people are often suspicious of the investors in the community.

Furthermore, customary acquired land rights, which are usually the farmers' greatest support to confirm their land rights in public, do not have to be registered by law. The registration is generally far from farmers' reach due to high costs and complicated formalities. Farmers feel that they are in an insecure position on land holding (actually land use), especially for securing fallow land reserved for crop rotation under the shifting cultivation system. This could be a reason for the excessive self-defense reaction of community people against investors who are looking for a DUAT in or around the community.

## **2.3. Farm Supporting Services**

### **2.3.1. Agricultural Research and Agricultural Extension**

#### **(1) Agricultural Research**

IIAM has two zonal research centers covering the Study Area, i.e., the North Eastern Center (IIAM CZnd) in Nampula and the North West Center (IIAM CZnw) in Lichinga. The centers must be leading players in development of appropriate agricultural technology in the Study Area. However, the both centers face the following constraints.

- 1) Shortage of qualified/experienced management and scientific staff due to low incentive staff-management system, including the salary system
- 2) Low financial resources and their high-dependency on donor funding
- 3) Inconsistent budget disbursement system with main research (cropping) season
- 4) Deficient research infrastructures and equipment
- 5) Weak research management

- 6) Inflexible research planning and inadequate priority setting
- 7) Poor coordination with IAM, INCAJU, universities and agricultural extension

Since April 2011, JICA and EMBRAPA have launched a technical cooperation project to provide capacity building assistance to both centers.

## **(2) Agricultural Extension**

Agricultural extension in Mozambique historically focused on commercial and export cash crops, such as cotton, tobacco and sugarcane, mainly financed by the corresponding crop sectors before independence. In 1987, when the country's economic system was liberalized, the public extension system was established in accordance with a paradigm shift towards enhancement of private sector agriculture dominated by small-scale farmers.

Since 2008, the government has launched a comprehensive agricultural extension project covering 42 districts in the country, PRONEA, as an operational program of the Agricultural Extension Master Plan (2007-16). PRONEA aims at attaining increased returns and improved household food security of subsistence farmers through a steady uplift in production efficiency. A role of agricultural extension envisaged in PRONEA is not only just assisting subsistence farmers in technology transfer, but also facilitating agricultural innovation through stimulation interactive learning between all actors in agribusiness or in agricultural value chain, such as farmer communities, public and private extension workers, NGOs, service providers, agro-industry, etc. PRONEA covers 9 out of the 14 districts in the Study Area.

The PRONEA approach, which represents SISNE, must be reasonable, considering the weak public extension system in most parts of the country, and the history of the extension service. The extension policy, however, should pay more serious attention to the root causes that impedes farmers to transform their farming practices to be more intensive one as expected in PRONEA. As mentioned above, farmers in the Study Area cannot only improve their productivity, but also expand their cultivated area, as long as they stick with their familiar farming practice, slash and burning cum shifting cultivation. Unless farmers in the country transform their farming practice, all attempts of PRONEA would not be able to attain their expected goals. Even though it is a big challenge, agriculture extension services should focus on the core issue.

### **2.3.2. Agricultural Inputs Supply**

Low demand from farmers is a critical problem for running agricultural inputs supply businesses according to all dealers and shop owners interviewed by the Study Team. Small sales and high handling costs due to the small market cause the high retail price of the inputs. This again results in a low demand from farmers. Another problem is access to bank loans. Banks in the country take a conservative stance on a credit targeting small- and medium-scale agricultural enterprises, according to the dealers and shop owners. Even if

they could access the credit, high interest rates commonly exceeding 25% provide a difficult challenge for them in many cases. For the agricultural-inputs market structure in the country, as a limited number of companies dominate the market, it is also problematic. This might be caused by the small market in the country and some government interventions. Less competition among the companies arising from the structure may lead to the high-cost structure of the value chain. Undeveloped market infrastructure is another critical cause of the high-cost.

According to the Study Team's calculations, most of farmers cannot expect due return from agricultural inputs under the present price conditions. The following shows two simulations: one for the case of fertilizer use for maize and the other for the case of a tractor hiring business. It seems that only market principle measures are not sufficient toward attaining the return of farmers.

### (1) Simulation-1 (Fertilizers use for maize)

A profit-loss simulation was done in the following three cases of fertilizer application for maize, since maize would be the first priority crop when farmers in the Study Area start to use fertilizers on a substantial scale. The net profit is calculated for the three cases under various fertilizer-price discount conditions. The simulation result is shown in Table 2.3.1.

- 1) Case-1: No input (no fertilizer use, Yield: 1.3 ton/ha)
- 2) Case-2: Medium input (Urea: 50/kg & NPK: 100kg/kg, Yield: 2.5 ton/ha)
- 3) Case-3: High input (Urea: 100/kg & NPK: 200kg/kg, Yield: 4.5 ton/ha)

**Table 2.3.1 Profit/Loss of Fertilizer Use for Maize**

Discount Rate of Fertilizers	Net Profit (MT/ha)		
	Case-1	Case-2	Case-3
Present price (100%)	2,925	-1,253	597
10% discount price (90%)	2,925	-598	1,907
20% discount price (80%)	2,925	57	3,217
30% discount price (70%)	2,925	712	4,527
40% discount price (60%)	2,925	1,367	5,137
50% discount price (50%)	2,925	2,022	7,147

Source: The Study Team

The simulation result implies that net profit of Case-3 (high input) would exceed Case-1 (no input) only after a 20% discount price of fertilizers, while the profit of Case-2 (medium input) would not exceed case-1 even after the 50% discount price. The simulation clearly shows the reason why the majority of farmers don't use fertilizers for major crops.

### (2) Simulation-2 (Tractor Hiring Service)

A profit-loss simulation was done for tractor hiring service, since the service would be the most applicable way to popularize farm mechanization in the Study Area, where small-scale farmers are dominant. While an alternative to farm mechanization might involve utilizing



animal power, the Study Area has less potential to grow cattle due to serious constraints as mentioned in Sub-chapter 2.2.6. The net profit of the service is calculated in two cases with a 5-years loan interest rate and in three cases for annual working days. The simulation result is shown in Table 2.3.2.

**Table 2.3.2 Accumulated Profit/Loss of Tractor Hiring Service (per 1 unit tractor)**

<Interest: 10%/year>

(unit: MT)

Working Period	Year									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45 days	-100,468	-170,497	-217,442	-247,053	-263,804	-205,116	-156,211	-115,456	-81,493	-53,191
60 days	-28,424	-38,416	-35,330	-23,249	-5,257	82,383	155,417	216,278	266,995	309,260
75 days	43,620	93,665	146,781	200,554	253,291	369,883	467,044	548,011	615,484	671,711

<Interest: 0%/year>

Working Period	Year									
	1st	2nd	3rd	4th	5th	6th	7th	8th	9th	10th
45 days	-18,301	-33,552	-46,261	-56,852	-65,678	-6,991	41,915	82,670	116,632	144,934
60 days	53,743	98,529	135,850	166,951	192,869	280,509	353,542	414,403	465,121	507,386
75 days	125,787	230,610	317,962	390,755	451,416	568,009	665,170	746,137	813,610	869,837

<Condition for analysis>

- Specification and price of tractor: 4WD, 70HP, MT841,000/unit
- Specification and price of rotary plow: width 2.3m, MT45,000/unit
- Payment term: Once a year for 5 years
- Annual working period: for plowing service 45 days, 60 days and 75 days, for transportation service 500km
- Tractor service fee: MT2,000/ha (plowing), MT80/km (transportation)
- Depreciation period: 10 years
- Capital cost: 20%

Source: The Study Team

In the case of a 10% interest loan, which is a subsidized rate, a tractor hiring service provider would incur a loss under 45 days/year working conditions. Even after increasing the working days up to 60, the provider would not expect any profit until the fifth year and only get about MT 310,000 of accumulated profit in 10 years. Considering CWB in the Study Area as described in Sub-chapter 2.2.1, ideal crop planting (seed sowing) timing of major crops is limited to about one month in most places. This means that it is not realistic for the service provider to expect a 60-dayf annual working period each year. It seems that a tractor hiring service would be a high-risk and low-return business, even though the provider could get a subsidized loan with 10% interest. The simulation implies that the business can be feasible if a non-interest (0%) loan is available for a tractor hiring service provider with more than 45 days of annual working period.

### 2.3.3. Agricultural Loan and Credits

Financing for agriculture production and agribusiness operations in Mozambique is limited with serious constraint having been observed both in the operation of agriculture production cycles and agribusiness investment. The share of commercial bank lending to agriculture has also declined by 30% from 2008 to 2010, decreasing from 9.5 % to 6.5% of the total lending in the Mozambican economy, despite the fact that the total volume of agriculture lending increased by nearly 20% in 2009 and 30% in 2010.

In relation to the agricultural lending situation for small-scale farmers in rural areas, access to formal credit is extremely limited due to insufficient coverage by bank branches at the district level, the limited experience of micro-finance institutions in agriculture lending, high interest rates, and collateral requirements. There are also a number of reasons for the reluctance of financial institutions to provide credit to the agriculture sector. First, farmers often lack a sense of entrepreneurship and business management skills, and place insufficient focus on quality and productivity in their production activities. Moreover, the scale of individual farms raises potential difficulties for lenders since small-scale farmers are usually not targeted as clients for commercial banks due to their limited capacity in terms of crop production, which is crucial to the repayment of the loan.

In order to tackle those challenges, the Government, with support from donors, has applied a variety of mechanisms that can be used to promote agricultural lending such as guarantee funds, matching grants, and catalytic loans. Although these financial schemes have had some success in extending credit to small and medium producers and entrepreneurs, surveys show that many portions of such schemes have remained underutilized.

As was seen with the Nacala Corridor, there is a blatant lack of opportunities for small-scale farmers to access credit, resulting in low agriculture productivity by shifting cultivation over many years. In order to transform this production system from an extensive shifting cultivation method to an intensive settled cultivation approach, the introduction of an accessible and affordable financing mechanism for the agriculture sector is critical; targeting small-and medium-scale producers and entrepreneurs.

## **2.4. Farmers' Organizations**

### **2.4.1. Constraints of Farmers' Organizations**

Farmers' organizations present in the Study Area can be mainly divided into "farmers' groups" and "farmers' associations." The farmers' group means that farmers are just assembled, but the farmers' association has rules (constitution) and a management body for its purpose. The size of one organization is usually 10 to 40 farmers, for instance, and the extension service of MINAG/DPA/SDAE assembles 10 to 30 farmers into one farmers' group/association, but in the case of NGOs, one group/association consists of 20 to 40 farmers. A combination of two or more farmers' associations is a forum (Foro) (referred to as a union (União)), and there are rural forums (Faro rural) and district forum (Faro detrital). DPA is promoting the formation of forums by multiple farmers' associations. In addition, there is a federation (Federação) at the provincial level in some provinces (referred to as provincial union (União provincial)).

The emergence of the association movement in the north of Mozambique began in 1996, through the CLUSA Program in Nampula province. Since 1999, CLUSA has expanded its support services to Zambezia province and in 2000, it also expanded to the south of Niassa province in partnership with UCASN and OXFAM. This intervention combined with UNAC initiatives resulted in the creation of UPCN (União Provincial dos Camponeses de Niassa) with the support of Centro Cooperativo Sueco. Based on the first results obtained by CLUSA intervention from 1996 to 2000, many NGOs and agriculture departments such as World Vision, CARE, OIKOS, OXFAM, OLIPA, KULIMA, SPER/DPA have incorporated the promotion of association in their extension services.

Almost all farmers' organizations have, at least during part of their formation process, connections to funding entities, including NGOs, donors or MINAG, in the history of organization in Mozambique. Many farmers' organizations were grouped for the purpose of receiving the support of NGOs, and as a result, activities of farmers' organizations tend to cease when the support by NGOs is stopped or the support project is terminated. On the other hand, some farmers' associations have been formed for the purpose of receiving governmental support through DPA, such as agricultural inputs materials of PAPA from MINAG. As a result, MINAG (DPA and SDAE) is not able to grasp the whole picture of farmers' organizations.

Many NGOs do not apply a demand driving approach, but offering an extension approach through provision of seeds and other inputs. Because of the aspects highlighted above along with leadership weaknesses, the majority of the farmers' organizations do not function well. The major aspects encountered in the organizations are poor management skills, poor internal governance, and low accountability. The linkages between association/forum and forum/unions are weak. The problems of weak organizational structure and management skills of the farmers' organizations that opens space to excessive intermediation in the procurement of inputs and marketing of surplus were also pointed out in both the Green Revolution Strategy (MINAG, 2007) and PEDSA (2009-19).

#### **2.4.2. Business Challenge of Farmers' Organizations**

Many NGOs in the Study Area have been working with the farmers' organizations for a long period of more than 15 years. Farmer members were trained in improved farming practices as well as governance skills such as literacy, numeracy, conflict resolution, meeting facilitation, agendas, democratic governance practices and business skills. Unfortunately, significant outcomes from an economic perspective have not been seen. Many international NGOs have often been criticized for being more concerned with production than with marketing, even when supporting the creation of producers associations. In addition, it is clear from the Study results that, "the problem for the small-scale farmers is no buyer rather than market demands or no market information; the buyer cannot come up to the farm gate," it is a big problem. This is true for both farmers' organizations and individual farmers.

The result has been a lack of sustainability from a business view-point. The major challenge is in the current approach used by most NGOs. They simply run to the numbers and easy results through provision of inputs without preparing the farmer to cope with business challenges. However, in recent years, some agricultural production companies and some NGOs, without taking advantage of an existing farmers' organization from a business perspective, have started a new business in the grouping of farmers. They place emphasis on the activities that focus on purchase and marketing. It is notable that this new trial also has been successful.

### **2.4.3. Supporting Farmers' Organizations**

The General Law of Modern Cooperatives (Law 23/2009) was approved in September 2009, and enacted in March 2010. The new Cooperative Law provides a well-defined legal framework for organizing farmers' cooperatives with a clearly defined purpose. In order to encourage more economically-oriented organizations, supported by civil society and approved by the government, the new Cooperatives Law emphasizes the organization of people with an economic vision. Commercialization of products may at present be the most urgent, and the purpose towards which farmers can create reasonably well-functioning cooperatives. Making new legislation known and available, especially in the districts and rural areas, is still a real challenge. However, the creation of new modern cooperatives within the frameworks given by the new Cooperative Law can be one option towards building a basis for the forging of commercial linkages between farmers' organizations.

Due to the limited capacity of family labor, lack of access to improved input, technology, management skills, and business orientation, to support for the farmers' organizations, the following items are considered:

- Establishment of a rural credit system for agriculture production at the small-scale farmer level to increase working capital, to hire labor and equipment for agriculture mechanization, including irrigation system, plowing, sowing, weeding, and harvesting.
- Establishment of production and supply of improved inputs such as seeds, fertilizers, pesticides to be easily procured by farmers.
- Set up mechanisms to improve farmer access to improved technology through empowerment of farmers' organizations at associations, forums, unions, cooperatives, and federations.
- Provide qualified technical assistance in agriculture production and management of production chain, including development cooperative business.
- Provide post-harvest technology at individual farmer levels of associations, forums, unions, and federations.

- Set up a system to facilitate storage facilities access at farmers' organization levels such as associations, forums, unions, and federations.
- Establishment of realistic policies for the agriculture sector in Mozambique to support emerging business initiatives in agribusiness.
- Set up a strategy that support appropriate social facilities and infrastructure, such as roads and irrigation systems.
- Establish mechanisms that will increase farmer assets by using the land as collateral for loan acquisition.

## **2.5. Irrigation and Drainage**

### **2.5.1. Land Suitability for Irrigation Development**

Land suitable for irrigation development is widely spread over the Study Area. According to the study done by ARA-CN<sup>2</sup>, Class 1 (high potential) and Class 2 (moderately suitable) areas were estimated at 824,750 ha and 594,550 ha, and occupy 27% of the total land in the Study Area within the jurisdiction of ARA-CN, which excludes the districts of Niassa except for Cuamba. Those areas are considered as the ones with the possibility for irrigation development because land and water resources are available and irrigation farming is economically feasible. Areas that are highly or moderately suitable for irrigation are distributed throughout the Study Area, while Malema has the largest potential and Monapo is the second best.

### **2.5.2. Potential of Rehabilitation of Irrigation Systems**

Irrigation equipped areas, which have previously developed irrigation systems, cover 6,700 ha of the Study Area. Among these, only 45% are in-use at present due to malfunctions and the abandonment of facilities. Even if the area irrigation system is in-use, the systematic canal network is defunct and irrigation land and rain-fed land are mixed and scattered in a mosaic-like manner in most cases. The Areas which are not in-use can be considered as potential areas for irrigation development through rehabilitation and re-construction of systematic canal networks with re-arrangement of irrigation plots.

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<sup>2</sup> Present Status Report of Study for the establishment of ARA Centro-Norte, 2006, DNA.

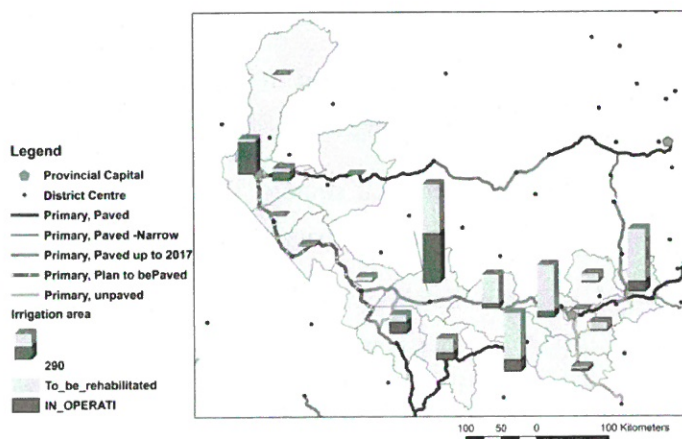
### 2.5.3. Available Water Resources

Due to the malfunction and abandonment of the hydraulic observation network after the 199's, there are serious limitations in the river discharge needed to assess the hydraulic situation in the Study Area. The mean annual runoff in the Study Area is estimated at approximately 20,000 million m<sup>3</sup>/year. By examining the runoff of districts, smaller runoff both in (specific) and amount is observed in the eastern districts of Monapo, Muecate and Meconta, whereas higher runoff is observed in the eastern districts of Ribaua, Malema and provinces of Zambezia and Niassa.

According to the study on ARA-CN and ARA-N, the potentials of surface water of the whole jurisdiction areas of them are estimated to be approximately 25,000 million m<sup>3</sup>/year and 24,400 million m<sup>3</sup>/year, while the water demands are 405~560 million m<sup>3</sup>/year and 160 million m<sup>3</sup>/year for ARA-CN and ARA-N. Those regions have a large potential for water development and the available volume is quite large and far from the estimated water demand, even if 30% of the runoff is reserved for ecological flows and conservation purposes. The situation in the Study Area is the same as those analyses.

On the other hand, it is to be considered that there is a time distribution of river flows, both throughout the year and from year to year. In the Study Area, the river flow is concentrated from January to April, and accounts for more than 70 % of the annual runoff on average. Even though the amount of water will not be a constraint, the intake and storage facilities, which are necessary to cope with the uneven water distribution over time, would be constraints of development. Thus, the capacity of water storage is a limitation factor of utilizing the abundant potential water in the area. The total storage capacity in the Study Area is assumed to be 76 million m<sup>3</sup> at maximum which is significantly lower than the amount of potential water resources. It can be said that the water resources in the Study Area are being kept (intact) at present.

Development has been observed in some river basins such as the Monapo River Basin in Nampula Province. Considering the increased demand for urban and rural water supply due to population growth, small horticulture irrigation system along the river, and industrial development, there is a concern that the balance of water resources and water demand would become seriously strained in the future. Thus, establishment of appropriate management systems for water resources and water allocation plans are required in such basins.



Source: Arranged by JICA Study Team

**Figure 2.5.1 Irrigation Area and Potential of Rehabilitation of Irrigation Systems**

## 2.5.4. Assessment of Rain-fed Crop Cultivation

The condition of rain-fed crop cultivation was assessed from the aspect of water deficit of crops, i.e., maize, beans, soybeans, potato and cotton in selected districts, i.e., Lichinga, Cuamba, Malema, Nampula and Meconta. The assessment was carried out using data on the average precipitation of 1998/99 to 2010/11, with some exceptions. The water deficit of crops during the vegetation period was estimated at 2% to 14% for maize, for which the water deficit occurs in the initial or late stage of growth. This deficit ratio can be reduced to less than 6% by choosing appropriate for seeding in the districts of Lichinga and Nampula. Beans have been observed to be cultivated without water stress except for the eastern are, represented by Meconta. The water deficit of soybeans is estimated at 0% to 7%, and is observed in the late stage of vegetation in April. Even though crops of maize and soybean are cultivated with a small degree of water stress in the average conditions, it is considered that the unevenness of rainfall both throughout the year and from year to year affects the growth of crops in the Study Area, as shown in Figure 2.5.2. Thus, supplemental irrigation is expected to contribute to increasing and stabilizing the productivity of crops.

Cotton suffers from an approximately 19% water deficit in Malema and Meconta mainly in April, which is during the late stage of vegetation. For the first-season potatoes (rainy season), a 4% to 20% water deficit is estimated and requires application of supplemental irrigation from March to May in order to achieve adequate productivity.

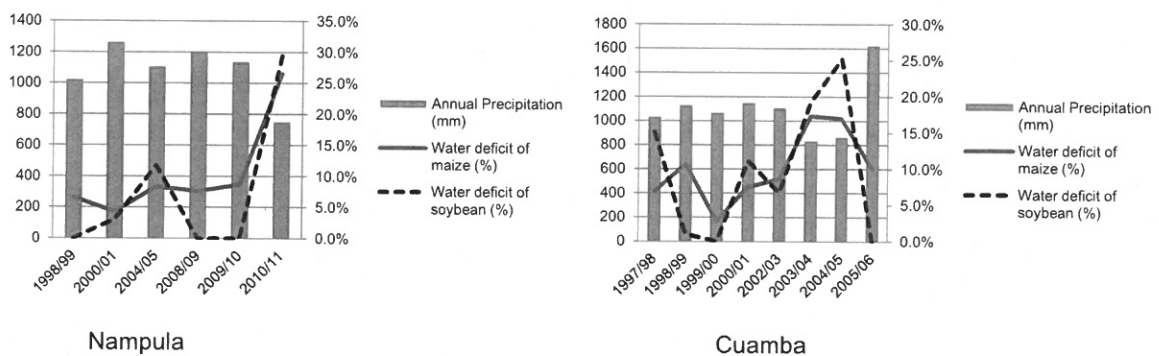


Figure 2.5.2 Annual Precipitation and Water Deficit of Crops in Selected Districts

## 2.5.5. Expected Direction of Irrigation Development

The future development of irrigation in the Study Area can be discussed from two different main actors of irrigation: small and medium-scale irrigation farmers, and large-scale irrigation users such as farming enterprises or foreign investment firms.

Regarding the small and medium-scale irrigation farmers, the following directions for irrigation development can be considered:

- Full use of the potential of irrigation development through rehabilitation of existing irrigation systems is considered to be essential to expand the irrigation area. Improving the operation and maintenance of facilities, increasing the efficiency of water use and

improving the technology of irrigation farming are required to utilize the expanded irrigation area effectively.

- Due to the existence of scattered small-family farmers in the ex-beneficiary area of the existing irrigation systems regardless of whether they use irrigation or not, it is considered to be rather difficult to invite new development for large scale users. Those areas are recommended to be used for expanding and increasing small and medium-scale irrigation farmers.
- Through land consolidation during the rehabilitation of existing irrigation systems, a systematic irrigation network will be established to solve the mixture of irrigation and rain-fed cultivation in the area.
- Increasing the number of commercial farmers who use irrigation, through expansion and re-arrangement of irrigation areas as well as through promotion of appropriate irrigation technology.
- Establishing water users associations or strengthening the function of farmer's groups and associations because they are required in order to improve the operation and maintenance of facilities and water management of small irrigation systems.
- Promotion of vegetable production with small-scale irrigation by promoting mobile pumps and small storage equipment in the area easy access to rivers, lake and marshes as well as access to the market.

For the large-scale irrigation development by farming companies or through foreign investment, the following directions for irrigation development can be considered:

- There are abundant water resources to be developed for new large-scale irrigation development. The main issue is securing free land that is close to rivers, lakes and marshes in order to develop water storage facilities.
- It shall be taken into consideration that the basins in the eastern part represented by Monapo Basin are not suitable for new large-scale development due to the small runoff and concentration of land and water resources development.
- Stabilizing and increasing the productivity of crops such as maize, soybean and cotton, which are currently cultivated through rain-fed methods, through introducing supplemental irrigation.
- Promoting full irrigation with modern irrigation technology for maize, soybean and other cash crops, which aim at high productivity as well as high quality of production.



## **2.6. Logistics and Processing the Agricultural Products**

### **2.6.1. Logistics Infrastructure**

#### **(1) Logistics**

##### **1) National roads**

High transportation costs weaken the price competitiveness of agriculture products of the Study Area in large consumption areas of central and southern regions of Mozambique. The high transportation costs arise from: 1) shorter lifetime of equipment and high fuel consumption caused by poor road conditions, 2) higher operational cost for longer transportation time due to poor road conditions, and 3) low competition level among service providers due to the small number of transportation service providers entering the area.

Rehabilitation of the national road network can contribute to the improvement of situations 1) and 2) above. Regarding 3), in order to promote new transportation services entering the area, the volume of goods, especially agriculture products, both coming-in and going-out has to be increased, after which the situation will become attractive to service providers. This will also have a positive effect on lowering agriculture input costs.

##### **2) Rural roads**

Apart from national roads, the poor condition of rural roads connecting farmland to national roads still remains as a constraint of transportation efficiency for producers and traders. Rural road network planning is necessary based on agriculture production areas. But, shifting cultivation practices, which periodically changes cultivation land areas, are an obstacle for the planning. Conversion to settled farming and integration of farmland needed to be implemented prior to rural road network planning.

##### **3) Railways**

Railways are suitable for mass transportation. Rehabilitation and new development of a line from Tete to Nacala Port through Malawi is currently underway by the private sector. It can be utilized for export of production surplus to regional and international markets in the future.

##### **4) Transportation service**

As mentioned above, the low competitive level is one reason for high transportation costs in the supply chain. Currently, private companies, which handle a large amount of commodities, have their own transportation equipment. Major transportation service providers are based at Nacala Port. Small and medium service providers are working in the corridor.

Once national roads are rehabilitated and agriculture production volume increases, it is expected that more small to large-scale service providers will enter to corridor.

## **(2) Storage**

### **1) Public storage facilities:**

In each district of the Study Area, there are a few public warehouses, which were built in the Portuguese colonial era. These warehouses are currently managed by ICM (Institute of Cereal Mozambique). The storage volume of these warehouses varies from 200 to 5000 tons. Of these, almost all are rented out to the private sector for agriculture products. Since it has been more than 50 years since their construction, these warehouses are very old and need rehabilitation.

ICM has a plan to install grain silos in Tete, Zambezia, Niassa and Nampula provinces. The total capacity of these silos is 21,000 tons. A 3,000-ton capacity grain silo is under construction in Malema, Nampula province with Portuguese government support. These silos will also be rented out to the private sector.

### **2) Private storage facilities:**

Storage facilities are divided into two types: one is modern warehouses with various capacities, and the other is traditional storage facilities, which farmers build on their property. Most modern warehouses are general-purpose type warehouses. Grain silos, very recently, are being built in maize and soybean production areas by both private and public sectors.

Small capacity warehouses (less than 100 tons) are scattered in remote areas to assemble products for a larger assembling points, while medium capacity warehouses (100 – 1,000 tons) are located in district capitals or larger assembling points across adjacent districts. Large capacity warehouses (more than 1,000 tons) tend to be built on the fringe of large consumption zones or shipping points for long-distance transportation like Nacala Port and Nampula city.

Traditional storage facilities, which are made of local materials, still prevail at the farm household level. Farmers store maize and beans in preparation for shortage of these staple foods in the rainy season. However, this type of storage often leads to considerable product loss in both quantity and quality due to insects, pests, mold and rodent attacks.

## **2.6.2. Value Chain and Market Demands**

### **(1) Maize**

Maize is one of the food staples in Mozambique, as well as important material for animal feed. According to the estimation by the Study Team, local maize demand for food consumption will reach 1,012,500 tons by 2030. The demand for maize for chicken feed for meat production at the national level is estimated to increase to 175,000 tons by 2030. Maize is exported from the western part of the Study Area through the Mandimba border and Nacala Port. Further demand for both domestic and international markets is expected. In

order to supply maize for both food and feed demand throughout the year, systematic grain storage facilities will be necessary.

## **(2) Cassava**

The northern region is an important area for both cassava production and consumption in Mozambique. 2,360,000 tons of raw cassava was produced in the Study Area in 2011.

Fresh cassava is extremely perishable and cannot be stored for a long period. So, it must be dried for a long-term storage. In the rainy season, the price of cassava flour increases due to the shortage of dried cassava. Cassava sold in the market is dried in the dry season and stored until the rainy season. Cassava can be stored in the ground so it can be harvested throughout the year, but it is difficult to dry it in the rainy season.

The demand for cassava will continue to increase as a food staple and material for flour, chips, breweries and breads, and likely for animal feed, biofuel and starch. 40,000 tons of fresh cassava is currently used for breweries.

## **(3) Groundnuts and Beans**

Groundnuts and beans, especially haricot bean, have high demand in both domestic and international markets. Farm gate prices of these products are very high at 22 MT/kg and 19MT/kg respectively, and provide a high profit margin for the producer. These products have price competitiveness even in Maputo, for which high transportation cost is added. Storage loss and damage by insect attacks, fungus, and rodents are the main problems.

## **(4) Soybean**

Mozambique imported 36,000 tons of soybean oil and 7,200 tons of soybean cake in 2009 as well as 12,600 tons of chicken meat. Import volumes of these products tend to increase year by year. However, the domestic chicken meat industry is growing led by strong domestic demand. Chicken farms prefer domestic soybean, because a lot size of 50-100 tons is suitable for their production scale. Usual imports of soybean are 500-1000 tons, so they have to find suitable warehouses and pay storage fees. Delivery times of imported soybean are often unpredictable so the farmer has to consider the timing of the order carefully. Furthermore, ordering a big lot size requires a large amount of cash. This sometimes results in a tight cash flow management for local chicken farms. Thus, the demand of domestic soybean as a substitution for imported product is increasing.

The post-harvest loss of soybean reaches more than 20% according to the results of a survey. This is caused by poor drying and storing conditions. The price of domestic soybean can currently compete with imported product, but the quality is slightly lower. It is necessary to rehabilitate the main roads and rural roads for efficient distribution of product, and to install suitable storage facilities to ensure uniform product quality.

### **(5) Cashew nut**

Cashew nut is a competitive product in the international market. During the last decade, a number of cashew processing factories have entered into this sub-sector. Mozambique has a processing capacity of about 40,000 tons for raw cashew nuts, of which, 65% are located in Nampula province. The increase of the number of cashew nut processing factories means an increase in the demand for raw cashew nuts. The constraints of cashew factories are procurement of quality and a stable volume of raw cashew nuts.

The cashew value chain is extended across domestic and foreign sectors. The domestic value is estimated at only 18% of the total value. The other 82% is produced in foreign areas., 48% of this comes from the roasting/ salting/ packaging process, and 40% comes from the trading and retailing process. The low rate of added value in the domestic process is another constraint.

### **(6) Vegetables**

Vegetables produced in the Study Area, such as tomatoes, onions and potatoes have high potential in the region and surrounding areas.

Generally, vegetable demand consists of household demand and food industry demand, especially for catering services and restaurants. In the Study Area, the demand from catering services in industrial areas near Nacala Port and urban areas is expected to grow in the future. The newly established fertilizer factory in Monapo, which plans to employ 2000 workers, will also have potential catering demand.

Another potential is import substitution. In the markets near the western border, tomatoes produced in Malawi are sold. South African potatoes are sold in the market of Nampula. Demand for these products is high in densely populated areas, Nampula city and the eastern part of Nampula province.

### **(7) Sesame**

Sesame contributes a high profit margin to producers. The farm gate price of sesame is as high as 23 MT/kg. Exports of sesame for the confectionary market and-, organic produce market have increased, and reached about 40,000 tons in 2009. According to the estimation by Agrifuturo, the potential volume for the international market is estimated at 2.8 million tons, and sesame has high potential in the international market. The main problem is unstable production caused by striped flea beetle infestations.

### **(8) Chicken**

The demand for chicken meat is growing in the domestic market. According to the estimation by Technoserve, the consumption volume will reach 137000 tons in 2020. Investment in poultry farms has increased in response to this strong domestic market demand.

However, domestic supply of material products for feed, soybean and maize are not stable throughout the year. so poultry farms have to rely on import of these material products. On the other hand, the volume of one ordering lot for import product is much larger than the amount needed for basic operation. The farmers have to pay in advance when ordering and then wait for 2-3 months to receive the products. This causes difficulty in their financial management leading to higher operational costs. A Larger volume of domestic feed material production and its stable supply are necessary for further development of the poultry industry.

## 2.7. Road and Social Infrastructure

### 2.7.1. Transportation

#### (1) Road Transportation

Many classified roads in the Nacala Corridor area will be developed by 2017, as two parallel paved, two - lane roads connecting Nacala Port to Cuamba and Pemba to Lichinga. Rehabilitation of the N13 road from Cuamba to Lichinga is being discussed with AfDB and JICA.

For the vertical network, N1 and No.103 road from Zambezia to Pemba and to Magegi will be rehabilitated by 2014. The rehabilitation/pavement of road from Magegi to Cuamba, and Cuamba to Marrupa in the Pemba Corridor in Niassa is under discussion.

If the aforementioned works are carried out, Cuamba city might become an accumulation point for road transportation in the west part of the Study Area.

On the other hand, rural areas face difficulty regarding access. First, fundamental road networks are not developed in rural areas, especially in Gurue, Alto Molocue, Murrupula, Mandimba and Ngauma districts as shown in Table 2.7.1. Moreover, many roads become impassable for



Source: Study Team

Figure 2.7.1 Future Road Network

Table 2.7.1 Road Density of Districts

District	Area (km <sup>2</sup> )	total length of roads (m)	Road density (m/km <sup>2</sup> )
Monapo	3,528	235,879.1	66.9
Muecate	4,121	268,978.9	65.3
Meconta	3,690	279,396.8	75.7
Mogovolas	4,728	293,012.0	62.0
Nampula	4,006	427,555.6	106.7
Murrupula	3,104	181,865.5	58.6
Ribaue	6,271	451,479.8	72.0
Malema	6,075	416,466.5	68.6
Alto Molocue	6363	334,517.8	52.6
Gurue	5,664	226,266.1	39.9
Cuamba	5,363	383,538.6	71.5
Mandimba	4,698	278,861.4	59.4
N'gauma	3,016	182,984.1	60.7
Lichinga	5,695	368,511.6	64.7
total/average	66,322	4,329,313.8	65.3

Source: Estimable based on Cenecarta GIS

vehicles because of seasonal rivers in the rainy season. Poor drainage is also a cause of impossibility in rainy season, and it makes roads muddy and slippery on steep hilly parts.

There is a high priority to increase access to the roads passable by vehicle, because the lack access causes high transportation costs, lack of access to market, low amounts and prices of sold products, weak bargaining power, large losses and poor access to public services.

## **(2) Railway Transportation**

CDN, the company operating the Nacala port and railway network in northern Mozambique, has an improvement plan of the North Railway line (hereinafter called Nacala Railway). The transportation capacity of the Nacala Railway will reach 29 million tons per year after rehabilitation. CDN expects to handle 22 million tons per year consisting of 18 million tons of coal, 2 million tons of national cargo and 2 million tons of transit cargo. Agricultural products will be able to be included in the 2 million tons of national cargo.

The discussion regarding rehabilitation of the Lichinga line has not begun yet. If CDN improves the Lichinga line, Niassa Province will have mass transportation.

## **(3) Nacala Port**

Nacala Port has advantages in its natural depth and location close to Asia. Due to this, the Port is considered be one of the important ports in east Africa.

However, the port's facilities are too old to handle cargo efficiently. JICA prepared a rehabilitation plan to secure its competitiveness and sustainability for development of the Nacala Corridor area. This emergency plan is being implemented through Grant Aid by JICA.

The plan states that capacity of the port will be increased by stages up to 250,000 T.E.U. in 2030. The expected handling amount of cargo per year will become 9,972,000 MT, which is 10 times the 995,000 MT in 2008.

Nacala Port is operated by CDN under concession until 2020 and the concession can be extended for an additional 15 years. Vale has plans to make a new port specifically for coal shipping at Nacala-a-Velha.

### **2.7.2. Power Supply**

Through improvement of the North Cahora Bassa Hydro Power Plant, Hydro Power of Cahora Bassa (HCB) will increase its capacity to 3,320 MW from present 2,075 MW. In order to supply stable power from HCB to the Nacala area, it plans to install a 220 kV lines from Caia to Nampula. The new line will begin in 2020. Moreover, distribution transformers in Nampula 220 and Nampula Central substations require upgrading due to their loads being close to maximum capacity.

Regarding power supply for rural areas, the Government of Mozambique stated that the power supply network will be expanded along the existing network. They will connect administration posts then cover localities in that area, where the power line is laid. This means that there is a potential to install mechanical or irrigation pumps for agriculture in these areas. Conversely, the power supply has only reached the district centers and people in rural areas still have no power supply. The electrification rate in the Study Area is low. Table 2.7.2 shows the rate of households using electricity as their main energy source.

**Table 2.7.2 Rate of Households using Electricity**

District	Number of Family	Using Electricity	
		No. of Family	%
Monapo	74,951	1,782	2.4
Muecate	23,581	47	0.2
Meconta	39,752	1,774	4.5
Mogovolas	74,152	1,514	2.0
Nampula City	101,484	32,027	31.6
Nampula Dist	53,659	323	0.6
Murrupula	36,127	75	0.2
Ribaue	44,000	1,307	3.0
Malema	40,476	849	2.1
Alto Molocue	62,902	3,402	5.4
Gurue	69,060	2,288	3.3
Cuamba	43,290	2,720	6.3
Mandimba	32,146	901	2.8
Ngauma	15,451	57	0.4
Lichinga City	28,372	6,875	24.2
Lichinga Dist	22,463	141	0.6

Source : Estatística Distrito 2012

The area between Ribaue and Malema does not have power lines because the power grid was laid in a Y shape connected at Alto Molocue. Thus, it is difficult to expand power lines in this area. As a result, diesel generators have been installed in district center of Ngauma ; but the generator has broken down.

### 2.7.3. Domestic Water Supply

#### (1) Rural Water Supply

In the districts, 55.6% of the households use manual shallow wells and 29.6% gather water from rivers or lakes. The percentage of households using tap water is only 2.5%. A safe water supply should be improved in rural areas.

#### (2) Urban Water Supply

The capacity for water supply with present facilities has limitations in every city as shown in Table 2.7.3 below. FIPAG, the water supply authority, is upgrading water supply systems in Nacala and Nampula based on short-term development plans under projects by MCA and WAISIS (water service and institutional support project of World Bank). Upon completion of the works, service coverage of at least 70% is expected by the year 2015. The feasibility study prepared by MCA is targeted for 2029 and development to meet future demand is dependent on the additional surface water development.

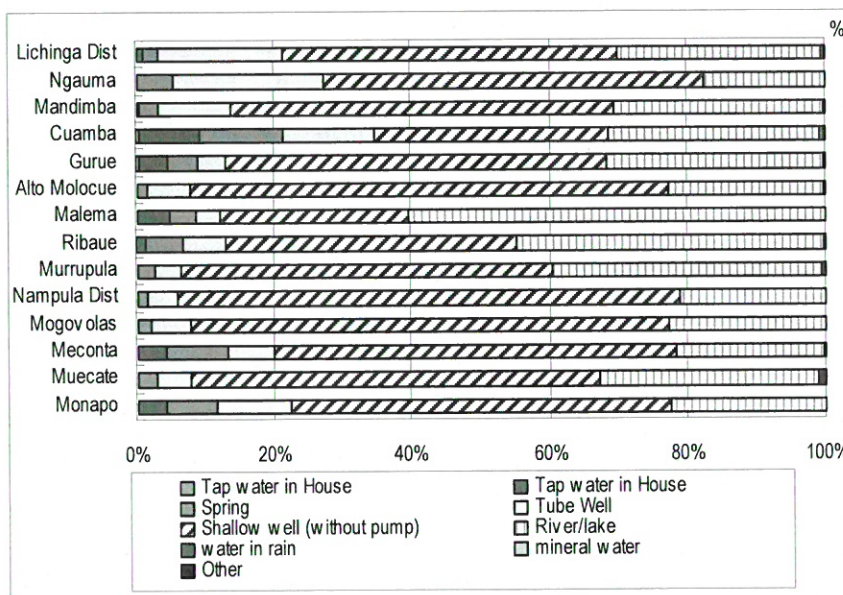


Figure 2.7.1 Water Sources in Study Area

In Niassa province, a feasibility study with the target year of 2029 was prepared by ASANANI (Integrated Water Supply and Sanitation Project for Niassa and Nampula Provinces) in 2008 and detailed design engineering is underway through an AfDB and ASNANI Study.

However, all of the future water source development plans require dam construction, which is a big challenge for FIPAG.

Table 2.7.3 Present Water Supply Service in the Study Area

	Nampula	Nacala	Lichinga	Cuamba
Water supply service coverage (%)	68	50	21	17
Service time (hr/day)	10	15	21	8

### 2.7.4. Education

Human resource development is a key function for regional development.

The number of facilities for education is not sufficient, and securing the required number of teachers in rural areas is big challenge. The number of students per teacher in elementary school (primary education) in all districts is over 40, standard for primary education. The same rate is seen in ESG, secondary education; however, urbanized districts like Nampula, Murrupula, Mogovolas, and Lichinga are lower.

Table 2.7.3 Average Literacy Rate in the Study Area by Age Group (%)

	Total	Men	Women
15-19	55.6	67.9	44.5
20-24	43.3	60.3	29.0
25-29	36.2	52.4	20.6
30-39	36.6	54.2	19.2
40-49	36.3	57.2	14.2
50-59	26.1	45.3	6.8
60over	17.7	29.4	4.2

Source: INE Estatísticas do Distrito 2012



Securing the necessary number of teachers in rural areas must be done in order to increase the literacy rate.

The rate of female student in EP I +II is moderate at 47.2% on average for the 14 districts. There is potential for mitigating gender issues in the near future. As shown in Table 2.7.4, the literacy rate of women is much lower than men, especially for older ages, thus preventing the participation of women in development.

### 2.7.5. Public Health

In general, the number of hospitals is extremely limited in the Study Area and half of the districts have only health centers in the territory. The coverage area of one hospital / health centers in the Study Area is calculated at 577 km<sup>2</sup> on average, but the conditions are different in each district. Ngauma and Mamdinba are poorest at more than 2,000 km<sup>2</sup>. If health posts are deemed health units, the average coverage area becomes 364 km<sup>2</sup>, a circle with a radius of about 10.7 km. This 10 km distance is too long for visits to the health unit for patients or pregnant women. Moreover, transportation in rural areas is poor and the people do not have their own transportation. Therefore, increasing the number of health units and also medical staff in rural areas is required.

The HIV rate in northern Mozambique is relatively low and this low rate is one of the positive aspects of the Study Area. It is necessary to take measures to prevent its spread during economical development.

**Table 2.7.4 HIV Prevalence Rate by Province, 2009**

Province	Prevalence of HIV (%)	Province	Prevalence of HIV (%)
<b>Mozambique</b>	<b>12.6</b>	<b>Manica</b>	<b>15.3</b>
<i>Niassa</i>	<i>3.7</i>	<i>Sofala</i>	<i>15.5</i>
<i>Nampula</i>	<i>4.6</i>	<i>Inhambane</i>	<i>8.6</i>
<i>Zambezia</i>	<i>12.6</i>	<i>Gaza</i>	<i>25.1</i>
<i>Cabo Delgado</i>	<i>9.4</i>	<i>Maputo Prov.</i>	<i>19.8</i>
<i>Tete</i>	<i>7.0</i>	<i>Maputo City</i>	<i>16.8</i>

Source: MDG Report Mozambique, 2010

## 2.8. Agricultural Investments

### 2.8.1. Potential for Commercial Farming involving Small-scale Farmers

By reviewing the lessons learned from the Beira Agriculture Growth Corridor (BAGC) initiative as well as from agribusiness initiatives with small-scale farmers in the Nacala Corridor, positive aspects have been observed for the potential of commercial farming involving small-scale farmers as summarized below.

The strategy for the BAGC initiative is to create a collaborative mechanism by which small-scale farmers benefit from the growth of commercial agriculture while working with

large agribusiness companies in Mozambique for the development of a joint irrigation project that would contribute to the modernizing of the agriculture sector in the region. Small/medium scale commercial farms take a leading role in the expanding of agribusiness initiatives by involving groups of small-scale farmers in commercial production, which is regarded as an effective agriculture development model applicable to the Nacala Corridor.

Compared to the Beira Corridor, commercial agriculture has not fully matured in the Nacala Corridor due to several limitations in the agribusiness environment, such as accessibility to large markets, the availability of inputs at an affordable price and the lack of infrastructure, particularly the limited rural road networks and their condition. In addition to such limitations, private businesses have faced other challenges from the business environment in creating new business models that involve small-scale farmers in the entire value chain, such as the availability of affordable loans, which are not conducive to local agribusinesses. Taking into consideration the efforts made by the different sectors in the Nacala Corridor in order to address those issues, it is recommended that collaborative work be initiated to develop a sustainable mechanism involving small-scale farmers as a partner, not a recipient, in the support/grant aid as well as the commercial agribusiness in order to improve productivity and strengthen the entire product value chain.

As summarized above, contract farming is a potential model for involving small-scale farmers in the commercial agriculture value chain, which would result in increased productivity and better market access for small-scale farmers. As for the current contract farming models applied in the Beira and Nacala Corridors, they are mainly categorized in three types, as listed below, according to the conditions for input supply and its repayment.

- Model 1: Input supply (seed and fertilizer, sometimes land preparation service by a tractor) based on the bank loan contract. Inputs are delivered to farmers from a private sector partner at a price,
- Model 2: Input supply (seed and fertilizer, sometimes land preparation service by a tractor) based on a mutual agreement with farmers on the delivery of the harvest. Input costs are deducted from the payment for the harvest.
- Model 3: Input supply (only seed) free of charge based on a mutual agreement with farmers on the delivery of the harvest.

Each model has its advantages and disadvantages relating to the points of: i) the input supply system; ii) the provision of technical extension services; iii) arrangements for the collection of crops; and iv) repayment of input costs. Those points will be clarified upon implementing the pilot projects with agribusiness partners, explained in sub-chapter 2.10, in order to test the potential arrangements for involving both private sector partners and small-scale farmers in the production of food/cash crops with the provision of necessary agriculture inputs and extension services.

However, there is no doubt that the contract farming model has the potential of involving a large number of small-scale farmers in the product value chain by facilitating private sector partnerships, which would eventually contribute to improved food security and income for the local population.

## 2.8.2. Responsible Agricultural Investment (RAI)

ProSAVANA will fully adopt the concept of RAI which is represented by the internationally accepted “7 key principles.” Table 2.8.1 shows the constraints and potentials for private investment projects in agriculture / agro-industry sector in the Nacala Corridor as related to each RAI principle.

**Table 2.8.1 RAI Principles as related to Constraints and Potentials in Nacala Corridor**

	Constraints	Potentials
1	<b>Respecting Land and Resource Rights</b>	
	<ul style="list-style-type: none"> <li>- Disordered tenure of small and scattered farm plots (DUAT holders by occupancy) .</li> <li>- Weak dissemination and enforcement of Land Law.</li> </ul>	<ul style="list-style-type: none"> <li>- Government's strong initiative in search of available land for investment projects;</li> <li>- “Investor-community partnership agreement” as a mechanism to smooth negotiation on DUAT.</li> </ul>
2	<b>Ensuring Food Security</b>	
	<ul style="list-style-type: none"> <li>- Prevailing practice of shifting cultivation with low yield and long fallow period;</li> <li>- Small-scale farmers' adhesion to having own land for staple crop production.</li> </ul>	<ul style="list-style-type: none"> <li>- Large potential to produce surplus of staple crops (maize, cassava, sorghum, beans, groundnut ).</li> <li>- Emerging out-grower schemes in benefit of small-scale farmers' income and livelihood.</li> </ul>
3	<b>Ensuring Transparency, Good Governance, and a Proper Enabling Environment</b>	
	<ul style="list-style-type: none"> <li>- Complexity and structural deficiency of different licensing mechanisms (investment authorization, DUAT application, EIA, industrial license, etc.)</li> </ul>	<ul style="list-style-type: none"> <li>- Existence of Nacala SEZ and other proposed new SEZs for agro-industrial clusters, as well as CPI / CEPAGRI branches in Nampula.</li> </ul>
4	<b>Consultation and Participation</b>	
	<ul style="list-style-type: none"> <li>- Weak consensus building in the current procedure of community consultation .</li> <li>- Vagueness of “investor-community partnership agreement” and lack of enforcement mechanism.</li> </ul>	<ul style="list-style-type: none"> <li>- Modification of Land Law Regulations to improve the procedure of community consultation</li> <li>- Existence of experienced NGOs and skilled facilitators fluent in local languages.</li> </ul>
5	<b>Responsible Agro-Enterprise Investing</b>	
	<ul style="list-style-type: none"> <li>- Frequent failure of CSR activities by investors due to donation of infrastructure without guaranteed continuity of human resources.</li> </ul>	<ul style="list-style-type: none"> <li>- Successful cluster development among soybean production, feed processing and poultry farming, involving small-scale farmers.</li> </ul>
6	<b>Social Sustainability</b>	
	<ul style="list-style-type: none"> <li>- Conflicts due to delayed payment of compensation or involuntary resettlement process.</li> <li>- High rate of social vulnerability in some districts.</li> </ul>	<ul style="list-style-type: none"> <li>- Good acceptance of some preceding investment projects associated with job creation and active technical transfer for local people.</li> </ul>
7	<b>Environmental Sustainability</b>	
	<ul style="list-style-type: none"> <li>- Difficulty in conversion of forest into farmland due to community's high dependency on forest resources for energy, fiber, timber, protein, etc.</li> <li>- Weak supervision mechanism of licensed projects by environmental authorities.</li> </ul>	<ul style="list-style-type: none"> <li>- District Land-Use Planning being elaborated to keep balance between economic development and environmental conservation.</li> <li>- Small area of protected zones and relatively low incidence of endangered species or habitats.</li> </ul>

Source: Study Team

### **2.8.3. Requirements for Environmental and Social Considerations**

From the perspective of private investment in the agriculture / agro-industry sector, there are three major requirements for environmental and social considerations: (1) selection of project site; (2) EIA and environmental licensing; and, (3) community consultation and compliance with investor-community partnership agreements.

#### **(1) Selection of Project Site**

The project should not be located inside or around the nationally-designated protected areas, namely: Lake Niassa Partial Reserve (also a Ramsar site), Mecuburi Forest Reserve, M'palue Forest Reserve and Ribaué Forest Reserve. Also, the project should avoid disturbance of the "zones for partial protection" stipulated in Land Law Regulations.

Since complete inventories based on scientific investigation are still lacking, project applicants should survey each potential site beforehand to avoid disturbance of the following elements: "zones of historical cultural value and use" stipulated by Forest and Wildlife Law Regulations; "zones for archaeological protection" stipulated by Archaeological Heritage Protection Regulations; other cultural heritages<sup>3</sup>; and, habitats of threatened plant or animal species<sup>4</sup>. It is also recommendable to verify the landmine clearance.

Overlapping with existing DUATs should also be avoided. Particular attention should be paid to the DUAT holders by occupancy, since these DUATs are usually "invisible" for outsiders due to the slow advance in voluntary registration.

#### **(2) EIA and Environmental Licensing**

Environmental license is defined to precede any other licensing required for an investment project. A full EIA Report or a Simplified Environmental Report is required for the projects in Category A and B, respectively. Projects in Category C are exempt from an EIA. A full EIA report should contain a summary, main text, environmental management plan, record of public consultation and annex, as well as a resettlement plan if necessary. The EIA process of a proposed project can result in either granting the environmental license, or partial/total rejection. A licensed project is required to start its activities within two years, and the environmental license should be renewed every five years. The project side has an obligation to periodically inform the monitoring results according to the environmental management plan, and also accept environmental inspection or audit by the Government at any time.

#### **(3) Community Consultation and Compliance with the Investor-community Partnership**

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<sup>3</sup> According to the Niassa Provincial Directorate of Education and Culture (DPEC), there are 454 cultural heritage sites in the province as of 2011 and the number of discovery and registration is increasing.

<sup>4</sup> There are at least 11 threatened (3 mammals and 8 birds) and 9 near threatened (4 mammals, 4 birds and 1 fish) animal species in the Study Area. In addition, at least 42 threatened plant species (including 35 endemic and 3 near-endemic species) are reported in Nampula, Niassa and Zambézia provinces. Lake Niassa and Mount Namuli are well known for endemism.

Community consultation is required both for the DUAT application process and the EIA process. Investors are recommended not to underestimate the importance of this process, since many reports point out that weak consensus building in the community consultation is the underlying reason for many problems that might occur in the operational phase of the projects.

As for the investor-community partnership agreement, one of the fundamental problems is that there is no legal mechanism of enforcement, supervision or penalty for non-compliance. However, both investors and communities are encouraged to put efforts towards fulfilling the terms of agreement in order to maximize the benefit from the investment project, optimize its distribution and minimize the possibility of conflict.

As an addendum to the Interim Report 1, the legal framework of environmental and social considerations in Mozambique is updated in Table 2.8.2, including recently promulgated laws and regulations.

**Table 2.8.2 Legal Framework of Environmental and Social Considerations**

<b>Major Legal Instruments (only those related to Agriculture/Agro-industry Sector)</b>	<b>Responsible Organs (central / provincial)</b>
<b>Environment in general, Environmental Impact Assessment</b> <ul style="list-style-type: none"> <li>✦ Law no. 27/90: Environment Law</li> <li>✦ Decree no. 45/2004: Regulation on Process of Environmental Impact Assessment (plus, Ministerial Orders no. 198/2005, 129/2006, 130/2006, 182/2010)</li> <li>✦ Decree no. 11/2006: Regulation on Environmental Inspection</li> <li>✦ Decree no. 25/2011: Regulation on Process of Environmental Audit</li> <li>✦ Decree no. 5/2012: Regulation on Simplified License</li> </ul>	MICOA / DPCA
<b>Pollution, Waste</b> <ul style="list-style-type: none"> <li>✦ Decree no. 18/2004: Regulation on Standard of Environmental Quality, Emissions and Effluents (plus, Decree no. 67/2010)</li> <li>✦ Decree no. 13/2006: Regulation on Waste Management</li> <li>✦ Decree no. 6/2009: Regulation on Management of Pesticides</li> </ul>	MICOA / DPCA MINAG / DPA (for pesticide)
<b>Land, Forest and Wildlife, Protected Areas</b> <ul style="list-style-type: none"> <li>✦ Law no. 19/97: Land Law</li> <li>✦ Decree no. 66/98: Regulation on Land Law (plus, Decrees no. 1/2003, 50/2007, 43/2010, Resolution no. 70/2008 and Ministerial Orders no. 29-A/2000, 144/2010, 158/2011)</li> <li>✦ Decree no. 60/2006: Regulation on Urban Land</li> <li>✦ Law no. 10/99: Forest and Wildlife Law</li> <li>✦ Decree no. 12/2002: Regulation on Forest and Wildlife Law (plus, Decrees no. 11/2003, 30/2012, and Ministerial Orders no. 55/2003, 93/2005)</li> </ul>	MINAG / DPA MITUR (for national parks and reserves)
<b>Water</b> <ul style="list-style-type: none"> <li>✦ Law no. 16/91: Water Law</li> <li>✦ Decree no. 43/2007: Regulation on License and Concession of Water</li> <li>✦ Decree no. 47/2009: Regulation on Small Dams</li> <li>✦ Decree no. 18/2012: Regulation on Survey and Exploitation of Groundwater</li> </ul>	MOPH / ARA (at regional level)
<b>Cultural Heritage</b> <ul style="list-style-type: none"> <li>✦ Law no. 10/88: Cultural Heritage Protection Law</li> <li>✦ Decree no. 27/94: Regulation on Protection of Archaeological Heritage</li> <li>✦ Law no. 13/2009: National Liberation Heritage Protection Law</li> <li>✦ Decree no. 72/2009: Regulation on National Liberation Heritage Protection Law</li> </ul>	MEC / DPEC
<b>Territorial Arrangement, Land Expropriation, Resettlement</b> <ul style="list-style-type: none"> <li>✦ Law no. 19/2007: Territorial Arrangement Law</li> <li>✦ Decree no. 23/2008: Regulation on Territorial Arrangement Law (plus, Ministerial Order no. 181/2010)</li> <li>✦ Resolution no. 63/2009: Conservation Policy and its Implementation Plan, Annex 4</li> <li>✦ Decree no. 31/2012: Regulation on Process of Resettlement caused by Economic Activities</li> </ul>	MICOA / DPCA

Source: Study Team

## **2.9. Land Administration**

### **2.9.1. Agricultural Investment and Land Issues**

The Land System within ProSAVANA, is an issue that stands in the discussions concerning the promotion of agricultural investment. Ensuring access to available land is the first factor for analysis in encouraging the private sector to invest.

Mozambique, in turn, adopts a legal framework related to land ownership in order to promote equitable access and secure local communities and the private sector, including the recognition of customary rights. By ensuring the lawful occupation of the land to the people, the government values its citizens properly and its tradition. However, the lack of simple, clear access to ownership and title of the Land Use Rights title (DUAT), as well as the transfer of land use rights, is a major constraining factor for the small farmers and the investing private sector.

In addressing the issue, it is important to have regard to the constitutional principles of Mozambique as: *“1. Land is a state property. 2. Land cannot be sold or by any other means alienated or mortgaged or confiscated. 3. As a universal means to create wealth and social welfare, the use of land is entitled to all Mozambican people (Article 109)”*, and *“the Republic of Mozambique agriculture is the basis of national development (Article 103)”* and *“in Mozambique, agriculture is the basis of national development (Article 103).”*

In this sense, it is important that investors, especially foreigners, are aware of what it means to work the land without the prospect of its valuation, and land tenure (DUAT). The Mozambican legal system allows for occupancy through three methods, (i) occupation through customary norms; (ii) occupation in good faith when held over a period of at least 10 years, and (iii) upon request to the State. For the first two cases, there is a right, whether or not in writing and the request to issue a title is voluntary. In the third case, for all investments in which the land is allocated for a development project, it is mandatory to obtain the Land Use Rights title (DUAT) to establish the exploration rights.

The presently increasing demand for land, concomitant with the increase in population, has caused a growing pressure on the systems of land administration, whose procedural characteristics are not prepared to meet the challenges in question.

### **2.9.2. Trial of MCC Project for Reformation of Land Administration**

Entities related to international cooperation in their analyses and recent studies point out the need for a common system of land management that can efficiently provide increased security of land tenure and improve access to land, enabling an effective environment for economical development.

The MCC - Millennium Challenge Corporation, an organization of American Cooperation, which acts in Mozambique through the Millennium Challenge Account - MCA, is doing

concentrated work in component cooperation with respect to the Land Tenure Project. The project has supported the Mozambican institutions of land administration to increase security in Land Tenure and improve procedures for access to DUAT. This support consists of three areas of activities:

- Activity at specific sites aimed at facilitating access to land collaborating with people: (i) clear information about rights and access to land, (ii) resolution of land conflicts in a more predictable and faster manner, and commercial disputes - creating better conditions for investment and business development, and (iii) register concessions of land use.
- Activity policies contained in the Review and Monitoring of Land Policy, cooperating in solving problems of implementation of existing law, and regulatory review in order to perfect it.
- Activity training for system administration of the lands intended to enable institutions with the goal of being able to implement policies and provide quality services related to land.

As for the project activity in specific locations (pilot actions), the Mozambique government committed itself to cooperation, to perform the mapping and inventory to identify and register the legal situation and the economic exploitation of the land, including the type of land rights (with permission of the state - DUATs in good faith and community) and existing land use. Given this commitment, MCA Mozambique is performing the following actions: (i) implementation of the mapping exercise and inventory, and as part of this process, the pilot of a whole sector approach to the registration of land rights in selected areas; (ii) provision of additional funding for the current program of support to the Community Land Initiative - ITC to allow its operation in Zambezia, Nampula and Niassa, and (iii) provision of simple tools to streamline information access for investors and farmers for land in northern Mozambique, such as legal information, guidance on the requirements for negotiating land access with communities to identify local land use and existing DUATs, and other mechanisms. The coverage areas of these actions are occurring in pilot provinces north of the center:

**Table 2.9.1 Coverage Areas of Actions**

Province	District	County
Zambézia	Morrumbala; Mocuba; Nicoadala	Mocuba; Quelimane
Nampula	Malema; Monapo; Moma	Monapo; Nampula
Cabo Delgado	Mocímboa da Praia; Mecúfi; Montepuez	Mocímboa da Praia; Pemba
Niassa	Majune; Lichinga; Lago	Cuamba; Lichinga

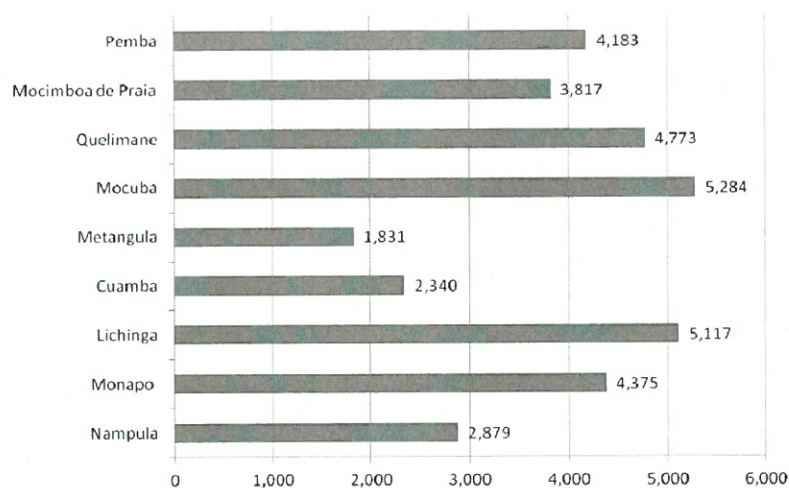
The areas chosen from each province were due to be economically more dynamic and this

will result in information available for various purposes, including planning and management of access to natural resources (including land), reducing the risk of land disputes, and easier and faster access to land by investors and small businesses (agricultural and non-agricultural).

It is observed that communities are increasingly looking to improve the security of their tenure rights, or engage in business relationships with investors through joint initiatives or lease of their land.

The MCA Mozambique, acting in an integrated way in the three areas of activities through a mutual effort, has achieved important results by conducting a systematic program and large-scale regularization and titling of land (DUATs).

Presently, the activity of Regularization DUAT (RDUAT) has featured as the first mass distribution of securities issued to beneficiaries with a total of 16,139 DUATs in the first quarter (February-April 2012). The results of the later period, from May to June, continued increasing and approximately 34,559 parcels were registered during the quarter.



**Figure 2.9.1 Parcels Registered by Counties, May-June 2012**

For the first time, a massive amount of individually or jointly occupied lands are being registered in a formal system in Mozambique. Although there was the possibility of obtaining land use rights title for holders of traditional rights and in good faith, each year an insignificant number of requests was made and consequently there low emissions of DUATs.

The experience of this cooperation (MCA – Land Tenure Project) on the deployed infrastructure and capacity building, can provide a method for obtaining DUATs for all small and medium-sized agricultural holdings under ProSavana, which along with the introduction of good cultural practices in agriculture, can be configured as an important step for mitigating inefficient farming practices and the consequent reduction of itinerant agriculture.



## 2.10. Pilot Project of Quick Impact Projects

### 2.10.1. Pilot Project in Collaboration with Private Sector Partners

Within the Agriculture Development Master Plan for the Nacala Corridor, Quick Impact Projects (QIPs), which are expected to produce positive impacts within a short time period, should be identified from a list of priority agriculture development projects identified in the Master Plan. Some of the QIPs are also expected to be carried out in collaboration with private sector partners in order to stimulate agriculture/agribusiness investments in the Nacala Corridor. Concerning this point, it is critical to demonstrate the feasibility of agribusiness from different perspectives, such as in terms of technologies, financial schemes, policies and regulations, markets, and the organizational framework for supporting business in order to attract private businesses to participate in agribusiness investment. It is therefore worthwhile to implement some pilot projects in order to test the potential arrangements for involving both private sector partners and small-scale farmers in the production of food/cash crops with the provision of necessary agriculture inputs and extension services. Lessons learned from the pilot projects will then be reflected in the Master Plan, making the implementation scheme for QIPs more feasible.

In order to facilitate the implementation of the pilot projects, it is essential that a soft loan scheme be introduced in order to support the efforts of private sector partners in expanding their businesses, and this would then be used to acquire necessary machinery or facilities as well as purchase crops from farmers. In consultation with the Ministry of Agriculture, it was agreed that the Counterpart Fund, for which funds are accumulated in an account managed by the Ministry of Agriculture and JICA Mozambique Office, would be mobilized in order to create a fund for private sector partners to implement pilot projects. GAPI (Sociedade de Investimentos S.A.), a private financial institution that has a specific mandate to support small/medium entrepreneurs with business loans, has been involved in the management of this fund. The fund was officially announced as the “ProSAVANA Development Initiative Fund (PDIF)” through a Memorandum of Understanding between the Ministry of Agriculture and GAPI on September 13, 2012.

An official call for proposals was announced on September 28, 2012 after conducting a public briefing. Twelve proposals from agribusiness companies were submitted, and an official screening of the proposals was conducted by a joint evaluation team, formed by GAPI, DPA and ProSAVANA-PD, by referencing the criteria set by the team with considerations taken in relation to the social impacts on small-scale farmers and local communities, the commercial viability of the business, and the sustainability of the proposed business model. The Steering Committee<sup>5</sup> selected four companies to provide the PDIF, as listed in Table 2.10.1, during a meeting held on October 12, 2012. The selected agribusiness companies will attempt to carry out crop production, such as maize, soybean, beans and

<sup>5</sup> The steering committee comprises of the Ministry of Agriculture, GAPI, JICA, ABC and ProSAVANA Headquarters.

sesame, as well as seed multiplication involving small-scale farmers with different contract farming arrangements.

**Table 2.10.1 Selected Agribusiness Companies and Information on the Proposed Project**

No.	Name of the Company	Project Site		Project Overview	Products	Amount (MT)
		Prov.	District			
1	Lozane Farm	ZA	Alto Molocue	1) Contract farming providing inputs and intensive training on agriculture practice and organizational management, 2) Involvement of more local women (22% of participants), 3) Production of basic seeds at own farm, 4) Information sharing by community radio	Seed (hybrid maize, soybean, bean), Soybean, Vegetables	2,500,000
2	IKURU	NA	Monapo, Mogovolas	Full-package of contract farming with written agreement (including provision of quality seed, tractor service for land preparation, fertilizer, technical extension services)	Sesame (Monapo), groundnuts (Mogovolas)	2,860,000
3	Oruwera Seed Company	NA	Murrupula, Mogovolas, Moma, Gurue	1) Seed production on contract farming with intensive technical extension services, 2) Basic seed production at own farm	Seeds: maize, sorghum, groundnut, sesame, cowpea, pigeon pea	2,800,000
4	Matharia Empreendimentos	NA	Ribaue	1) Crop and vegetable production at own farm (2,200 Ha), 2) Promotion of soybean production with support from TechnoServe, 3) Vegetable production with smallholders providing technical support	Soybean, tomato, onion, garlic, carrot, potato	1,640,000

(ZA: Zambezia Province, NA: Nampula Province)

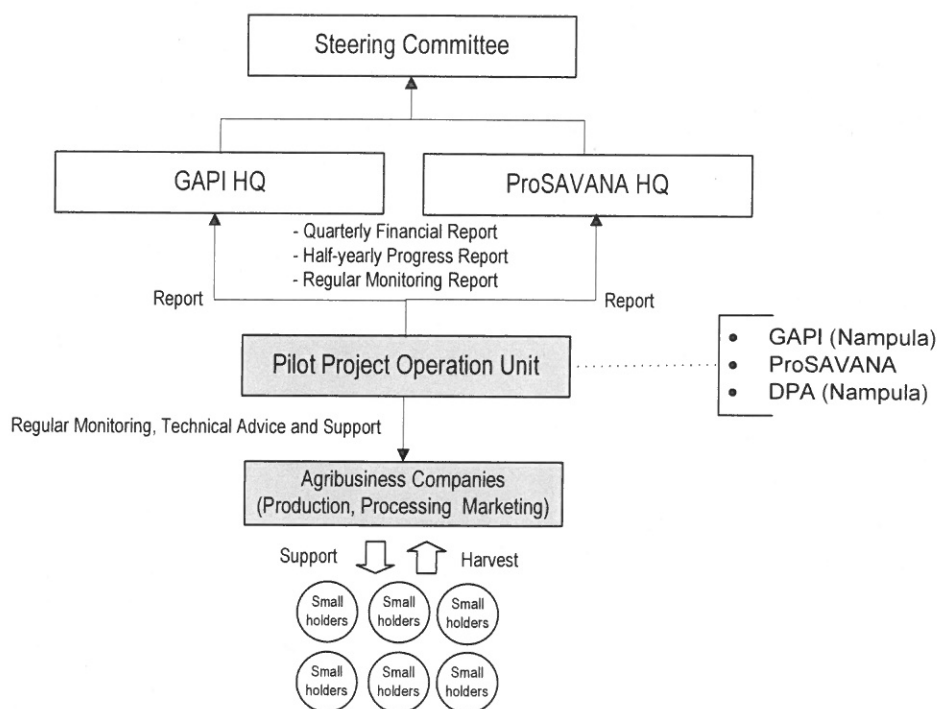
## 2.10.2. Implementation Plan of Pilot Projects

### (1) Project Management Structure

Since the primary goal of implementing the pilot projects is to test different approaches for contract farming involving both private businesses and small-scale farmers in order to gather information on potential commercial farming arrangements, it is critical that a proper management unit for pilot projects be established in order to provide monitoring and advisory support to the agribusinesses in the implementing of activities. The Project Operation Unit (POU) comprised of representatives from the GAPI Nampula office, DPA Nampula and ProSAVANA-PD was formed with the specific tasks summarized in Table 2.10.2. POU reports periodically to both GAPI and ProSAVANA Headquarters in Maputo on the progress of project implementation as well as the status of the fund's operations, which will be presented quarterly to the Steering Committee, as shown in Figure 2.10.1.

**Table 2.10.2 Project Operation Unit in Nampula**

	GAPI Nampula Office	ProSAVANA-PD	DPA Nampula
	- Branch Manager (1) - Task Manager (1) - Technical Staff (3)	- Task Manager (1) - Technical Staff (2) (work at GAPI Nampula office)	- CEPAGRI (1) - DPA SPER (1)
Overall Tasks	<ul style="list-style-type: none"> <li>Identify potential private sector partners (pre-consultation on project ideas)</li> <li>Support preparation of a loan proposal and project implementation plan as necessary</li> <li>Conduct screening of proposals for approval</li> <li>Provide technical supports and advisory services during the implementation</li> <li>Conduct regular monitoring of project implementation</li> <li>Prepare periodic report (Quarterly Financial Report, Half-yearly Progress Report)</li> </ul>		
Specific Tasks	<ul style="list-style-type: none"> <li>Financial management</li> </ul>	<ul style="list-style-type: none"> <li>Advisory support on technical aspects (production and extension)</li> </ul>	



**Figure 2.10.1 Management Structure of the ProSAVANA Development Initiative Fund**

## (2) Implementation Schedule

Though pilot project periods vary from one to three years depending on the proposed agriculture activities/business of the companies, it is expected that the first production cycle with small-scale farmers will start in November 2012 following the conducting of a series of consultations with target groups/associations for the contract farming arrangement. Once the first production and marketing cycle has ended in July 2013, a comprehensive evaluation will be conducted to derive lessons learned from the pilot project.

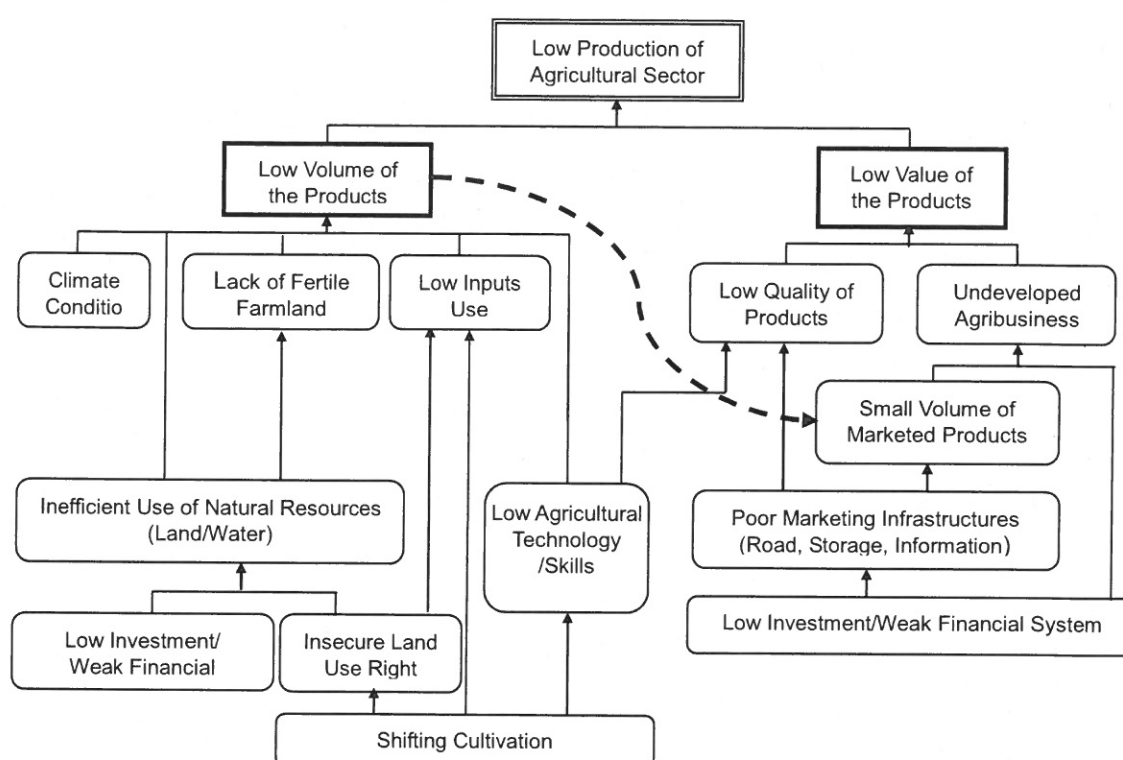


## CHAPTER 3 BASIC CONCEPTS OF AGRICULTURAL DEVELOPMENT MASTER PLAN (DRAFT)

### 3.1. Agricultural Development in the Nacala Corridor

#### 3.1.1. Constraints of Agricultural Development

The constraints of agricultural development in the Nacala Corridor area were identified through field surveys, workshops and interviews with farmers' groups. The general outline of the constraints structure is understood as shown in Figure 3.1.1.



**Figure 3.1.1 Constraints of Agriculture in the Study Area**

At present, small-scale farmers are dominant in agricultural production in the Nacala Corridor Area. Their major farming style is “shifting cultivation with slash and burning.” Shifting cultivation is considered to be one of the suitable approaches of sustainable farming under the present social and economic conditions, i.e., poor farmer’s farming techniques and expensive agricultural inputs, as long as large available land to absorb the increasing farming population. However, shifting cultivation causes low productivity and a low production volume through inefficient use of land resources, low input use and low agricultural technology and skills. Due to the small volume of marketable products caused by the low production volume, the agribusiness and agro-processing industries have been prevented from expanding so far, which is also due to the lack of attractiveness for investment. This has

limited enhancement of the production value and resulted in an increase in the market price of farm products. Furthermore, the widespread shifting cultivation and insecure land use right system has demotivated farmers and investors in regards to investing in agriculture in the Nacala Corridor area.

Obviously, there are many other complicated reasons, but the low productivity of dominant small-scale farmers is the main cause of limitation of growth of the agriculture sector.

Therefore, in order to increase agricultural production and to improve income of local farmers in the Nacala Corridor, it is important to resolve or reduce the constrain factors of agricultural development necessary for the transition from the current shifting cultivation to the intensive farming as well as for increasing productivity of agriculture.

### **3.1.2. Potential of Agricultural Development**

Through filed survey, potentials for agricultural development were also confirmed as below.

- Soils in the Nacala Corridor area are almost neutral or only weakly acidic except for several samples in Gurue. Other specific problems regarding soil, such as salinity, contamination, compaction, depletion of organic matter etc., were not reported.
- The Nacala Corridor area has abundant and undeveloped surface water resources usable for irrigation.
- Areas highly or moderately suitable for irrigation are distributed throughout the Nacala Corridor area.
- A large number of farmers reside in the Nacala Corridor area.
- A new cooperative law, which provides a well-defined legal framework for organizing farmers' cooperatives was promulgated.
- The road from Nampula to Cuamba, and Cuamba to Mandimba will be paved.
- Nacala Port is one of the deepest sea ports in east Africa.
- The Northern Railway (Nacala Railway) allows for mass transit and it is planned to be rehabilitated.
- There is the potential to increase crop production through using cultivated varieties in Brazil developed to apply for tropical savanna.
- The demand for agricultural products for food and feed is high.
- The stabilized politics in the government.
- The government is promoting agribusiness development based on the National Plan of Agribusiness Development, 2012.
- The investment environment in Mozambique is broadly supportive of the agricultural sector, such as exemption of customs duties and VAT on the import of equipment for new projects and deduction of the corporate income tax.

In this way, the Nacala Corridor has a lot of development potential including cluster development and agri-business development, which will contribute to the agriculture

development. It is important to promote the agriculture development by taking advantages of these potentials.

By combination of resolution or reduction of constraints and utilization of development potential, it is possible to achieve a prosperous, competitive and sustainable agriculture in the Nacala Corridor. Thus, the Agricultural Development Master Plan in the Nacala Corridor is to be formulated in order to realize the increase of agricultural production.

## **3.2. Basic Concepts of the Agricultural Development Master Plan**

### **3.2.1. Project Area**

Target districts (the Project Area) of the Agricultural Development Master Plan are 14 districts and 2 municipalities along the Nacala Corridor covering Nampula, Zambezia and Niassa province in the northern area of Mozambique; 8 districts in Nampula province (Monapo, Muecate, Meconta, Mogovolas, Rapale (Nampula) including Nampula city, Murrupula, Ribaue and Malema); 2 districts in Zambezia (Alto Molocue and Gurue) and 4 districts in Niassa (Cuamba, Mandinba, Nguama, and Chimbonila(Lichinga) including Lichinga city).

The Project Area covers a total of 66,300 km<sup>2</sup>. The total population was estimated at 3.7 million in 2011 with a population density of 56.2 people/km<sup>2</sup>.

Land use of the Project Area is covered farmland (28%), grass land (27%), and forest (44%) at the present. 3.3 million ha are arable land and 1.8 million ha are used for fields and tree crop cultivation. A total of 551 thousand farm households cultivate 755 thousand hectares.

### **3.2.2. Vision and Objectives of the Agricultural Master Plan**

#### **(1) Vision of Agricultural Development in the Nacala Corridor**

In the implementation approach of the National Agriculture Development Strategy (PEDSA), the Nacala Corridor is defined as one of the strategic runners among six runners (Pemba-Lichinga, Nacala, the Zambezi Valley, Beira, Limpopo and Maputo) to promote the development of value chains for agricultural products. PEDSA sets its vision as “A prosperous, competitive and sustainable agriculture sector, capable of providing sustainable responses to food security and nutrient challenges and targets agriculture markets globally.”

Ensuring the coherency of the national policy strategy as well as considering the regional character of the Nacala Corridor area, the vision of regional agricultural development is set as below:

*“A prosperous, competitive and suitable agriculture is attained in the Nacala Corridor through activating agricultural production of local farmers and promoting agribusiness.”*

## **(2) Objectives of the Master Plan**

The purpose of ProSAVANA-PD: Formulation of the Agriculture Development Master Plan for the Nacala Corridor is set as, “contributes to social and economic development by engaging private investment to promote a sustainable production system and poverty reduction in the Nacala Corridor.”

The Project Area of the Agricultural Development Master Plan is recognized as land fairly good for agriculture, but at present, agriculture is done in small-scale fields (1.37 ha per farm-household) under traditional shifting cultivation with traditional tools. Therefore, the productivity of crops has remained at a low level causing the slow reduction of poverty in the Project Area.

After the analysis of the above-mentioned national policies and the present constraints, and problem identified in the Project Area, the Master Plan shall be formulated based on the following objectives:

*Improve the agricultural productivity of the small to medium scale farms, and*

*Maximize the effects of increased agricultural products to the regional economy through the development of agricultural clusters through the private investment and involvement of the small and medium-scale farms*

### **3.2.3. Target Year and Staging**

The target year of PEDSA is 2020, that for Millennium Goals (PARPA) is 2015 and other development plans of Mozambique Government together with Beira Agriculture Growth Corridor is 2030. Also, the Cerrado development in Brazil took 30 years to achieve full development because it started from land reclamation.

The agricultural development plan proposes the transformation from traditional extensive shifting cultivation to intensive cultivation. This drastic change is inevitable to enhance the agricultural productivity. It needs a significant preparatory period considering the low literacy rate of the population.

Therefore, the target year of the Master Plan is set as 2030 after starting the implementation in 2014, with 7 years for the short term as the preparation period including the quick impact projects, 5 years for the middle term as the development growing period and 5 years for the long term as the full development operation period as shown in the figure below:



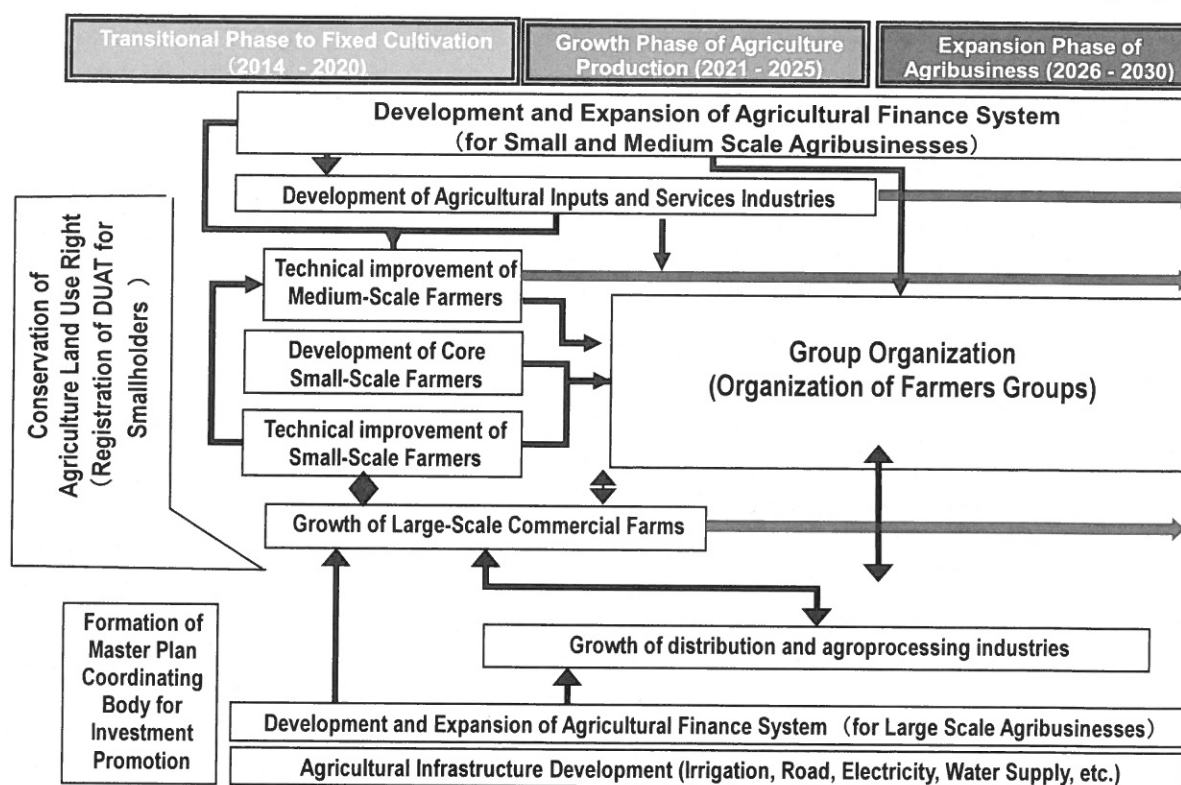


Figure 3.2.1 Phasing of the Master Plan Implementation

### 3.2.4. Targeted Beneficiaries

The main targeted beneficiaries through the implementation of the Master Plan are about 550,000 farm-households (or about 2 million family members) of small-scale farmers that live in the 14 districts in the Nacala Corridor. They will directly benefit through increased crop productions from intensive cultivation, technical supports, sufficient agricultural input, and easy access to the market by the implementation of the Master Plan.

Role of the Stakeholders of the Agricultural Development Master Plan are summarized as follows:

Table 3.2.1 Major Roles of Stakeholders in the Implementation of Master Plan

Stakeholders	Major Roles in the Master Plan Implementation
Family scale farmers (Small-scale farmers)	They are the major player to increase agricultural products. In order to do that, their transition from shifting cultivation to intensive cultivation is promoted. Using the intensive cultivation techniques, the growth of agricultural production will be archived
Leading farmers (Medium scale farmers)	They practice aforementioned intensive farming in a positive way. They will make a group to generate farmer's leader (or role model) to improve local agricultural production
Corporate farms (Large-scale farmers)	They are core to develop agribusiness in local areas. They are the main players to establish agricultural clusters. They also function as good buyers of the product in the area, technical extension service providers and employers.
Suppliers and distributors of agricultural inputs	Based on the principal of market mechanism, they supply required agricultural inputs consistently at a fair price
Traders and agro- processing industry	They function as good buyers of agricultural products in local areas and also as suppliers of employment for local inhabitants.
Agricultural finance institutes	They develop financial schemes for the agricultural sector and supply compassionate services especially for medium and small-scale farmers or companies related to the agricultural sector
Government, research institution, extension service, NGOs	They show the direction of agricultural development in the rural economy and prepare basic conditions needed for development of the private sector including individual farmers.

### 3.2.5. Forecasted Figures Concerning Major Crops

#### (1) Major Index of Target under PEDSA

Under PEDSA, an average annual growth of 7% is targeted for the agricultural sector. The target of major national agricultural production and other indexes under PEDSA up to 2020 are summarized as shown below.

**Table 3.2.2 Major Index of Target under PEDSA**

Indicators	Base Year (2010)	Indicative Target						
		Year						
		2011	2012	2013	2014	2015	2020	
Real growth of the agricultural sector (%)	6.1	At least 7 % per year						
Population in condition of insecurity feed (000)	400	350				200	200	
Annual production of cereals (000 ton)	2,800	3,250	3,650	4,200		4,950	7,000	
Annual production of staple foods (000)	Maize	2,166	2,283	2,400	2,600	2,740	3,000	4,400
	Rice	260	308	338	371	391	450	510
	Wheat	13.0	22.5	23.0	23.2	23.5	25.0	30.0
	Sorghum	378	422	450	480	500	500	750
	Beans	257	288	310	310	310	310	550
Productivity of major food crops (ton/ha)	Cassava	9,200	11,700	13,000	14,700	15,000	15,000	20,000
	Maize	1.1	1.2	1.3	1.5	1.7	1.8	2.0
	Wheat	1.8	1.8	1.8	1.9	2.0	2.0	2.0
Annual production in Cash Crops (000)	Rice	1.1	1.2	1.3	1.6	1.7	1.8	2.0
	Cashew nuts	96.0	98.0	103.0	112.0	120.0		120.0
	Cotton	70.0	75.8	83.4	91.7	120.0		120.0
	Soybeans	20	20	21	23	25		35
Annual production of vegetables (000)	Tobacco	70	73	76	80	83		100
	Banana	35	40	45	50	55		70
	Potato reno	186	203	230	250	250		300
	Tomato	195	200	205	215	220		400
The overall population of animals (million)	Onion	80	93	108	126	140		160
	Bovine	1.4	1.5	1.6	1.7	1.8	3.0	3.0
Quantity produced and Meat	Chickens	17.9	18.3	18.3	18.7	19.1	3.0	30.0
	Bovine meat	10.0	10.6	11.2	11.9	12.6		15.0
	Chickens	58.1	64.0	70.3	77.4	85.1		100.0
	Milk (million. liter)	2.3	2.7	3.3	4.0	4.8		10.0
Total number of producers received extension services (000)	432.0	487.0	531.0	545.0	582.0		600.0	
Areas with irrigation systems built (000)	0.8	2.5	2.5	5.0	5.5		5.0	
Index of use of drip irrigation systems	60.0	65.0	70.0	80.0	85.0	90.0	90.0	
Nr. joints used in traction animal	9,777	10,777	11,777	12,777	13,777	14,777	20,000	
Basic seed quantity produced	631	757	908	1,098	1,200	1,200	1,500	
Number of ha. of reforested land	15.7	23.0	29.0	33.0	37.0		60.0	
Number of communities with certified land	25.0	35.0	45.0	55.0	65.0	70.0	100.0	
Number of producers' associations assisted in potential agricultural areas	4,277	4,872	6,072	7,272	8,472	9,700	13,000	

#### (2) Production in the Project Area

Production of major crops in the Project Area for the year 2020 and 2030 is shown in Table 3.2.3. The six crops listed in the table, i.e. maize, cassava, sorghum, beans, groundnut, paddy and soybean, accounted for almost 90 % of the total crop planted area in the Project Area during the cropping seasons for 2006/07-2010/11.

**Table 3.2.3 Production Forecast of Major Crops in the Study Area**

Crop	Base Year (2010/11)				2020				2030			
	Area (ha)	Yield (ton/ha)	Production (ton)	Value (mil.MT)	Area (ha)	Yield (ton/ha)	Production (ton)	Value (mil.MT)	Area (ha)	Yield (ton/ha)	Production (ton)	Value (mil.MT)
Maize	305,000	1.3	396,500	1,665	406,000	2.0	812,000	3,410	505,000	2.5	1,262,500	5,303
Cassava	328,000	7.2	2,361,600	1,417	377,000	9.0	3,393,000	2,036	390,000	10.0	3,900,000	2,340
Sorghum	131,000	0.9	117,900	578	150,000	1.5	225,000	1,103	155,000	1.8	279,000	1,367
Beans	132,000	0.7	92,400	1,164	165,000	0.9	148,500	1,871	190,000	1.0	190,000	2,394
Groundnut	100,000	0.7	70,000	413	117,000	1.2	140,400	828	130,000	1.5	195,000	1,151
Paddy	37,000	1.0	37,000	155	45,000	2.0	90,000	378	50,000	2.5	125,000	525
Soybean	7,500	1.0	7,500	91	89,500	1.7	152,150	1,841	210,800	2.0	421,600	5,101
Total	1,040,500	-	3,082,900	5,483	1,349,500	-	4,961,050	11,467	1,630,800	-	6,373,100	18,180
Other Crops	110,000	-	-	-	220,500	-	-	-	369,200	-	-	-
Total Area	1,150,500	-	-	-	1,570,000	-	-	-	2,000,000	-	-	-

Source: The JICA Study Team

In this analysis, the planted area (ha) and yield (ton/ha) of the major crops in 2020 and 2030 were set through a synthetic judgment considering the following available information.

### 1) Planted Area (ha)

- Trend of planted area (agricultural statistics from concerned DPAs)
- Estimated population in rural areas based on the population census in 2007
- Trend of per capita consumption (FAOSTAT and Nampula DPA)
- New developed area for large-scale investments by 2020 (200,000 ha, the existing agriculture DUAT area)
- New developed area for large-scale investments during 2021-30 (300,000 ha, considering available farmland area and environmental impact, especially on the existing production forest area)
- Higher ratio for the increase of planted area increase of other crops than the percentage of major crops
- Soybean oriented farming combined with maize, etc. shall be introduced in 80% of the newly developed area for corporate farms
- 1 crop-season/year

### 2) Yield (ton/ha)

- Trend of yield (agricultural statistics from concerned DPAs)
- Yield of several advanced and neighboring countries, mainly Brazil and South Africa (FAOSTAT)

Total value of the major crops at constant price of the base year (2010/11) will be MT 11,467 million (209% of 2010/11) in 2020 and MT 18,180 million (332 % of 2010/11) in 2030.

### (3) Demand (Food Consumption) in the Project Area

Forecasted demands for the major crops in 2020 and 2030 are shown in Table 3.2.4. The demand is calculated only for direct food consumption. Indirect food demand such as that for edible oil and animal feed are not calculated. Wheat is also added in the forecast calculation, since it is a major food commodity in the Project Area. The following information is mainly referred to for the forecast calculation.

- Estimated population based on the population census in 2007 (INE)
- Trend of per capita consumption (FAOSTAT and Nampula DPA)

**Table 3.2.4 Demand Forecast of Major Crops in the Study Area**

Crop	Base Year (2010/11)			Population: 3,728,509	
	Per-capita (kg/year)	Food (ton)	Crop (ton)	Losses & Seeds (ton)	Total (ton)
Maize	40.0	149,140	165,712	33,142	198,854
Cassava	220.0	820,272	820,272	164,054	984,326
Sorghum	15.0	55,928	62,142	12,428	74,570
Beans	9	33,557	33,557	6,711	40,268
Ground nut	5.0	18,643	46,606	9,321	55,928
Rice (Paddy)	24.0	89,484	149,140	29,828	178,968
Wheat	20.0	74,570	82,856	16,571	99,427
Crop	Year 2020			Population: 5,016,047	
Maize	50.0	250,802	278,669	55,734	334,403
Cassava	215.0	1,078,450	1,078,450	215,690	1,294,140
Sorghum	10.0	50,160	55,734	11,147	66,881
Beans	11.5	57,685	57,685	11,537	69,221
Ground nut	5.0	25,080	62,701	12,540	75,241
Rice (Paddy)	29.0	145,465	242,442	48,488	290,931
Wheat	25.0	125,401	139,335	27,867	167,202
Crop	Year 2030			Population: 6,682,687	
Maize	50.0	334,134	371,260	74,252	445,512
Cassava	205.0	1,369,951	1,369,951	273,990	1,643,941
Sorghum	7.5	50,120	55,689	11,138	66,827
Beans	13.5	90,216	90,216	18,043	108,260
Ground nut	5.0	33,413	83,534	16,707	100,240
Rice (Paddy)	34.0	227,211	378,686	75,737	454,423
Wheat	30.0	200,481	222,756	44,551	267,307

(Note) a. Milling recovery of cereals is 90%, while that of rice is 60%  
 b. Yield of ground-nut after shelled is 40%  
 c. % of losses & seeds use is 80% for all crops

Source: The JICA Study Team

As shown in Table 3.2.5, per capita consumption of the major crops in the respective years can guarantee an adequate calorie intake for the population in the Project Area. The table implies that the people will be able to have a diverse and well-balanced diet gradually after 2020.

**Table 3.2.5 Predicted Calorie Intake in the Project Area**

Crop	Base year (2010/11)		2020		2030	
	kg/year	kcal/day	kg/year	kcal/day	kg/year	kcal/day
Maize	40.0	388	50.0	485	50.0	485
Cassava	220.0	922	215.0	901	205.0	859
Sorghum	15.0	146	10.0	97	7.5	73
Beans	9.0	84	11.5	107	13.5	125
Ground nut	5.0	80	5.0	80	5.0	80
Soybean	0.0	0	0.0	0	0.0	0
Rice	24.0	233	29.0	282	34.0	331
Wheat	20.0	199	25.0	249	30.0	298
S-total	-	2,052	-	2,201	-	2,251
All Foods	-	2,150	-	2,300	-	2,500
%of major crops	-	95	-	96	-	90

Source: The JICA Study Team

**(4) Food Balance**

Table 3.2.6 shows the forecasted food balance in 2020 and 2030 calculated with the values in Table 3.2.3 and 3.2.4. According to the forecast, the Project Area may have a huge surplus of major crops, i.e. maize, cassava, sorghum and soybean. While the area may have substantial deficit of paddy (rice) and wheat, it will be able to expect to export the surplus crops in addition to supplying them to deficit provinces in the country.

**Table 3.2.6 Forecasted Balance of Major Food in the Study Area**

(Unit: ton)

Crop	Base Year (2010/11)			2020			2030		
	Production	Food Demand	Balance	Production	Food Demand	Balance	Production	Food Demand	Balance
Maize	396,500	198,900	197,600	812,000	334,400	477,600	1,262,500	445,500	817,000
Cassava	2,361,600	984,300	1,377,300	3,393,000	1,294,100	2,098,900	3,900,000	1,643,900	2,256,100
Sorghum	117,900	74,600	43,300	225,000	66,900	158,100	279,000	66,800	212,200
Beans	92,400	40,300	52,100	148,500	69,200	79,300	190,000	108,300	81,700
Groundnut	70,000	55,900	14,100	140,400	75,200	65,200	195,000	100,200	94,800
Paddy	37,000	179,000	-142,000	90,000	290,900	-200,900	125,000	454,400	-329,400
Wheat	0	99,400	-99,400	0	167,200	-167,200	0	267,300	-267,300
Soybean	7,500	0	7,500	152,150	0	152,150	421,600	0	421,600

Source: The JICA Study Team

**3.2.6. Basic Approach of the Agricultural Development Master Plan**

It is recommended that agricultural development in the Nacala Corridor area is achieved through a combination of the approaches below.

- (1) Improvement of Basic Condition of Production and Social and Agricultural Infrastructure
- (2) Increased Agricultural Production
- (3) Development of Agribusiness
- (4) Sustainable Use of Natural Resources
- (5) Capacity Development of Human Resources

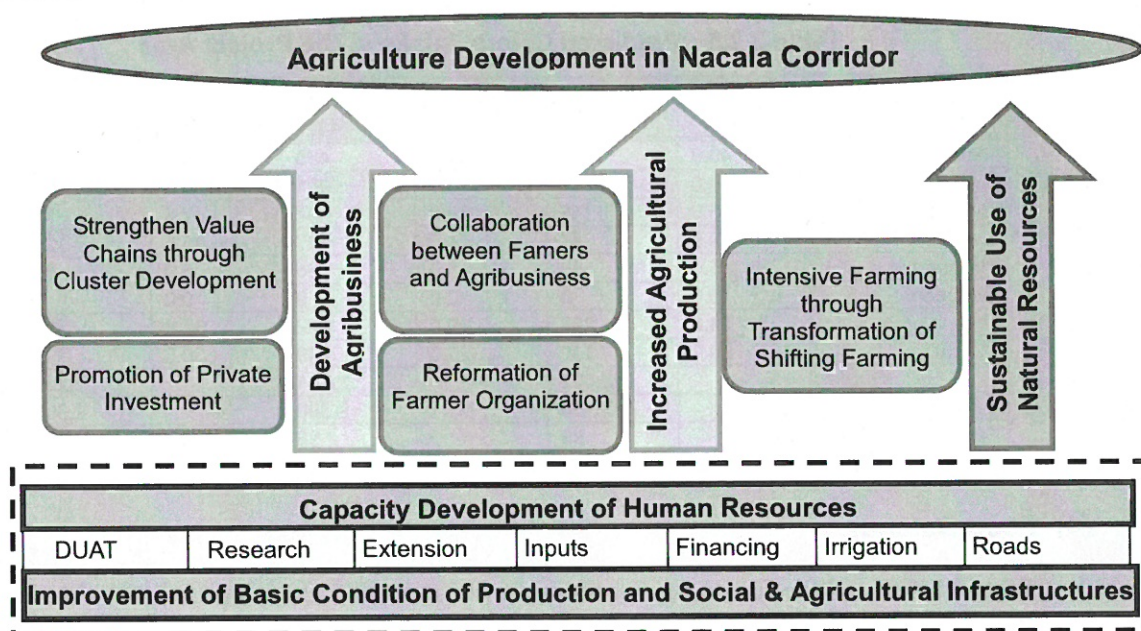


Figure 3.2.2 Basic Approaches of Agricultural Development in Master Plan

**(1) Improvement of Basic Condition of Production and Social and Agricultural Infrastructure**

For sustainable development, strengthening of the basic conditions for agricultural production for both soft and hard components is important. Soft components mean research and development, extension systems, financial support systems and inputs distribution. The hard components refer to infrastructure like irrigation systems and road networks.

Farmland is the base of the production, so the registration of DUAT is also recognized as a fundamental condition for both farmers and investors.

**(2) Increased Agricultural Production**

Increased agricultural production is the base of development of the agricultural sector. In the Nacala Corridor area, small-scale farmers are dominant at present. The production of small-scale farmers will be increased through the transformation from shifting cultivation to intensive cultivation. Further, collaboration among small and medium-scale farmers and agribusiness enterprises is promoted to use private vitality for technical transfer to the farmers. Farmers who cannot access the agribusiness enterprises are improved through farmers' organizations.

Moreover, in order to increase production in the area, private investment in production is also promoted.

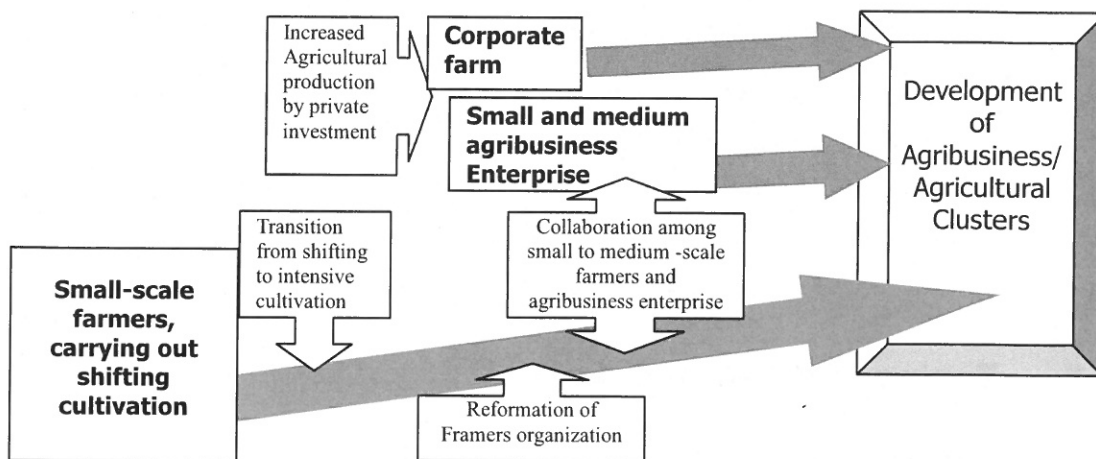


Figure 3.2.3 Approach to Increase Agricultural Production

### (3) Development of Agribusiness

If agricultural products are sold without processing, they earn only a simple value. When agribusiness is developed, the value earned from the products will become much larger than without development. This increased value can raise the regional economy through its proper distribution. Therefore, development of agribusiness should be considered in the Master Plan.

The development of agribusiness will be achieved through the promotion of private investment and by strengthening the value chain through cluster development.

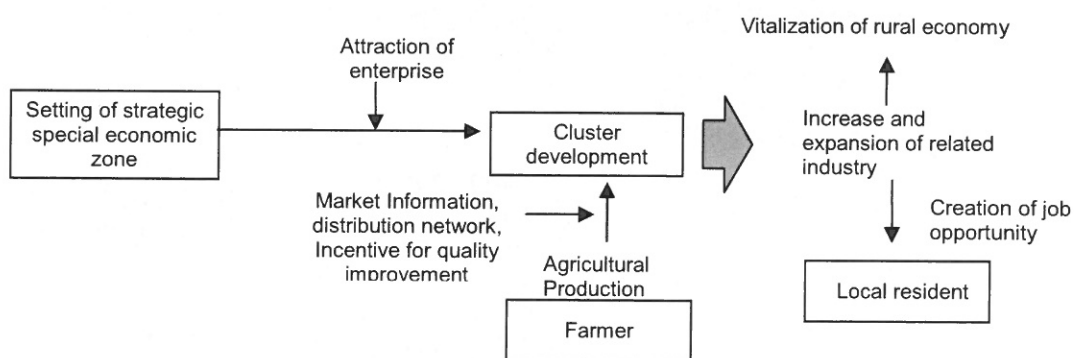


Figure 3.2.4 Cluster Development Model

### (4) Sustainable Use of Natural Resources

Natural resources are the base of agricultural production. In the Nacala Corridor area, natural resources are in a relatively good condition at the moment. However, there are concerns that the conditions might deteriorate due to the growth of the population and economy if no countermeasures are applied. Therefore, the pressure on deforestation should be reduced through the transition from shifting to intensive agriculture. Moreover, proper production for the future must be ensured by establishing a sustained agricultural production system at regional and farm levels.

### (5) Capacity Development of Human Resources

Human resources are a key factor in development. As a result of human resources development, self-sustaining development can be achieved. Therefore, the capacity of farmers should be improved through various methods and channels, and the capacities of leading farmers should be developed to lead improvement of the rural economy.

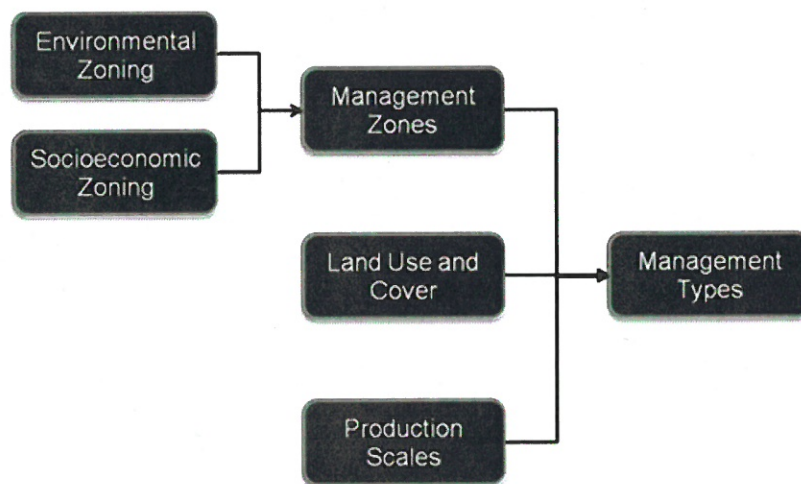
## 3.3. Zoning of the Project Area

### 3.3.1. Methodology

#### (1) Management Type prepared by Brazilian Study Team

The Brazilian study team, the Getulio Vargas Foundation (FGV), designated zones according to “Management Type” indicators in the Project Area. The outline of the methodology is explained in this section.

The Project Area was divided into seven management types (see Table 3.3.2), based on five factors: environmental zoning, socioeconomic zoning, management zones, land use and cover, and production scale as shown Table 3.3.1. The approach for making management types is shown in Figure 3.3.1.



Source: Brazilian Study Team

**Figure 3.3.1 The Approach to Make Management Type by FGV**



**Table 3.3.1 Factors for Making Management Type**

<b>Factors</b>	<b>Contents</b>
Environmental zoning	Environmental Vulnerability by districts (Ranking districts by the indicators of Protected area %, Partial protection area* %, and Wood energy %)
Socioeconomic zoning	Socioeconomic Vulnerability by district (Ranking districts by the indicators of Rural population, Road density, Railway density, Total cultivated area %, and Literate population %)
Management Zones	Classification of districts by Environmental Vulnerability and Socioeconomic Vulnerability
Land use and cover	Land cover and land use map at the scale of 1 : 1,000,000 from AIFM by DNTF
Production Scale	Selecting crops in large-scale, medium-scale, or small-scale farms by referring to Crop Suitability Map

\*: The area around perennial river courses and springs

## **(2) Regional Zoning Approach by the JICA Study Team**

The Brazilina Study Team took a project-oriented approach to classify the zoning of the Project Area and they gave priority to identifying areas of high potential for the development of commercial agriculture (corporate farm). The JICA Study Team emphasizes the elaboration of development strategies to cover the entire Project Area under a regional approach. The integration of the two parties' approaches will enable establishment of the Agriculture Development Master Plan showing a regional development strategy.

## **(3) Integrating Approach of FGV and JICA**

The Project Area is classified into four agriculture development types by district, based on the sum of the scores (3 levels) of three factors by district. The agriculture development types have the following characteristics:

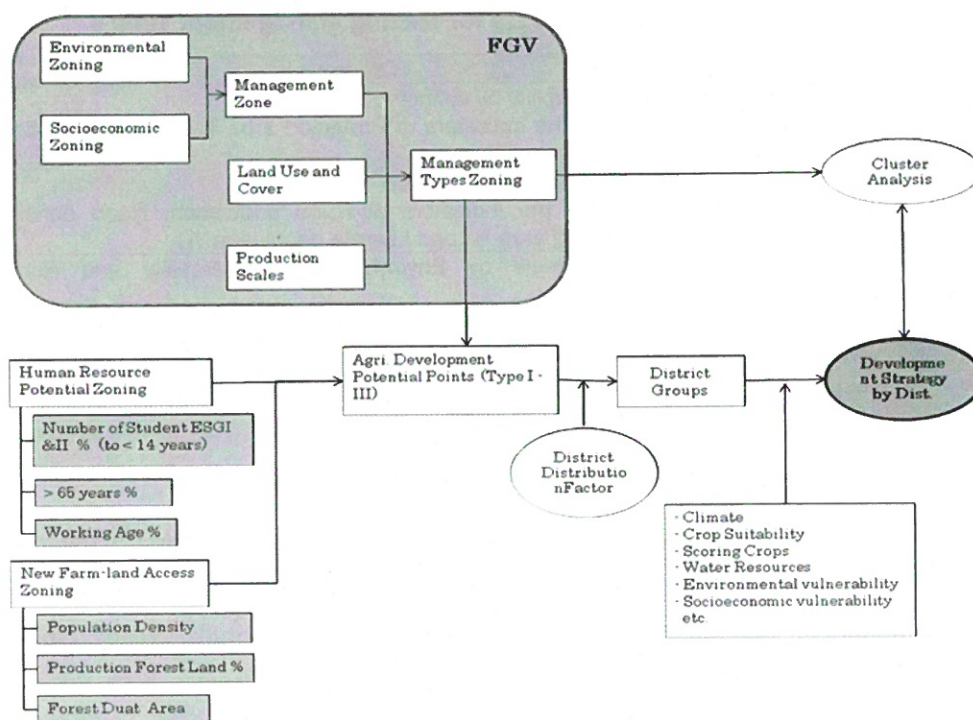
Type I: It has great potential for the development of industrial agriculture

Type II: It has potential for the development of industrial agriculture

Type III: Displays a particular potential for the development of industrial agriculture but needs attention on environmental terms

Type IV: Presents little potential for the development of agriculture industry

The flow of approach is shown in Figure 3.3.2.



Source: JICA Study Team

Figure 3.3.2 Flow of Integrated Approach of Both Study Teams

#### (4) Agricultural Potential Points

The entire Project Area was classified in terms of environmental vulnerability and socio-economic vulnerability. The overlap of these conditions on a land cover map allows the delimitation of areas with high potential for development of industrial agriculture. The Project Area was reevaluated according to their characteristics in terms of "Agricultural Development Potential"

To show the "Agricultural Development Potential" for each district, the district was ranked into three levels by scoring factors related to agricultural development. The two factors "Human Resources" and "Land Resources", which have great influence on agricultural development, are scored for qualification of "Agricultural Development Potential". Another important factor, "Finance" or "Budget" is not considered in quantifying, since it is allocated based on the component of the Master Plan. Other factors to be considered such as the "Weather" and "Crops for particular climate" were used to show the features of each zone, after classification in terms of "Potential Agricultural Development."

The two quantified factors above were subdivided into sub-factors as below. Each sub-factor was scored on five levels, so that the factor score is the sum of all points of its sub-factors.

##### 1) Human resources (human resources potential zoning)

- Percentage of students of ESG I&II for the population between 10 and 14 years by district (human capacity)

- Percentage of seniors (above 65 years) for the total population by district (health)
- Working age population by district (the population of the workforce)

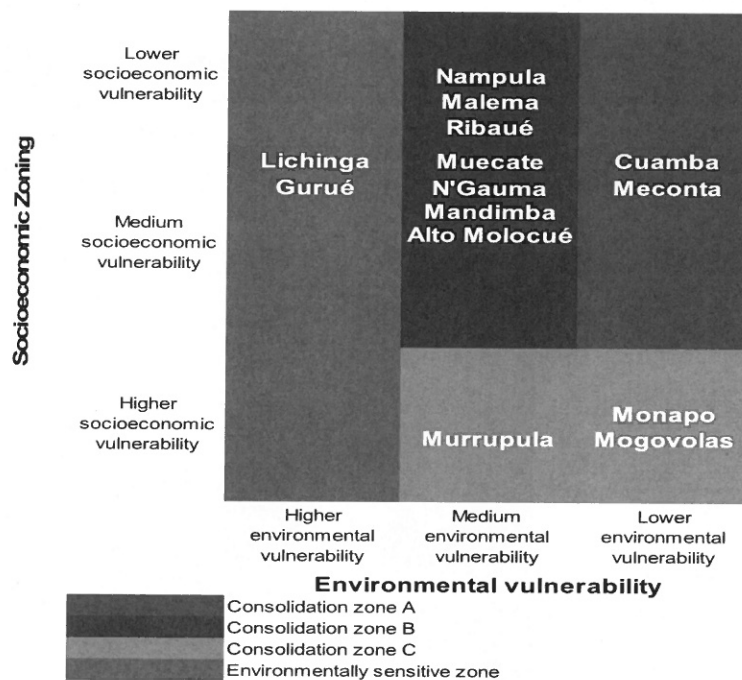
**2) Land resource (new farm-land access zoning)**

- Population density by district (land availability)
- Percentage of forest area for the entire area by district (limitation of new land development 1)
- Percentage of DUATs forest for the entire area by district (limitation of new land development 2)

**3.3.2. Zoning of the Project Area**

**(1) Management Type by Brazilian Team (FGV)**

The 14 districts are classified into 4 management zones, based on their ranking of environmental and socioeconomic vulnerability, as shown in Figure 3.3.3. Cuamba and Meconta are classified as Consolidation Zone A, which has low environmental vulnerability and low to medium socioeconomic vulnerability. In Consolidation Zone A, serious environmental and socioeconomic considerations are not required. Gurue and Lichinga are classified as environmentally sensitive zone. In environmentally sensitive zone, large-scale land development is not recommended.



**Figure 3.3.3 Management Zones by Brazilian Study Team**

Crop suitability maps were prepared by the Brazilian team for Cashew, Cassava, Coffee, Cotton, Cowpea, Elephant grass, Eucalyptus, Groundnut, Haricot beans, Maize, Off-season maize, Paddy rice, Potato, Paddy and Upland Rice, Sesame, Soybean, Sugarcane, Sunflower, Sweet potato, Tobacco and Wheat. The Figure 3.3.4 shows the crop suitability map of soybean and maize. These maps were prepared according to the condition of suitability for annual precipitation, annual average temperature, and soil.

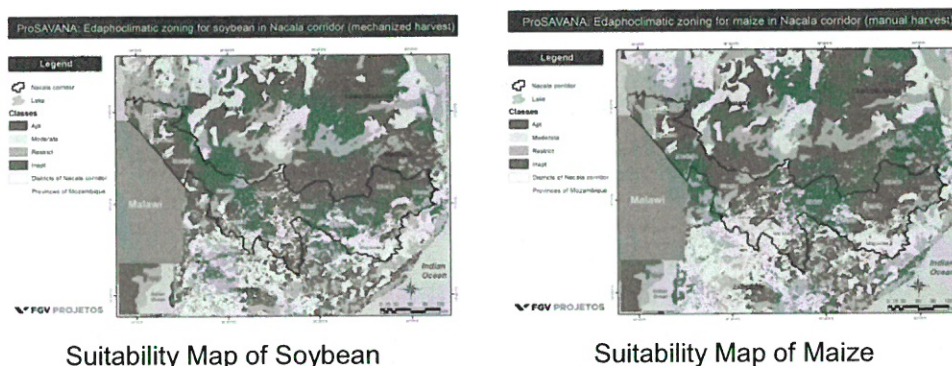
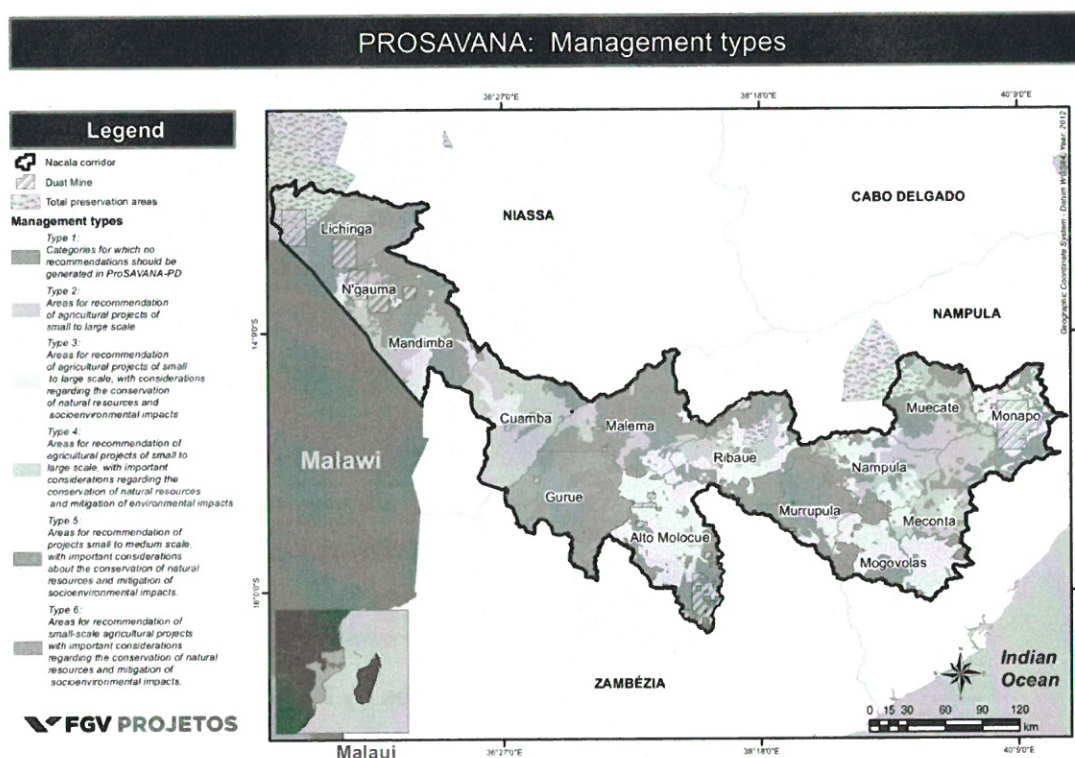


Figure 3.3.4 Crop Suitability Maps

The aforementioned crops are categorized into three production scales such as family farmers, associated farms and corporate farms. (refer to Table 3.5.1), The map of distribution of management type (see Table 3.3.2) in the Project Area was also prepared by the Brazilian team, based on management zone, land cover and land use map, and production scale, as shown in Figure 3.3.5.



Source: Brazilian Study Team

Figure 3.3.5 Management Zones by Brazilian Team

**Table 3.3.2 Description of Management Type**

<b>Management Type</b>	<b>Description</b>
Management Type 1	Areas unsuited for agricultural activities or inadequate for exploitation within the precepts established by the Master Plan
Management Type 2	Areas for recommendation of agricultural projects of family farming to agricultural corporate production
Management Type 3	Areas for recommendation of agricultural projects of family farming to agricultural corporate production, with special considerations regarding the conservation of natural resources and socio-environmental impacts
Management Type 4	Areas for recommendation of agricultural projects of family farming to agricultural corporate production, with important considerations regarding the conservation of natural resources and mitigation of environmental impacts
Management Type 5	Areas for recommendation of agricultural projects of family farming and associated farm, with important considerations regarding the conservation of natural resources and mitigation of socio-environmental impacts
Management Type 6	Areas for recommendation of family farming projects with important considerations regarding the conservation of natural resources and mitigation of socio-environmental impacts

Source: Brazilian Study Team

**(2) Agricultural Development Potential by Zone**

In order to formulate group of districts, districts in the Project Area are divide into six zones based on agriculture development type (I - IV) in addition to considering district geographical distribution. The result is shown in Table 3.3.3 and Figure 3.3.6.

**Table 3.3.3 Grouping of Land Cover Classification**

<b>Districts Groups Zone</b>	<b>Districts</b>	<b>Agri. Development Type</b>
Zone - I	Monapo, Muecate	Agriculture Development Type III
Zone - II	Meconta, Mogovolas, Nampula, Murrupula	Type I, II
Zone - III	Ribaue, Malema, Alto-Molocue	Type III
Zone - IV	Gurue (excluded Lioma plateau)	Type IV
Zone - V	Cuamba, Gurue (Lioma plateau)	Type II
Zone - VI	Mandimba, Ngauma, Lichinga	Type III

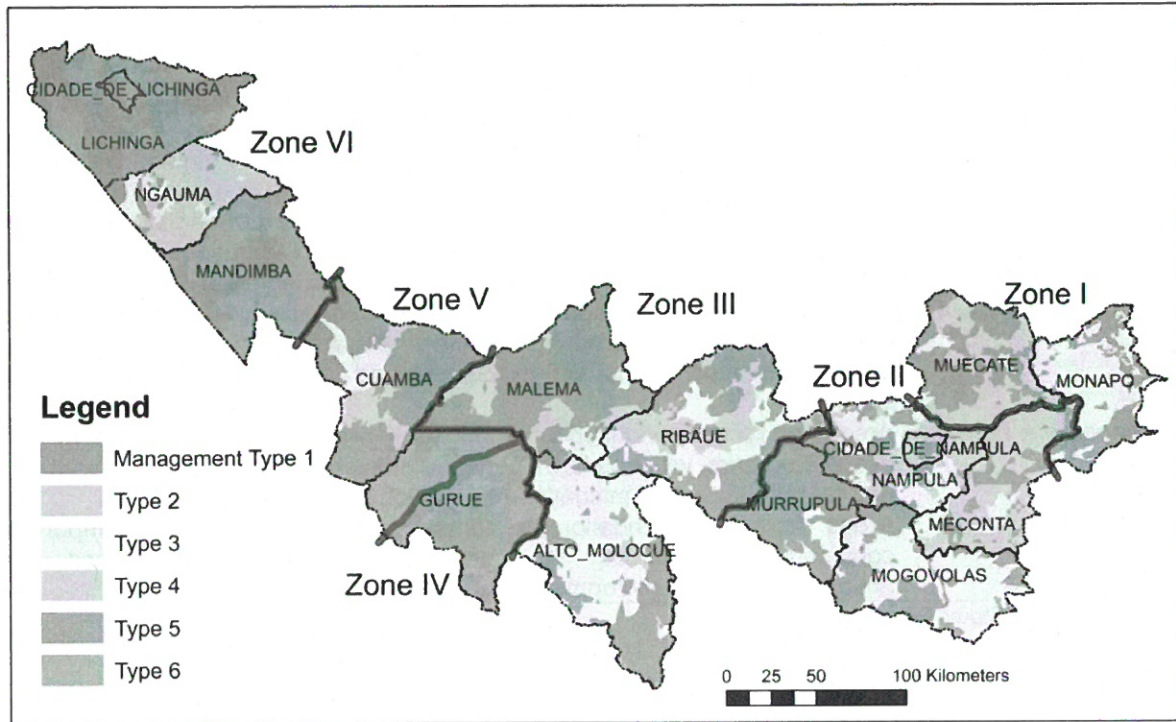
Type I: It has great potential for the development of industrial agriculture

Type II: It has potential for the development of industrial agriculture

Type III: Displays a particular potential for the development of industrial agriculture but needs attention regarding environmental terms

Type IV: Presents little potential for the development of agriculture industry

Source: JICA Study Team



Source: JICA Study Team

Figure 3.3.6 Zoning of the Project Area

### 3.3.3. Agricultural Development Potential

The agricultural development potential by zone is summarized in Table 3.3.4.

Table 3.3.4 Agriculture Development Potential by Zone

Zones	I	II	III	IV	V	VI
Districts & area	Monapo, Muecate	Meconta, Mogovolas, Nampula, Murrupula	Ribaue, Malema, Alto-Molocue	Gurue (excluded Lioma plain)	Cuamba, Gurue (Lioma plain)	Mandimba, Ngauma, Lichinga
Human resource potential	Low to medium	Medium to high	Low to medium	Low	Medium	Medium
New farmland access possibility	Medium	Medium to high	Low to medium	Low	Medium	Medium
Environmental consideration	<Normal Attention> High alert area: Protected area in Muecate. Alert area: Existing forest area in the western part of Muecate district.	<Normal Attention> Alert area: Existing forest area in the southern part of Meconta district.	<Medium Attention> High alert area: Protected area in Ribaue district, and river courses in the area. Alert area: Existing forest area in Malema District and in the south-eastern part of Alto-Molocue district.	<High Attention> High alert area: Concentrated river courses in the area and steep-slopes of Mt. Namuli.	<Normal Attention> Alert area: Existing forest area in Cuamba district	<High Attention> High alert area: Protected area in Lichinga district and river courses in the area. Alert area: Existing forest area in the western part of the area.
Socioeconomic consideration	1. High social vulnerability in Monapo district 2. Large-scale mining concession in Monapo district	1. High socioeconomic vulnerability in Mogovolas and Murrupula district	1. Large-scale mining concession in the south-eastern part of Alto-Molocue district			1. Large-scale mining concession in Ngauma and Lichinga districts
Climate	Average Temperature	Meconta, Nampula, Murrupula: 24 - 25°C Mogovolas: 25 - 26 °C	23 - 24 °C The area around the boundary of Gurue: 22 - 23°C	22 - 23°C	23 - 24 °C	Mandimba: 21 - 23°C Ngauma: 20 - 22 °C Lichinga: Less than 20°C
	Annual Precipitation	1,000 - 1,200 mm	800 - 1,600 mm	1,200 - above 1,600 mm	800 - 1,200 mm	1,000 - 1,200 mm
Land scape (area % of slope above 12%)	Monato: 1 % Muecate: 15 %	Meconta: 4 %, Mogovolas: 4%, Nampula: 15%, Murrupula: 7%	Ribaue: 22%, Malema: 28%, Alto Molocue: 9%	Gurue: 44%	Cuamba: 9%	Mandimba: 10%, Ngauma: 20%, Lichinga: 46%

Zones	I	II	III	IV	V	VI
Soil fertility <sup>1</sup> (area %)	High: 80% Medium: 7% Low: 13%	High: 80% Medium: 6% Low: 4%	High: 39% Medium: 19% Low: 42%	High: 16% Medium: 39% Low: 45%	High: 39% Medium: 31% Low: 30%	High: 0% Medium: 67% Low: 33%
Water resource (specific & annual runoff in MCM)	Specific: 106 Annual: 402	Specific: 226 Annual: 875	Specific: 349 Annual: 2,165	Specific: 648 Annual: 3,657	Specific: 400 Annual: 2,143	Specific: 263 Annual: 1,172
Irrigated area (ha)	In operation: 138 Out of operation: 662	In operation: 267 Out of operation: 1,133	In operation: 702 Out of operation: 1,026	In operation: 136 Out of operation: 76.5	In operation: 10 Out of operation: 44	In operation: 107 Out of operation: 52
Priority staple food crops	Maize, Cassava, Groundnuts	Maize, Cassava, Paddy (Rice), Groundnut	Maize, Cassava, Groundnut	NA	Maize	Maize, Paddy (Rice)
Priority cash crops	Cowpea, Pigeon pea, Sesame, Vegetables, Cashew, Cotton	Cowpea, Pigeon pea, Sesame, Vegetables, Cashew, Cotton	Haricot beans, Soybean, Potato, Vegetables, Cotton, Tobacco	Haricot beans, Pigeon pea, Soybean, Vegetables, Potato, Tea	Haricot beans, Pigeon pea, Soybean, Sesame, Cotton, Tobacco	Haricot beans, Soybean, Sesame, Vegetables, Potato, Tobacco
Area (km <sup>2</sup> )	7,617	15,132	18,636	5,646	5,353	12,945
Population	448,296	907,929	722,576	350,830	216,098	351,191
Population density (habit/km <sup>2</sup> )	59	60	39	62	40	27
Land use (area % of cultivated area, forest, and others)	Agricultural land <sup>2</sup> : 63.4% Forest: 36.4% Others: 0.3%	Agricultural land: 74.3% Forest: 25.0% Others: 0.8%	Agricultural land: 52.0% Forest: 47.2% Others: 0.8%	Agricultural land: 57.8% Forest: 42.2% Others: 0%	Agricultural land: 26.8% Forest: 72.8% Others: 0.5%	Agricultural land: 40.0% Forest: 58.0% Others: 2.0%
Road density (road length m/km <sup>2</sup> )	61	67	53	40	50	47
Railway density (railway length m/km <sup>2</sup> )	6	11	12	0	22	16



### 3.3.4. Current Situation Analysis by Zone (SWOT Analysis)

The current situation of each zone is analyzed by SWOT analysis, based on the potential of each zone as shown in Table 3.3.4. The target of SWOT analysis is “Developing the Agriculture Sector.” The results are shown from Table 3.3.5 to 3.3.10.

**Table 3.3.5 SWOT Analysis for Zone I (Monapo and Muecate)**

	Helpful	Harmful
Internal Origin	<p><b>&lt;Strengths&gt;</b>  <b>Socioeconomic</b>            High population density (high demand for food)  <b>Priority crops</b>            - Priority staple food crops: maize, cassava, ground nuts            - Priority cash crops: cow peas, pigeon pea, sesame, vegetables, cashew, cotton  <b>Local special products</b>            Cashew  <b>Balance of crop production</b>            Surplus of cassava production  <b>Transportation</b>            Along Road N1, N12, and railway (good access to market of Nacala and Nampula)</p>	<p><b>&lt;Weaknesses&gt;</b>  <b>Socioeconomic</b>            Human resource potential: Low to medium  <b>Land cover &amp; land use</b>            - Low access to new farmland development in Monapo (high population)            - Land conflict among local farmers            - Land conflict between local farmers and large-scale farmers            - Limited area to be developed for farm (planned by PDUT)  <b>Irrigation</b>            Many defunct irrigation facilities  <b>Specific problems</b>            Old cashew trees (replacing with new trees)</p>
External Origin	<p><b>&lt;Opportunities&gt;</b>  <b>Market</b>            - Close to Nacala Port, Developing Nacala Port (opportunities to export)            - High demand of food from Nacala area            - High demand of food from Nampula  <b>Irrigation</b>            Installing small pump irrigation</p>	<p><b>&lt;Threats&gt;</b>  <b>Land cover &amp; land use</b>            - PDUT in Muecate (What size will be kept for agricultural area?)            - Large mining concession in Monapo            - Reducing farmland by development of industry and population increase</p>

Source: JICA Study Team

**Table 3.3.6 SWOT Analysis for Zone II (Meconta, Mogovolas, Nampula, Murrupula)**

	Helpful	Harmful
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<b>Internal Origin</b>	<p><b>&lt;Strengths&gt;</b>  <u>Socioeconomic</u>                      Medium to high human resource potential  <u>Land cover &amp; Land use</u>                      Medium to high new farmland access possibility (Mogovolos)  <u>Priority crops</u>                      Priority staple crops: maize, cassava, groundnut                      Priority cash crops: cow peas, pigeon pea, sesame, vegetables, cashew, cotton  <u>Local special products</u>                      Cashew  <u>Balance of crop production</u>                      Surplus of cassava production  <u>Transportation</u>                      Good access to market(Road N1, railway, highest road density in the Project Area)  <u>Market</u>                      Providing feed for poultry</p>	<p><b>&lt;Weaknesses&gt;</b>  <u>Socioeconomic</u>                      High socioeconomic vulnerability  <u>Land cover &amp; land use</u>                      - Limited area to be developed for farm in Murrupula (planned by PDUT)  <u>Infrastructure</u>                      Low utilities of storage facilities  <u>Transportation</u>                      Poor condition of road between Nampula and Mogovolos  <u>Irrigation</u>                      Many defunct irrigation facilities  <u>Specific problems</u>                      Old cashew trees (replacing with new trees)</p>
<b>External Origin</b>	<p><b>&lt;Opportunities&gt;</b>  <u>Market</u>                      - High population of Nampula (High demand for food)                      - High population growth of Mogovolos) (High demand for food in future)  <u>Transportation</u>                      Improving access between Nampula and Cuamba (Road N13)  <u>Irrigation</u>                      Installing small pump irrigation</p>	<p><b>&lt;Threats&gt;</b>  <u>Land cover &amp; land use</u>                      - PDUT in Meconta, Nampula (What size will be kept for agricultural area?)                      - Reducing farmland by development of industry and population increase  <u>Environment Consideration</u>                      Large forest area in Meconta</p>

Source: JICA Study Team

**Table 3.3.7 SWOT Analysis for Zone III (Ribae, Malema, and Alto Molocue)**

	<b>Helpful</b>	<b>Harmful</b>
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<b>Internal Origin</b>	<p><b>&lt;Strengths&gt;</b>  <u>Land cover &amp; land use</u>                  Large cultivated area in Alto Molocue  <u>Water resource</u>                  High water resource capacity                  Many river courses  <u>Priority crops</u>                  - Priority staple crops: maize, cassava, groundnut                  - Priority cash crops: Haricot beans, soybean, potato vegetables, cotton, tobacco  <u>Local special products</u>                  Onion in Malema  <u>Balance of crop production</u>                  Surplus of maize and cassava production  <u>Transportation</u>                  - Rout N1 (To Nampula, To Mocuba)                  - Railway (between Nampula and Cuamba through Ribaue and Malema)  <u>Irrigation</u>                  Many irrigation facilities in operation</p>	<p><b>&lt;Weaknesses&gt;</b>  <u>Socioeconomic</u>                  Low to medium human resource potential  <u>Land cover &amp; land use</u>                  - Forest concession in Ribaue                  - Forest protected area in Ribaue  <u>Transportation</u>                  Low rural road density  <u>Irrigation</u>                  Many defunct irrigation facilities</p>
<b>External Origin</b>	<p><b>&lt;Opportunities&gt;</b>  <u>Land cover &amp; land use</u>                  Large agriculture area in Alto Molocue (Planned by PDUT)  <u>Transportation</u>                  - Improving access between Nampula and Cuamba (Road N13)  <u>Market</u>                  - Close to high population area (Nampula)                  - Close to Cuamba (transportation strategic stop)  <u>Irrigation</u>                  Installing small / medium pump irrigation / gravity irrigation</p>	<p><b>&lt;Threats&gt;</b>  <u>Land cover &amp; land use</u>                  - PDUT in Ribaue and Malema (What size will be kept for agricultural area?)                  - Forest concession in Ribaue and Malema  <u>Environmental consideration</u>                  Large forest area in Malema</p>

Source: JICA Study Team

**Table 3.3.8 SWOT Analysis for Zone IV (Gurue excluding Lioma Plain)**

	<b>Helpful</b>	<b>Harmful</b>
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<b>Internal Origin</b>	<p><b>&lt;Strengths&gt;</b>  <u>Climate</u>                      Cool climate and high precipitation  <u>Water resource</u>                      High water resource capacity                      Many river course  <u>Priority crops</u>                      Priority staple crops: NA                      Priority cash crops: haricot beans, pigeon pea, soybean, potato vegetables, tea  <u>Local special products</u>                      Tea of Gurue  <u>Infrastructure</u>                      Good access to Mocuba</p>	<p><b>&lt;Weaknesses&gt;</b>  <u>Landscape</u>                      Mountainous area (unsuitable for field crop production)  <u>Socioeconomic</u>                      Low human resource potential  <u>Land cover &amp; land use</u>                      Low new farmland access possibility  <u>Infrastructure</u>                      Low rural road density  <u>Market</u>                      Far from Nampula and Nacala  <u>Specific problems</u>                      Necessary to replace old tea trees and old tea processing facilities</p>
<b>External Origin</b>	<p><b>&lt;Opportunities&gt;</b>  <u>Market</u>                      Close to Cuamba (transportation strategic stop)                      Export of tea to India</p>	<p><b>&lt;Threats&gt;</b>  <u>Land cover &amp; land use</u>                      PDUT (What size will be kept for agricultural area?)  <u>Environment consideration</u>                      High environment vulnerability (high concentration of rivers)  <u>Market</u>                      Change of commodity distribution route by improved road N13 between Cuamba and Nampula</p>

Source: JICA Study Team

**Table 3.3.9 SWOT Analysis for Zone V (Cuamba and Lioma Plain)**

	Helpful	Harmful
<b>Internal Origin</b>	<p><b>&lt;Strengths&gt;</b>  <u>Water resource</u>                      High water resource capacity                      Lurio river (perennial river) (small irrigation)  <u>Priority crops</u>                      Priority staple crops: maize                      Priority cash crops: haricot beans, pigeon pea, soybean, sesame, cotton, tobacco  <u>Balance of crop production</u>                      Surplus of Maize production  <u>Local special products</u>                      Soybean in Lioma plain  <u>Agricultural Production</u>                      Huge soybean farm in Lioma plain  <u>Transportation</u>                      Strategic stop (gateway to Nampula, Gurue, Lichinga, Marupa, Tete, and Malawi by primary roads and/or railway)</p>	<p><b>&lt;Weaknesses&gt;</b>  <u>Transportation</u>                      Low rural road density  <u>Irrigation</u>                      Small irrigation area</p>
<b>External Origin</b>	<p><b>&lt;Opportunities&gt;</b>  <u>Transportation</u>                      Road rehabilitation between Cuamba and Nampula, Cuamba and Lichinga, Cuamba and Gurue through Lioma plain, Cuamba and Pemba (Pemba corridor)  <u>Irrigation</u>                      Installing pumping irrigation system along Lurio River</p>	<p><b>&lt;Threats&gt;</b>  <u>Other industries</u>                      Mining industry in Tete and Niassa provinces  <u>Environment consideration</u>                      Large forest area</p>

Source: JICA Study Team

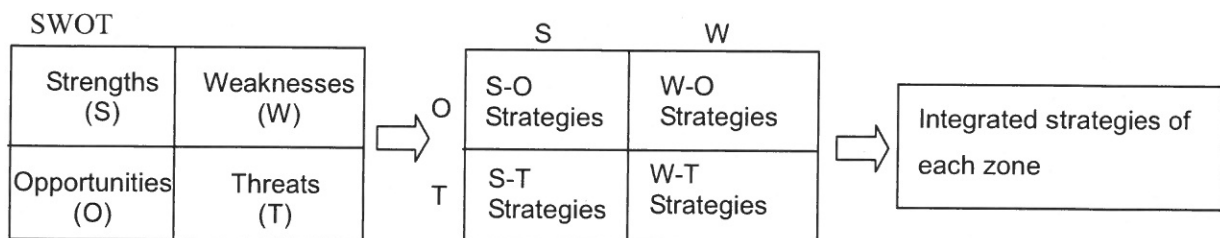
**Table 3.3.10 SWOT Analysis for Zone VI (Mandimba, N'Gauma, Lichinga)**

	Helpful	Harmful
<b>Internal Origin</b>	<p><b>&lt;Strengths&gt;</b>  <u>Climate</u>                      Cool climate and much precipitation in Lichinga  <u>Water resource</u>                      Many river course  <u>Priority crops</u>                      Priority staple crops: maize, paddy                      Priority cash crops: haricot beans, soybean, sesame, vegetables, potato, tobacco  <u>Local special products</u>                      Potato and haricot bean in Lichinga                      Poultry farm in Lichinga  <u>Balance of crop production</u>                      Surplus of maize production  <u>Irrigation</u>                      High rate of irrigation facilities' utilization  <u>Transportation</u>                      Railway to Cuamba  <u>Market</u>                      Feed for poultry                      Exporting maize to Malawi</p>	<p><b>&lt;Weaknesses&gt;</b>  <u>Land cover and land use</u>                      Forest concession  <u>Transportation</u>                      Low rural road density                      Low frequency of train transportation between Cuamba and Lichinga  <u>Irrigation</u>                      Small irrigation area</p>
<b>External Origin</b>	<p><b>&lt;Opportunities&gt;</b>  <u>Demand from farmers</u>                      Providing good quality seed potato to the west area including Zones III, IV, VI  <u>Transportation</u>                      Improvement road to Cuamba and Pemba  <u>Market</u>                      Close to market in Malawi</p>	<p><b>&lt;Threats&gt;</b>  <u>Market</u>                      Importing vegetables from Malawi  <u>Other industries</u>                      Large scale forestry  <u>Environmental consideration</u>                      - Large forest area in Zone VI                      - Many river courses in Zone VI                      - High environment vulnerability in Lichinga (Protected area and high concentration of rivers)</p>

Source: JICA Study Team

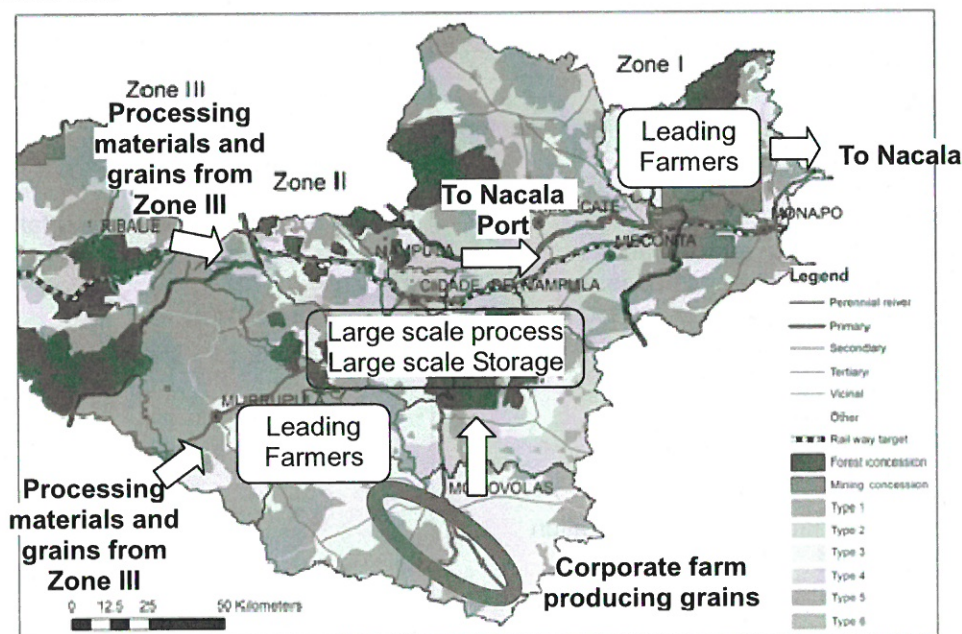
### 3.3.5. Agriculture Development Strategies of Each Zone

Figure 3.3.7 shows the flow of considering agriculture development strategies of each zone. The strategies of each zone are shown from (1) to (6) in this section.



**Figure 3.3.7 Flow of Consideration on Agriculture Development Strategies of Each Zone**

(1) East Area



Source: JICA Study Team

Figure 3.3.8 Agriculture Development Strategies in Zones I and II

1) Zone I: Providing food to Nacala area

(a) Providing food to Nacala area

- i) Maize, cassava and vegetables to Nacala area
- ii) Groundnuts, cowpeas, pigeon pea, and sesame for exporting
- iii) Rehabilitation of defunct irrigation facilities
- iv) Developing leading (core) farmers and supporting small-scale farmers
  - Developing leading farmers through 1)
  - Supporting tractor service providers
  - Supporting small-scale farmers through supporting contract farmers with core farmers, strengthening associations led by core farmers, and pilot projects for small-scale farmers
  - Supporting small-scale pump irrigation for vegetables

(b) Supporting replacement of old cashew trees

(c) Dissemination of intensive cultivation

- i) DUAT application support to small to medium-scale farmers
- ii) Model village for dissemination of intensive cultivation

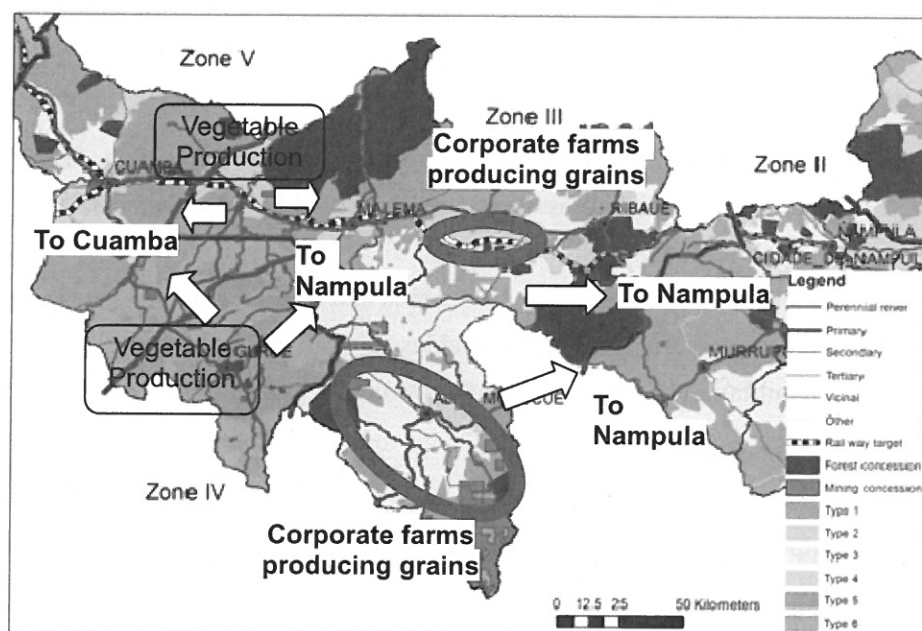
2) Zone II: Providing food to high population areas (Nampula and Mogovolas)

(a) Providing food to Nampula and Mogovolas

- i) Producing vegetables by using irrigation system
- ii) Rehabilitation of defunct irrigation system

- iii) Rehabilitation of road between Nampula and Mogovolas in order to transport foods
- iv) Developing leading farmers and supporting small scale-farmers
  - Developing leading farmers through 1)
  - Supporting tractor service providers
  - Supporting small-scale farmers through supporting contract farmers with core farmers, strengthening associations led by core farmers, and pilot projects for small-scale farmers
  - Supporting small-scale pump irrigation for vegetables
- (b) Inviting large-scale processing factories
  - i) Soybean and other foods processing factories in Zone II
  - ii) Providing soybean cake to poultry industry in Zone II and food oil to consumers in Nampula
  - iii) Developing cassava processing techniques by private processing company (subsidizing research by the provincial government)
- (c) Supporting replacing old cashew trees with new ones
- (d) DUAT application support to small to medium-scale farmers
- (e) Environmental consideration to keep forest area in Meconta

## (2) Central Area



Source: JICA Study Team

**Figure 3.3.9 Agriculture Development Strategies in Zones III and IV**

### 1) Zone III: Food production providing to Nampula and Cuamba

(a) Food production provision to Nampula and Cuamba

Developing corporate farm and leading farmers producing haricot beans and soybean in Alto Molocue and Ribaue

(b) Vegetable production provision to Nampula and Cuamba

- i) Developing leading farmers producing vegetables, especially onions and garlic by using irrigation facilities in Malema and transporting products to Cuamba and Nampula
- ii) Rehabilitating the defunct irrigation system and developing leading farmers producing vegetables
- iii) Developing small/medium-scale pump/gravity irrigation for vegetables and other cash crops
- iv) Dissemination of vegetable cultivation to small-scale farmers in Malema
- v) Rehabilitation and developing rural roads in order to promote vegetable production

(c) Environmental consideration for forest area in Malema

DUAT application support to small to medium-scale farmers in order to change shifting cultivation to intensive cultivation

**2) Zone IV: Promoting local special products by small to middle-scale farmers**

(a) Promoting vegetable production in cool climates

- i) Developing leading farmers and supporting small scale farmers as vegetable producers
- ii) Supporting small scale farmers  

Supporting small-scale farmers through supporting contract farmers with core farmers, strengthening associations leaded led by core farmers, and pilot projects for small scale farmers
- iii) Shipping vegetable products to Cuamba and Nampula in the lean season
- iv) Producing potato and other vegetables suitable for cool climates
- v) Rehabilitation of rural roads and constructing bridges

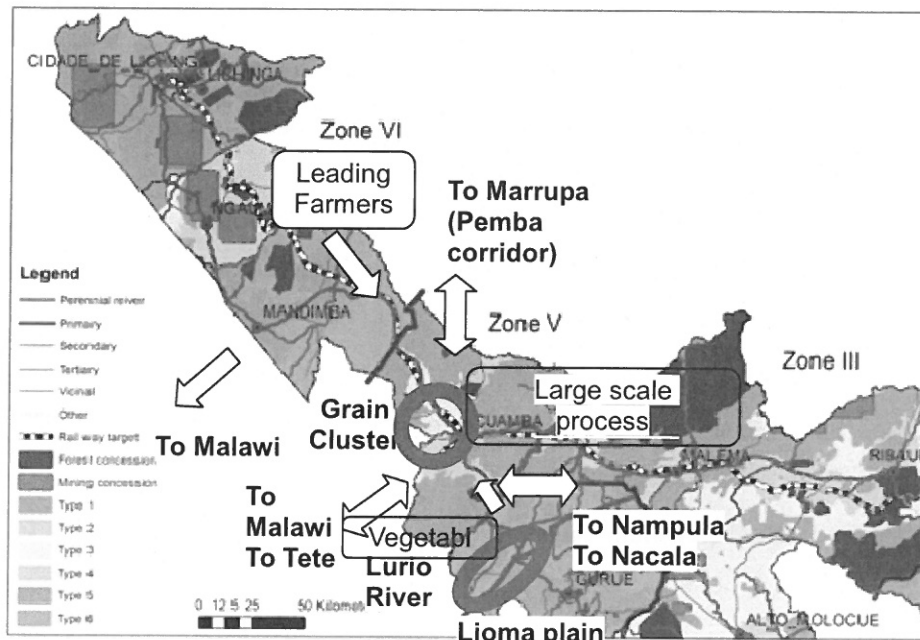
(b) Reactivation of tea industry

- i) Supporting replacement of old trees
- ii) Supporting replacement of old processing facilities

(c) Environmental consideration for mountainous area in Gurue



### (3) West Area



Source: JICA Study Team

**Figure 3.3.10 Agriculture development strategies in Zone V and VI**

#### 1) Zone V: Traffic strategic stop

##### (a) Formulating soybean cluster

- i) Developing corporate farms and out-growers producing soybean and maize
- ii) Supporting tractor service providers
- iii) Collecting materials from Lioma plain, Malema, Mandimba, and within Cuamba
- iv) Concentrating large-scale processing facilities
- v) Concentrating large-scale facilities

##### (b) Installing large-scale storage facilities

##### (c) Promoting food production along the Lurio River and its tributaries by pump irrigation in the dry season

- i) Supporting installation of small pumps
- ii) Developing leading farmers to use small pumps in the dry season
- iii) Supporting small-scale farmers

Supporting small scale farmers through supporting contract farmers with core farmers, strengthening associations led by core farmers, and pilot projects for small-scale farmers

##### (d) Environmental consideration to Forest area in Cuamba

Formulating a model village in order to disseminate intensive cultivation to small-scale farmers

**2) Zone VI: Crop production suitable to cool climate by small to medium scale farmers**

(a) Producing crops suitable for cool climates

- i) Producing potato, other vegetables, or haricot bean suitable for cool climate by using irrigation facilities in Lichinga
- ii) Rehabilitating defunct irrigation systems and developing new irrigation systems and providing potato and haricot beans in the dry season
- iii) Supporting small-scale farmers

Supporting small-scale farmers through supporting contract farmers with core farmers, strengthening associations led by core farmers, and pilot projects for small-scale farmers

(b) Environmental consideration for forest area

### **3.4. Agricultural Cluster Development**

#### **3.4.1. Agricultural Cluster Approach**

##### **(1) Definitions of Cluster**

Agriculture clusters in the Master Plan are defined as follows:

- Development clusters drive and facilitate the growth of key industry sectors as identified in the Master Plan.
- Management level refers to potential land use and social sustainability. A weighted numeric evaluation system of key factors related to the land and to the social environment permits identification of the most appropriate management structure for the development of the region.
- The purpose of this evaluation is to ensure coherent sizing and selection of the base development activity for the cluster. As an example, tobacco is a crop best undertaken by smallholders, while soybeans require large contiguous areas to be economically viable.
- Potential clusters refer to potential regional industries and can be considered a “short list” prior to defining the base crop.
- The cluster definition is obtained by merging data from management level, potential clusters, logistics, commercial viability, public policy, and other factors.

##### **(2) Methodology**

Based on the management type and crop suitability map shown in Sub-chapter 3.3.2, the following steps are taken to develop clusters.

- 1) Determine appropriate crops for each production scale using information on annual rainfall, annual average temperature and soil maps.
- 2) Determine priority crop for cluster focus and scope using information from previous steps crossed with gathered data, such as logistics, access to finance, market, operational risks, human resources, existing/planned projects, and governmental interest and policies.
- 3) Define schedule and steps - Cluster development must be divided into steps, with accompanying schedules and goals. The development schedule and steps are linked to ensure that goals are realistic and that development is logical.

### 3.4.2. Selection of Crops and Processing for Agricultural Cluster

#### (1) Determine Crop Fits (Potential Crops)

The crop division (Table 3.4.1) in production scales was performed by selecting those crops with the greatest potential to channel investment among small, medium or large producers.

- Process identifies aptitude for each scale.
- Some crops are classified in more than one scale.
- The algebra used in ArcGIS software requires the creation of intersection classes, just for calculations.

**Table 3.4.1 Crops Divided into Three Production Scales**

	Manual harvest	Mechanized harvest
Small-scale	Vegetables, cashew, cassava, castor beans, coffee, cotton, eucalyptus, groundnut, maize, cowpea, off-season maize, paddy rice, potato, sesame, sunflower, sweet potato, tobacco	Elephant grass, groundnut, maize, off-season maize, potato, upland rice, sunflower, sweet potato
Medium-scale	Banana, cashew, cassava, coffee, eucalyptus, maize, cowpea beans, off-season maize, potato, sesame, sunflower, sweet potato, tobacco	Cotton, elephant grass, groundnut, maize, off-season maize, potato, upland rice, soy beans, sunflower, sweet potato, wheat
Large-scale	Banana, coffee	Cotton, elephant grass, maize, off-season maize, potato, soy beans, sugar cane, sunflower, wheat

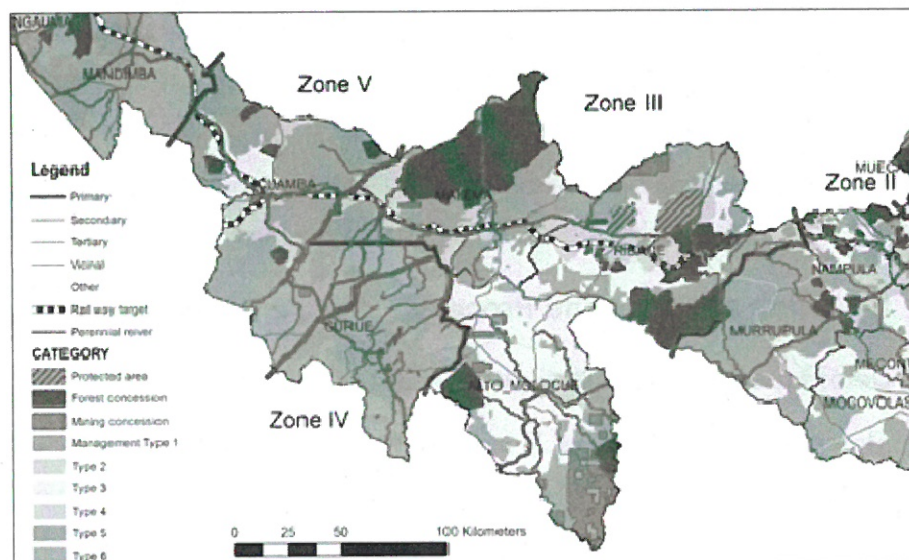
Source: Brazilian Study Team

At this stage of building the production scales parameter, no restrictions were applied to crops that could be recommended for agricultural development in later stages of the PD. It was sought only to establish an overview of factors for recommendation of trustworthy management types.

#### (2) Areas of Recommendation for the Cluster Development

Referring to the Management Type Map (Figure 3.4.1), areas categorized in Type 5 and 6 like Gurue, for small to medium-scale projects like vegetable driven clusters are recommended. On the other hand, areas for recommendation of agricultural projects of small

to large-scale as drivers activities are appearing in management type 2 and 3 areas, like Ribaue and Cuamba. In the case of large-scale cluster development, a series of consultation meetings with local residents and the community about relocation of their land for large-scale development have to be held at the planning stage.



Source: Brazilian Study Team

**Figure 3.4.1 Management Type Map**

**(3) Priority Crops for Cluster**

Table 3.4.2 shows selection criteria of priority crops and processed products. Based on the criteria, a priority crop will be selected as one of the priority crops considering gathered data and information.

**Table 3.4.2 Selection Criteria of Priority Crops and Processed Products**

	<b>Produce/ Producer</b>	<b>Product/ Processor</b>
Production potential	<ul style="list-style-type: none"> <li>• Enough number of producers</li> <li>• Experience of cultivation</li> <li>• Ability of certain amount of production</li> <li>• Accessibility to technical support</li> <li>• Vast suitable land area</li> <li>• High priority of GOM policy</li> </ul>	<ul style="list-style-type: none"> <li>• Supply of stable and enough materials of produce</li> <li>• Processing technology is available</li> <li>• Production facility is available</li> <li>• Enough experience and outputs are available</li> </ul>
Domestic market, import substitution, or export potential	<ul style="list-style-type: none"> <li>• Possibility of stable production</li> </ul>	<ul style="list-style-type: none"> <li>• Price competitive product</li> <li>• Enough market is available</li> <li>• Differentiate from competitors</li> </ul>
Adding value potential	<ul style="list-style-type: none"> <li>• Profitable for producers</li> </ul>	<ul style="list-style-type: none"> <li>• High value-added product</li> <li>• Labor intensive process</li> <li>• High synergy to surrounding business</li> <li>• Minimize affect from price fluctuation</li> <li>• Ability to remote companies to enter in the cluster</li> </ul>

Source: JICA Study Team

#### **(4) Expected Activity of the Cluster Development**

The following activities are expected in priority agriculture cluster development. This cluster is considered as a model cluster development of the Project Area, and lessons learnt will be utilized for future cluster development projects after this project.

- 1) To select a suitable location for soybean cluster development in terms of proximity to production and consumption area, and the availability of logistics.
- 2) To invite the private sector (farmer groups, input dealers, machinery service providers, oil processors, poultry farms, storage and transportation service providers), which should be given special credit lines or preferential tax systems for investment in the cluster.
- 3) To improve necessary infrastructure, such as roads, electricity, water supply and telecommunication network.
- 4) To facilitate to strengthen the linkage between participating farmer groups, private companies, and public institutions.
- 5) To provide technical, financial and management support services to participating actors.
- 6) To feedback lessons learnt to future cluster development projects.

### **3.5. Strategy for Agricultural Production Increase**

#### **3.5.1. Priority Crops and Their Opportunity**

##### **(1) Basic Food Crops**

Among the major crops mentioned in Sub-chapter 3.2.5, maize, cassava, beans (haricot beans and cowpea) and groundnut have a relatively higher score in promising crop evaluation (see Table 2.2.2). Soybean is categorized as a cash crop according to the nature of the crop in the Project Area. These crops should be given priority in the Master Plan.

Among all priority crops, maize should be the highest priority crop considering its opportunity and influence on the agriculture production.

- 1) Most farmers grow maize as a major staple.
- 2) The annual cultivated area is about 25% of the total area, next to cassava, in the Project Area.
- 3) Maize is suitable for wide-ranging growers, from small to large-scale farmers.
- 4) Mozambique still has a deficit of maize at the national level.
- 5) Maize has high potential for production increase with established intensive technology (can expect quick impact).

Paddy and wheat are not considered to be the priority crops for the following reasons, in addition to the lower scores shown in Table 2.2.2. Furthermore, both the Project Area and Mozambique have a substantial deficit of both crops every year.

1) Paddy (rice)

Paddy would not be a profitable crop for farmers at the present farm-gate price. A very low net profit is expected at the farmer level, according to Table 2.2.3. It seems that there is a limited potential area for developing a paddy field in the Project Area on an economically competitive scale in comparison with other rice producing areas in the country. There are several big investment projects underway to develop paddy clusters near the area, as well as in the southern provinces.

2) Wheat

Wheat growing is still in the testing stage at research stations. It is too early to expect that the crop will contribute to regional agricultural development in the near future.

Characteristics of the priority basic food crops are analyzed as shown in Table 3.5.1. Except for maize, the crops are expected to be grown mainly by small-scale and medium-scale farmers.

**Table 3.5.1 Priority Basic Food Crops**

Crop	Characteristics	Appropriate Farm Management Type		
		Small	Medium	Large
Maize	Major staple food, especially in the western part of the Project Area. Much demand in the south of the country and neighboring countries. Big demand is also expected for animal and chicken feed. Maize and soybean are a good combination in crop rotation.	Yes	Yes	Yes
Cassava	Major staple food, especially in the eastern part of the Project Area, as well as an important substitute crop for food scarcity periods. New processing technologies may expand market opportunities.	Yes	Yes	No
Haricot beans	High consumption from the central to the western parts of the Project Area as a major supplementary food to staples. Farmers can expect higher prices due to big market demand in the country.	Yes	Yes	No
Cowpea	High consumption from the central to the eastern parts of the Project Area as a major supplementary food to staples.	Yes	Yes	No
Groundnut	High consumption from the central to the eastern parts of the Project Area as an important seasoning material after crushing. It also widely consumed in the country in various forms, e.g. raw, boiled or roasted.	Yes	Yes	No

Source: The Study Team

## (2) Cash Crops

Among cash crops, soybean, potato, vegetables, sugarcane, cashew, cotton and tobacco have relatively higher scores in promising crop evaluation (see Table 2.2.2). They are considered to be priority cash crops in the Master Plan, except for sugarcane. Since well-established sugarcane companies subsidized by the government located out of the Project Area have very large scale and significant capabilities, the area has little room for developing a new commercial scale sugarcane cluster.

Among the priority cash crops, soybean should be given the highest priority for the following reasons:

- 1) Soybean is compatible with maize in a crop rotation system.
- 2) Soybean is suitable for wide-ranging growers, from small to large-scale farmers.
- 3) Growers enjoy a relatively good farm-gate price
- 4) High and continuous demand is expected from the domestic market, as well as from the international market.
- 5) Soybean has high potential to develop a wide-ranging cluster in processing and livestock industries.

Characteristics of the priority cash crops are analyzed as shown in Table 3.5.2.

**Table 3.5.2 Priority Cash Crops**

Crop	Opportunity	Appropriate Farm Management Type		
		Small	Medium	Large
Soybean	Continuous high demand in the country, as well as from neighboring countries, is expected for chicken feed and edible oil extraction. Even after the country may have a huge surplus, increasing international market demand could absorb the surplus.	Yes	Yes	Yes
Potato	Profitable and relatively easy crop for farmers, especially in Niassa province. Demand is increasing in the domestic market. It can be combined with soybean or other beans in crop rotation.	Yes	Yes	Yes
Vegetables	Good income source for farmers due to high demand of local markets, especially in town areas. They also create high job opportunities in rural areas. Tomato, onion, garlic, cabbage, kale, carrot and lettuce are popular vegetables.	Yes	Yes	No
Cashew	Mozambique was the leading cashew producer before independence, and Nampula province is the production center. Many projects are underway to revitalize the production and processing.	Yes	Yes	No
Cotton	Famous and well-established export commodity of the country. Processing industries can be developed. It can be combined with soybean in crop rotation. Cotton companies must play a major role in the development, since they enjoy a monopoly position in their concession territory approved by the government.	Yes	Yes	Yes
Tobacco	Famous and well-established export commodity of the country. Niassa is a production center of the country. Tobacco companies must play a major role for the development, since they enjoy a monopoly position in their concession territory approved by the government.	Yes	Yes	No

Source: The Study Team

### (3) Other Considerable Crops

Considering the condition of locality, some crops should be given high priority in the Master Plan, though they have a relatively low score in promising crop evaluation (see Table 2.2.2).

Table 3.5.3 shows these crops with their characteristics.

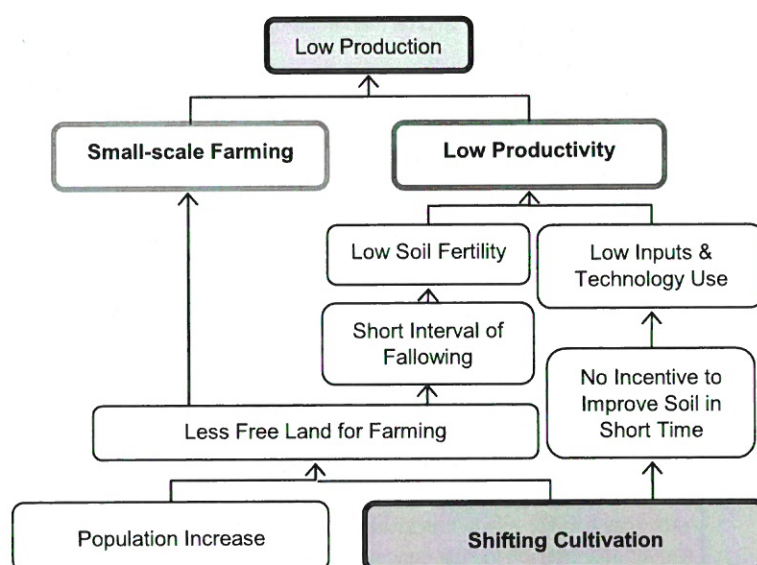
**Table 3.5.3 Other Considerable Crops**

Crop	characteristics	Appropriate Farm Management Type		
		Small	Medium	Large
Sesame	It is an emerging crop and currently exported to Asia and the Middle East. Nampula is a production center in the country. It can be used in a good combination with cashew to generate a bridge-income before harvesting cashew.	Yes	Yes	No
Sunflower	It is a high potential oil seed crop to be combined with soybean in crop rotation.	Yes	Yes	Yes
Tea	It was a well-established export commodity, produced in the Gurue area as a special local product. The government is giving serious attention to revitalizing the industry.	No	Yes	Yes

Source: The Study Team

### 3.5.2. Transformation from Shifting Cultivation to Settled Farming

Small-scale farming and low productivity must be causes of low agricultural production in the Project Area. The Study Team understands that shifting cultivation with slash and burning must be a factor that has a crucial impact on the both causes as shown in Figure 3.5.1.



Source: The Study Team

**Figure 3.5.1 Problems Caused by Shifting Cultivation**

Shifting cultivation is an established traditional farming system, in which farmers choose shifting farmland with a certain interval for recovering soil fertility by natural resilience, instead of keeping or improving soil fertility of fixed land by using fertilizers and other soil conservation technology. This land-consuming farming system is only feasible for maintaining farmers' livelihoods under the following conditions:

- 1) Low population density (a limited number of population over an extended area)
- 2) Farmers accept production at a subsistence level (don't expect an abundant harvest)

There is a common recognition that there are large plots of land suitable for farmland in the Project Area among not only farmers, but also the general public. Many farmers, therefore,



prefer to choose a land-oriented strategy rather than a productivity-oriented strategy for production increase. However, this way of thinking must be changed considering the present population density in the area. The relatively high population density and increasing population will not allow farmers to continue their familiar farming practice, i.e., shifting cultivation with slash and burning, on a sustainable basis any more. It has been observed that many farmers in the area don't wait the required 10 – 15 years for fallowing in order to recover soil fertility. There are even farmers who have their farmland in some high population density districts in the area.

Considering the present circumstances, transforming from shifting cultivation to settled farming must be an indispensable precondition for increasing cultivated area without serious to against the environment, as well as for improving crop productivity. As long as farmers continue shifting cultivation, they will face a shortage of farmland and fallow farmland in the near future, despite an unchanged low productivity. Consequently, it will be practically impossible to achieve PEDSA's main goal of increasing agricultural growth by an average of at least 7%/year during its implementation term. The government and people should understand that the land is fundamental capital for agriculture to be used on a sustainable basis rather than simple spendable resources generating a quick return.

The fallow farm land area in the shifting cultivation system at present, which is at least about equal acreage to the actual annual cultivated area, can be used for additional farming after the transformation. Also, farmers will be able to find an incentive to change their farming strategy to a productivity-oriented one after they secure fixed land for their farming. The productivity can be improved only after farmers become serious about gaining a continuous high yield by improving soil fertility.

The following comprehensive measures should be taken in order to promote the transformation.

**Table 3.5.4 Measures to be Taken for the Transformation from Shifting Cultivation to Settled Farming**

Measure	Initial-term	Mid-term	Final-term
Securing individual DUAT of farmland (DUAT registration)	x	x	-
Providing incentive to farmers who transform from shifting cultivation to settled farming (to be combined with DUAT registration)	x	x	-
Development and dissemination of improved farming technology & practice applicable to settled farming	x	x	x
Securing availability of quality farm inputs with affordable price, especially seeds and fertilizers to farmers	x	x	x
Improving farmers' accessibility to market and market information	x	x	x
Establish a micro-credit system with affordable condition to farmers	x	x	x
Promotion of ecological education, mainly targeting on children and youth	x	x	x

### **3.5.3. Improvement of Technical Supporting System**

Agricultural technical supporting services should focus on small-scale and medium-scale farmers since they must remain the major players of agricultural production in the Project area. According to the long history of colonization, people in the country used to coexist with only a limited number of large-scaled plantation farms under corporate management and a large number of subsistence farmers. Then, the subsistent farmers could not have a concrete image of economic independent farm management system within their reach due to a weak technical supporting system, despite some emerging farmers among them.

The technical supporting system should aim at fostering able individual farmers to improve their farm management system and livelihood with autonomy and public spirit for the future agricultural development in the Project Area. Large-scale farmers cannot be the backbone of agriculture in the area considering the large number of existing farm household, an available land area for farming and the current economic growth trend , though the large-scale farmers can be a catalyst to develop agribusiness, as well as an actor to disseminate new farming technology and management systems.

#### **(1) Agricultural Research**

A well-organized agricultural research system will have a strong positive impact on agricultural development with relatively small investment. The present research system, however, has many fundamental constraints, as described in Sub-chapter 2.3.1, to be addressed by a long-term approach in order to comply with various expectations from the fields. Considering the limited number of able staff and the weak financial base, “selection and concentration” must be a realistic concept for activating the research system. The following are considerations for setting the improvement strategy.

- 1) Research themes and target crops should be prioritized based on the farmers’ needs
- 2) Ongoing technical cooperation projects under triangular cooperation program between Mozambique, Brazil and Japan, i.e., Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development (ProSAVANA PI) should play a major role.
- 3) Cooperation with foreign research institutes and the private sector should be promoted

Regarding a crop-wise research strategy, ProSAVANA PI has already selected maize and soybean as the top priority crops. The selection is considered reasonable and in accordance with the present agricultural circumstances in the target area. Most research activities should concentrate on maize and soybean development for the first several years, including various intercropping and crop rotation systems with the base of both crops, and base-data collection necessary for the research works.

Research for the other crops shall be carried out after a certain achievement is made in maize and soybean development. Research works on cassava, another important staple food, should

instead focus on processing to increase the market demand since the Project Area has a substantial surplus of cassava every year. Among cash crops, concerned private companies should be responsible for major part of research works for cotton, tobacco and tea based on their business policy.

The priority crops mentioned in Sub-chapter 3.5.1 shall be divided into the following three groups for the strategy of agricultural research works.

- 1) Group-1 (top priority crops):  
Maize and soybean
- 2) Group-2 (next priority crops):  
Cassava, haricot beans, cowpea, groundnut, potato, vegetables, cashew, sesame and sunflower
- 3) Group-3 (private companies responsible crops)  
Cotton, tobacco and tea

The following five pillar themes have been defined by ProSAVANA PI. They should be the basis for considering the theme-wise research strategy.

- 1) Empowerment of IIAM research centers in the northeast and northwest
  - Capacity building of research and supporting staff
  - Providing facility and equipment
- 2) Assessment of environmental and socio-economic potential for crop production
  - Soil analysis and evaluation
  - Collecting and analysis of base-data (climate, hydrological features, geographic features, potential of crops and livestock, socio-economic condition, etc.)
- 3) Developing a soil improvement and conservation technology
- 4) Developing an appropriate cultivation technology
  - Selection of varieties (high yield, good quality, insects/diseases resistance, shorter growing period, etc.)
  - Development of basic seed production system
  - Development of water resources assessment and utilization methods
  - Development of applicable cropping system, technically and economically (fertilizer application, plant protection, weed control, growing period, intercropping, crop rotation, etc.)
- 5) Demonstration of newly developed farming technology

Simultaneously, the government should make a continuous effort to address the constraints that are their responsibility. The following are the most urgent measures to be taken by the government.

- 1) To recruit able staff members to IIAM based on the research priority.
- 2) To establish an incentive management system in IIAM, so that an able staff member can continue research works for a long time.

Table 3.5.5 shows the arranged research strategy based on the above-mentioned considerations.

**Table 3.5.5 Agriculture Research Strategy**

Research Theme	Crops		
	Group-1	Group-2	Group-3
Empowerment of IIAM research centers in the northeast and northwest	Whole-term		-
Assessment of environmental and socio-economic potential for crop production	Initial-term		
Developing a soil improvement and conservation technology	Initial-term		
Developing an appropriate cultivation technology	Initial/Mid-term	Mid./Final-term	Whole-term
Demonstration of newly developed farming technology	Initial/Mid-term	Mid./Final-term	Whole-term
Recruiting able staff members to IIAM based on the research priority	Initial-term	Mid-term	-
To establish an incentive management system in IIAM	Initial-term		-

## (2) Agricultural Extension

Circumstances of the present agricultural extension system in the Project Area are quite similar to those of agricultural research as mentioned above. A limited number of able staff and a weak financial base are critical subjects to be addressed. Therefore, “selection and concentration” must be a realistic concept for activating the extension system as well. The following are considerations for setting the improvement strategy:

- 1) Extension themes and target crops should be prioritized based on the farmers’ needs
- 2) Extension activities should focus on capable and emerging farmers
- 3) Ongoing PRONEA (the National Agricultural Extension Program) supported by IFAD and EU should play a major role
- 4) Mutual communication and task sharing with IIAM should be promoted
- 5) Cooperation with the private sector including NGOs should be promoted

The service should mainly focus on subjects concerned with maize production increase and its stable production system including inter-cropping and rotation-cropping with other crops for the first several years in close collaboration with IIAM. The services targeting other crops shall be undertaken after a certain achievement is made in maize productivity increase.

While PRONEA (2012–2016) is a comprehensive program to vitalize agricultural extension system in selected districts in Mozambique under the National Agricultural Extension Master Plan, it only covers 9 out of 14 districts in the Project Area. PRONEA has three major components.

### 1) Supply-side Development

Empowerment of extension agents not only in public sector but also in NGO and private sector, including equipment supply necessary for the services

- 2) Demand-side Development  
Empowerment of individual farmers and farmer organizations
- 3) Agricultural Extension Service Provision  
Provision of better extension service at provincial and district/local-level through public, private and NGO agents

Simultaneously, the government should make an effort to address the subjects are not covered by PRONEA. The following are supplementary measures to maximize the impact of PRONEA:

- 1) Restart of agricultural extension programs on radio or TV with the participation of farmers
- 2) Implementation of a permanent training system targeting rookie agents, as well as veteran agents for empowerment and refreshment
- 3) Implementation of a training system to foster selective core farmers to play a leading role in agriculture and rural development
- 4) Demonstration of an applicable intensive farming technology and management system in settled-farming by well-trained farmers at the field level

The use of human resources in the private sector shall be stimulated in order to complement the weak public extension system. Farm inputs suppliers, such as retail shop-owners and keepers will be trained as grass-roots technical advisors close to farmers. After training, qualified farm inputs suppliers can be given a certain incentive from the government to run their business, although earning the trust of customers (farmers) through proper advice will be the best incentive for them.

The following measures should be taken in order to activate the agricultural extension system.

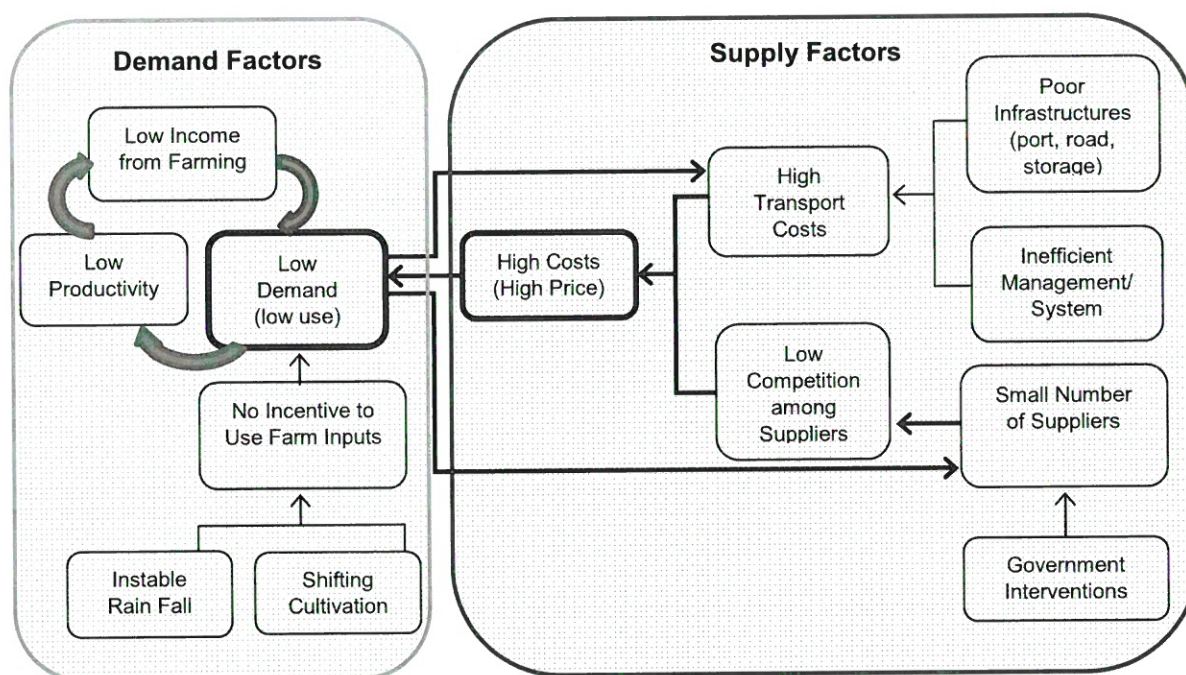
**Table 3.5.6 Measures to be Taken to Activate Agricultural Extension System**

Measure	Initial-term	Mid-term	Final-term
PRONEA (for 9 districts)	x	-	-
Successive program after PRONEA (for remaining 5 districts)	-	x	-
Restart of agricultural extension program on radio or TV with farmer participation	x	x	x
Implementation of a permanent training system targeting rookie agents, as well as veteran agents for empowerment and refreshment	x	x	x
Implementation of a training system to foster selective core farmers to play a leading role in agriculture and rural development	x	x	x
Demonstration of an applicable intensive farming technology and management system in settled farming by well-trained farmers at field level	x	x	x
Fostering qualified farm-inputs suppliers, so that they can provide simple technical advice to customers (farmers)	x	x	x

### 3.5.4. Improvement of Access to Agricultural Inputs

Most farmers depend on an extensive farming practice and rarely use agricultural inputs, i.e. quality seeds, chemical fertilizers, pesticides and farm mechanization at present. The low use of inputs is the main reason for the low productivity of major crops. While it seems that the low use is caused by poor accessibility of farmers to agricultural inputs, many inputs suppliers affirm that low demand (low use) from farmers is the most critical problem for running their business.

Problems related to agricultural inputs supply are complicated as shown in Figure 3.5.2, which arranges the major problems. There are vicious circles of the problems on both demand and supply sides. The figure implies that “low demand” and “high costs” are the major targets to be addressed, and the strategy to improve accessibility to agricultural inputs should give comprehensive attention to the problems on both sides.



**Figure 3.5.2 Problems Related to Weak Accessibility to Agricultural Inputs**

On the demand side, prevailing shifting cultivation farming with slash and burning is a critical issue. As long as farmers depend on the shifting cultivation, they have no incentive to use agricultural inputs as mentioned. The strategy to transform the shifting cultivation to settled farming has already been discussed in Sub-chapter 3.5.2.

On the supply side, as analyzed in Sub-chapter 2.3.2, it is almost impossible for farmers to be motivated to use fertilizers and tractor services at present costs. It seems that only market-principle oriented measures to address the problem cannot generate farmers’ demand for fertilizers and tractors, even after the costs are reduced to some extent by the measures mentioned below. The situation may be a good reason for the government to establish a

pump-priming subsidy system for fertilizers and a tractor service for a certain limited period, considering the economic impact of both inputs on farmers.

Furthermore, there are several critical factors responsible by the government on the supply side. According to the Study Team's analysis, several government interventions, especially in the markets of seeds and farm machinery, could be an entry barrier of agricultural inputs supply chain against new entrants. Consequently, a limited number of players in the supply chain leads to a high cost structure due to less competition among them. It is desirable that the government terminates its direct-participation strategy in the supply chain, and should stimulate a fair competition environment among players in the supply chain by preparing the basic condition to develop the private sector. Distribution of agricultural inputs direct to farmers or running business in the supply chain is not the original role of the government sector. The following are priority measures to be taken by the government.

- 1) To review its intervention policy in the supply chain, including direct distribution of the inputs to farmers.
- 2) To review its tax systems and administrative formalities regarding the supply chain control from a viewpoint to foster the private sector.
- 3) To implement a subsidized public-financing system targeting small/medium-scale farm inputs suppliers at provincial/district level.

High transportation costs including port charges due to ineffective operation are other major causes of the high costs of inputs. The transportation cost problems are mainly caused by undeveloped road-networks and port facilities, while small lot handling and transportation due to low demand is another reason for the high costs. Continuous efforts of the government to develop and rehabilitate road-networks and major port facilities should contribute to the reduction of the transportation costs.

The following measures should be taken in order to improve farmers' accessibility to agricultural inputs.

**Table 3.5.7 Measures to be Taken to Improve Accessibility of Agricultural Inputs**

Measure	Initial-term	Mid-term	Final-term
Transformation shifting cultivation to settled farming	x	x	x
Review of the government intervention policy in the supply chain, including direct distribution of the inputs to farmers	x	-	-
Review of the government tax systems and administrative formalities regarding the supply chain control from a viewpoint to foster the private sector	x	-	-
Implement of a subsidized public-financing system targeting small/medium-scale farm inputs suppliers	x	x	-
Development and rehabilitations of road-networks and major ports	x	x	x
Establishment of a pump-priming subsidy system for fertilizers and a tractor service for a certain limited period	x	-	-

### **3.5.5. Improvement of Access to the Agriculture Financing/Credit**

#### **(1) The Establishment of a Platform to Structure a Comprehensive Agriculture Finance System in the Nacala Corridor**

Over the past years, the government has applied different financial mechanisms to promote agricultural lending. Unfortunately, outcomes have not always been favorable due to the fact that most credit lines have been underutilized. In consideration of the unfavorable situation of the agricultural finance system summarized in Section 2.3.3, the promotion of agriculture development in the Nacala Corridor can be said to be critical for the development of a comprehensive strategy to improve access to financing for all levels of producers, including individual farmers, farmers' organizations and small and medium-sized agribusiness enterprises. Towards this end, the following measures are required:

- Development of a long-term strategy to promote agricultural financing/credit for different types of agriculture/agribusiness entities with lending conditions adapted to the agriculture production cycles, the scale of businesses and the abilities of the borrowers (both financially and operationally in relation to agriculture production).
- Based on this strategy, the introduction of accessible and affordable lending schemes to all types of producers and agribusiness.
- Establishment of a unified information dissemination channel/platform for applicable financing schemes, which would allow proper distribution of financial resources allocated to the agriculture sector.
- Capacity development of local financial institutions to strengthen their operational capabilities with the aim of expanding the volume of agriculture lending, especially to individual farmers and small-medium sized agribusiness enterprises.

#### **(2) Introduction of Accessible and Affordable Financing Mechanisms for Individual Farmers and Entrepreneurs**

##### **1) Agricultural financing/credit for individual farmers**

As discussed in the previous sections concerning strategies for the improvement of agriculture productivity, it is essential that an affordable agricultural credit mechanism for small and medium farmers be created, which would make it easier for such farmers to access agriculture inputs and other services when needed. As a starting point to promote the agricultural credit for individual farmers, it is necessary to introduce a short-term soft loan with terms adapted to the agricultural production cycle. This soft loan scheme will be introduced by the government with donor's financial contributions, or its own funds, through the provision of subsidized credit lines to commercial banks or micro-finance institutions that will manage the loans. It is important to note that private financial institutions should be



involved in the operation of the agriculture credit on behalf of the government, which could ensure transparency in the screening of loan proposals and efficiency in the fund's operation. Soft loans will also be utilized to promote small-scale agribusiness activities by individual farmers to fund their efforts to start businesses.

The District Development Fund (DDF) has been mobilized for loans for agriculture production targeted towards local associations and selected individuals with low interest rates, ranging from 10% to 12% per year. However, the management of DDF has been very weak due to several issues such as the lack of capacity of the District Consultative Council that manages DDF, and improper political interference in the allocating of loans. As a result, repayment has been very poor, generally less than 20%. In order to facilitate the effective use of DDF, one potential option would be the mobilization of DDF as a source of the soft loans proposed above, which would then be transferred to private financial institutions as a trust fund.

- 2) Agricultural finance/credit to small and medium-sized enterprises and farmers' organizations (cooperatives and associations)

The ProSAVANA Development Initiative Fund (PDIF) was launched in September 2012 with the goal of involving small-scale farmers in the commercial agriculture value chain through contract farming with agribusiness companies, which would then result in increased productivity and better market access for small-scale farmers. PDIF originally planned to offer low interest loans (5%~10% per annum) to agribusiness companies as well as farmers' organizations (associations/cooperatives). However, based on the results of the first round of proposals for the PDIF in October 2012, farmer's organizations were not given the opportunity to use such loans due to their lack of capacity for developing a business proposal and providing the proper collateral required by PDIF.

While there is no doubt that PDIF is an effective tool to promote agriculture investments involving small-scale farmers in commercial agriculture, in terms of the impact on improved agriculture productivity as well as the transition to the intensive fixed cultivation for larger parts of the Nacala Corridor, it must create a mechanism, under PDIF, to allow farmers' associations or cooperatives to access low-interest loans with reasonable conditions so as to introduce improved agriculture production and processing systems as well as ease the financial burden of purchasing crops from group members during the harvest. Providing proper technical assistance in production and marketing should be a requisite for the providing of loans to farmers' organizations in order to avoid the risk of default.

In order to introduce a separate budget line for loans to farmers' organizations, the capital amount of PDIF will be increased through the mobilizing the Counterpart Fund<sup>1</sup> managed by the Ministry of Agriculture or grant assistance from donors.

<sup>1</sup> A part of the payment from the sale of agriculture machinery or inputs granted by the Government of Japan through Food Assistance and Food Production Grants is accumulated in an account for the recipient country (the Ministry of Agriculture).

### 3.5.6. Partnership between Local Farmers and Agribusiness

Agribusiness is expected to contribute to the development of rural economy through value addition, i.e., marketing and processing, of crops produced mainly by small-scale and medium-scale farmers, as well as generating job opportunities and providing new farm technology to enhance the weak farm supporting system in the public sector. While there are a lot of agribusiness entities from small to large scale, there is still a lot of room for growth in agribusiness in the Project Area. Considering insufficient accumulation of local capital at present, an investment from outside of the Project area, including foreign investments, should play an important role in agribusiness development for the time being, especially for large-scale development. However, small-scale and medium-scale farmers should remain the major players of agricultural production in the area. It is simply calculated that the average farmland area per farm household will remain at several ha in 2030, even though 100% of the Project Area would be converted to farmland. The household numbers will reach one million in 2030, considering the estimated population increase in the rural area by the national statistics office.

The existing agribusiness entities have already entered into partnership with local farmers individually or in a group through contracting for growing a crop as an out-grower. They may have a partnership based on a win-win relationship with different interests as shown in Table 3.5.8.

**Table 3.5.8 Expected Benefit of Partnership between Farmers and Agribusiness**

Farmers	Agribusiness
<ol style="list-style-type: none"> <li>1. To secure a firm market</li> <li>2. To receive quality farm inputs</li> <li>3. To acquire advanced farming technology</li> <li>4. To reduce risk against unexpected incidents</li> </ol>	<ol style="list-style-type: none"> <li>1. To save initial investment costs</li> <li>2. To save running costs (only crop growers)</li> <li>3. To secure a stable products (only traders &amp; processing industry)</li> <li>4. To reduce risk against unexpected incidents</li> </ol>

The partnership should be tightened through reinforcement of the win-win relationship for the promotion of agribusiness. Regarding the mutual benefit, production increase in terms of quantity and quality has the strongest impact on the relationship. The following strategy should be taken to realize the production increase in contract farming between local farmers (outgrowers) and agribusiness. The government should prepare a necessary base condition to stimulate the strategy without a direct intervention in the win-win relationship.

- 1) To share all necessary information in order to avoid information gap between outgrowers and agribusiness.
- 2) To share due benefit and responsibility with each other.
- 3) To make a contract in a transparent manner.
- 4) To apply clear quality standards with necessary technical support provided from agribusiness.

- 5) To organize outgrowers to improve working efficiency.

### 3.6. Strategy for Livestock Development

#### 3.6.1. Chicken Industry Development

Chicken is the only commodity among livestock with high potential at present in the Project Area as discussed in Sub-chapter 2.2.6. Several chicken breeding companies have already produced and marketed their chicken, feed and some inputs through the vertically integrated production system. With development of these companies, the demand for raw feed materials for chicken, especially for soybean has recently been increasing in the area. The companies also provide job opportunities for the population in the area.

The chicken industry is, however, not well integrated in a cluster in the Project Area. Through appropriate strategies to reinforce the basic business environment, a synergistic effect and competitiveness among players in the industry should be generated in order to develop a sustainable chicken value chain based on social and economic benefits in the area. Figure 3.6.1 shows an image of a poultry cluster.

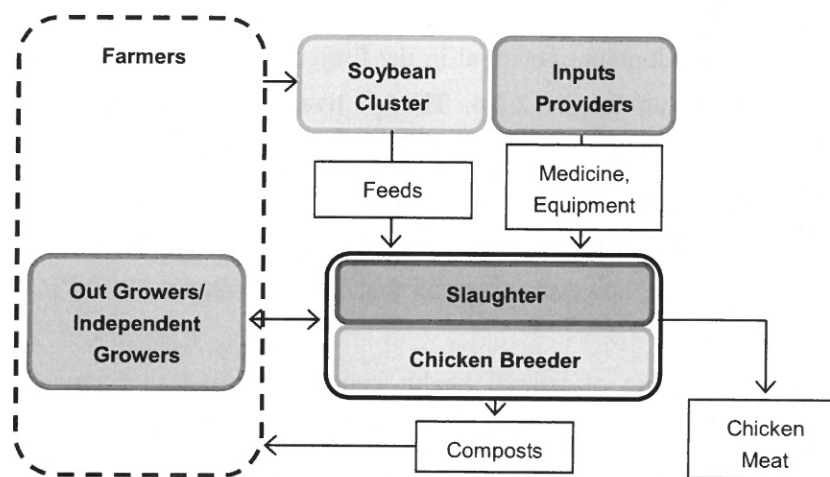


Figure 3.6.1 Image of Poultry Cluster

The integration of chicken breeders and slaughterers is the core part in the chicken cluster. Through the integration, effective operation of the slaughtering process shall be guaranteed. Many local farmers are expected to be involved in the cluster as outgrowers of the integrated company. The company will be able to provide incentives for breeding chickens to the outgrowers at an affordable cost, such as chicks, feed for the entire breeding cycle, transport, vaccines, medicines, specialized technical assistance and guarantee for purchase of products. The poultry cluster should have a close relationship with a soybean cluster for further efficient management. Also, development of input suppliers can be expected with the development of the cluster.

Since several companies have been involved in the chicken industry in the Project Area, they are expected candidates to become a core company of the cluster. However, investments from outside of the area must be stimulated, since the domestic demand shows a strong positive trend. In addition, promoting a loan and credit system could be the most important activity to involve local farmers in the breeding system as outgrowers. Table 3.6.1 shows the strategy of chicken production development.

**Table 3.6.1 Measures to be Taken to Develop Chicken Industry**

Measure	Initial-term	Mid-term	Final-term
To promote establishment of new chicken breeders	x	x	-
To promote out-growing system of chicken breeding	x	x	x
To improve access to inputs and feed	x	x	x
To encourage local production of necessary inputs and feed	x	x	x
To implement affordable credit system to outgrowers	x	x	x
To promote integration of partnership of different companies in the chicken industry	-	x	x
To develop a chicken cluster	-	-	x
To establish and carry out R&D program	-	x	x

### 3.6.2. Other Livestock Development

Livestock development potential in the Project Area other than chicken is relatively low as discussed in Sub-chapter 2.2.6. Though livestock development is an important pillar for developing the rural economy in general, a lot of fundamental and deep-rooted constraints, which impede the engagement of general farmers in livestock breeding, exist in the area at present. The following are urgent measures to be taken by the government to address the constraints. It is, however, assumed that the government should make efforts to overcome them.

- (1) Strengthening of animal health control system (veterinary and animal quarantine), especially for control of tsetse fly and African Swine Fever
- (2) Introduction of breeding stock (male and female) to breed the herd
- (3) Establishment of livestock technical extension system
- (4) Pasture improvement through the formation of cultivated pasture
- (5) Introduction of forage cropping system to feed the herds during dry season

It is recommended that the government should include the all measures listed above in its long-term strategy before considering the hasty popularization of livestock breeding among general farmers in the Project Area. Without overcoming the basic constraints, every effort to develop livestock in the area will not achieve the expected result. Like chicken breeding, vital involvement of pioneer private companies might be a realistic solution to break the stagnant situation by enhancing the weak public supporting system. An intensive livestock breeding system should be introduced by the private companies instead of the extensive stock farm system that was common during the colonial period considering land availability and population increase trends in the area.

### **3.7. Strategy for Promotion of Value Adding Agricultural Products**

Formulation of value chain by crop sub-sector, and development strategies for each sub-sector are shown as follows.

#### **3.7.1. Formulation of Value Chain**

##### **(1) Maize**

The value chain of maize is shown below. Maize is consumed for both food and animal feed. As agribusiness, maize millers and traders/transporters (storage and distribution service) are key actors for development of the value chain. The quality of their facilities and equipment, and management skills have to be improved for cost effective operation. Increasing the number of service providers is also necessary to the processing volume for millers and the handling capacity of transporters.

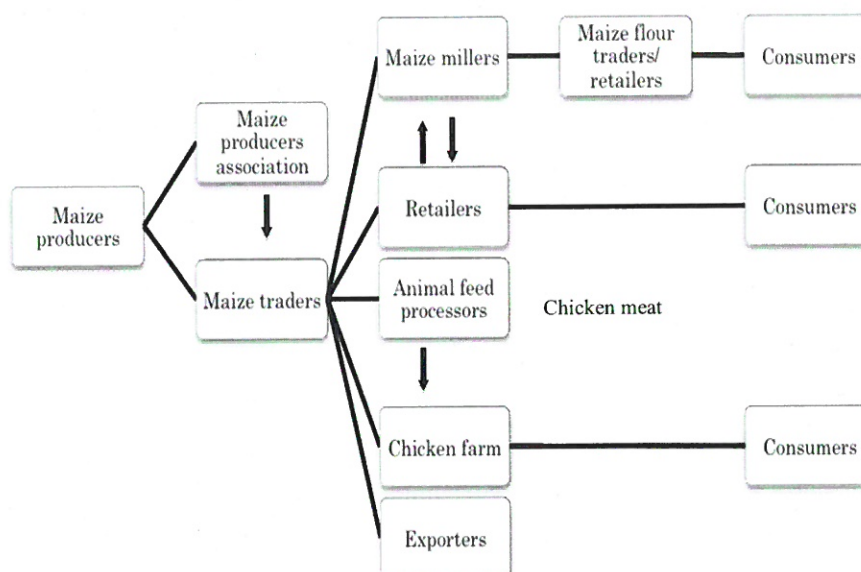
Maize millers are divided into three types according to their capacity. Small-scale maize mills, which have less than 200 kg/hr processing capacity, are dominant in rural areas. They only provide milling service for maize brought by customers. Middle-scale maize mills, which have 1,000-5,000 kg/hr processing capacity with weighing and bagging equipment and are likely to have packaging equipment, buy maize and sell maize flour by the bag. This type of mill is expected to increase in urban and semi-urban areas. Supports for finance and business management are necessary for small and medium-scale maize mills. Large-scale maize mills, which have more than 5,000 kg/hr processing capacity, and is equipped with packaging equipment for final consumer. They buy maize and sell various size of packaged maize flour. The number of middle and large-scale mills is expected to increase in urban areas. Table 3.7.1 shows the forecasted number of maize mills in 2020 and 2030. Rates of mechanically milled maize against consumption volume in 2020 and 2030 are assumed at 25% and 40% respectively. The present average rate of mechanically milled maize is considered to be 10-15% in the study area. Small-scale maize millers are a driving force of development of the maize processing industry especially in rural areas. Medium and large-scale millers drive semi-urban and urban areas. Since provision of maize flour to the outside area is expected using maize surplus, a larger number of large-scale millers can be established.

Traders and transporters have a substantial role in logistic service. As key actors of logistics, they are expected to supply the required volume of quality maize within the required delivery time to the required place. Traders have a role to store maize in good condition (quality control) and supply it to the downstream of the chain throughout the year. Improving the capacity of storage facilities in the Project Area and capacity development of storage management including quality control are necessary.

**Table 3.7.1 Forecast of Number Forecast of Maize Mills**

District	2020 (25%)				2030 (40%)			
	Consumption (tons)	Small	Med.	Large	Consumption (tons)	Small	Med.	Large
Monapo	27,400	15	0	0	31,400	22	1	0
Muecate	8,200	5	0	0	8,900	8	0	0
Meconta	13,900	8	0	0	15,700	14	0	0
Mogovolas	39,500	11	2	0	77,200	20	4	1
Nampula	68,500	6	2	1	80,600	13	6	1
Murrupula	12,600	7	0	0	14,100	12	0	0
Ribaue	20,300	11	0	0	28,600	14	2	0
Malema	13,800	8	0	0	14,500	13	0	0
Alto Molocue	30,700	11	1	0	45,400	18	4	0
Gurue	31,000	12	1	0	37,300	17	3	0
Cuamba	18,700	10	0	0	23,400	15	1	0
Mandimba	14,200	8	0	0	18,000	15	0	0
Ngauma	8,300	5	0	0	12,200	11	0	0
Lichinga	27,300	10	1	0	38,200	12	4	0
<b>Total</b>	<b>334,400</b>	<b>127</b>	<b>7</b>	<b>1</b>	<b>445,500</b>	<b>204</b>	<b>25</b>	<b>2</b>

Source: Estimation by the Study Team



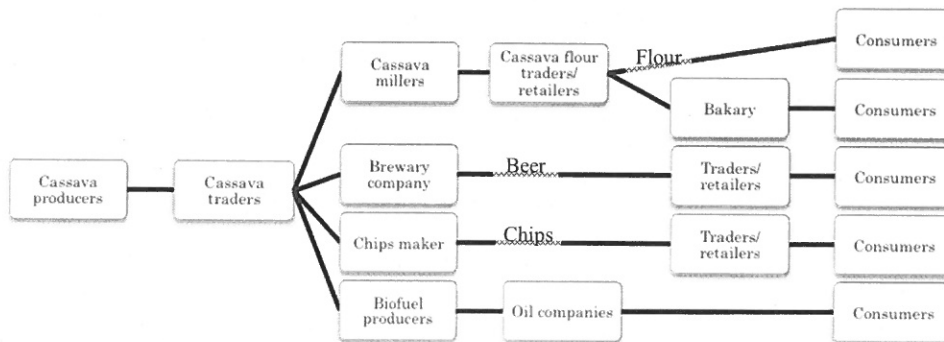
**Figure 3.7.1 Value Chain of Maize**

**(2) Cassava**

Fresh cassava is very perishable, and a period from harvest to consumption is quite short, within 2-3 days. As soon as harvested, most cassava is sliced and dried by sun-drying. Dried sliced cassava is bagged and stored in warehouse for shipment. So, value chain of cassava was considered for only dried cassava as illustrated below.

Potential market opportunities other than cassava flour, such as brewery, bakery, bio ethanol, and industrial material, are key for further value adding to this sub-sector. But, cost of research and development for new products or new materials are a burden to private companies. Special credit line or a certain amount of subsidy for R&D for new product in

cassava sub-sector is necessary to stimulate innovative product development. Public research institute of industry, science, and agriculture can cooperate with them to develop alternative usage of cassava.



**Figure 3.7.2 Value Chain of Cassava**

### (3) Cashew nuts

Two strategies are considered in this sub-sector. One is scale oriented strategy in medium-term, and another one is scope oriented strategy in long-term.

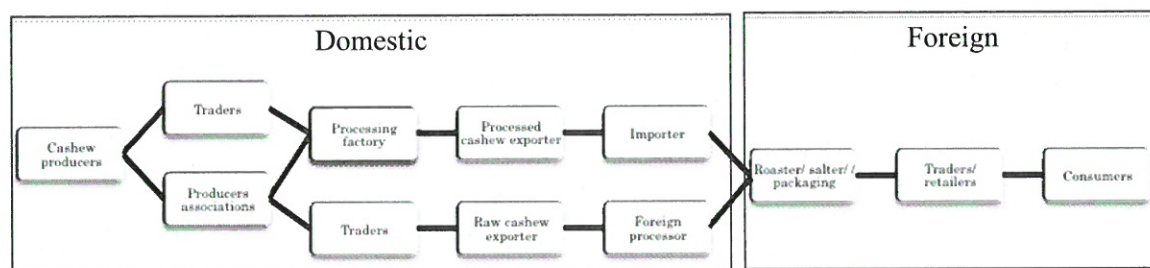
Scale oriented strategy is to increase a volume of production, processing and export aiming to maximization of gross and net added value. The Government has to create a suitable environment, in which stakeholders at each process in present domestic value chain can facilitate further invest in their business.

Scope oriented strategy is to increase coverage of activity/ process in value chain. Value chain of cashew nuts is shown below. As mentioned in sub-chapter 2.7.2, a value produced in domestic part is estimated only 18% of total value, and rest 42% and 40% are produced at roasting/ salting/ packaging process, and at trading and retailing process respectively in foreign part. If roasting/ salting /packaging process can be taken in domestic part, more value can be remained in Mozambique.

Regarding to roasting, salting and packaging process, proximity to consumption area is a big advantage, because this process needs knowledge, experience and a skill to process a product adapting consumer's preference. So, following two steps are recommended;

- Success of final product in domestic market accumulating necessary knowledge, skill, and experience as core competence.
- Entering international market with gained core competence.

In order to materialize above steps, special credit line or a certain amount of subsidy for R&D for new product in cashew nuts sub-sector is necessary to stimulate further investment for equipment and facility for roasting, salting and packaging. Promotion by the Government institution such as IPEX, and other NGO and donors supports are also important when entering international market.



**Figure 3.7.3 Value Chain of Cashew nuts**

#### (4) Soybean

Soybean value chain is important to supply both edible oil and cake as import substitution in the domestic market. Soybean sub-sector is still new in Mozambique. In order to avoid a diffusion of performances in production, processing, and logistics, a cluster development should be applied for soybean value chain development. So, the Government has to take necessary action to support its start-up for leading proper direction as follows.

- To facilitate organizing each stakeholder group of supply chain, such as input dealer, machinery service provider, producer, processor, and chicken farm.
- To facilitate communicating among above groups in order to improve quality, quantity and delivery system of product.
- To provide technical extension service.
- To support business administration skills of small and medium-scale producers and processors.
- To disseminate information to stakeholders on market, and technique of production and processing.



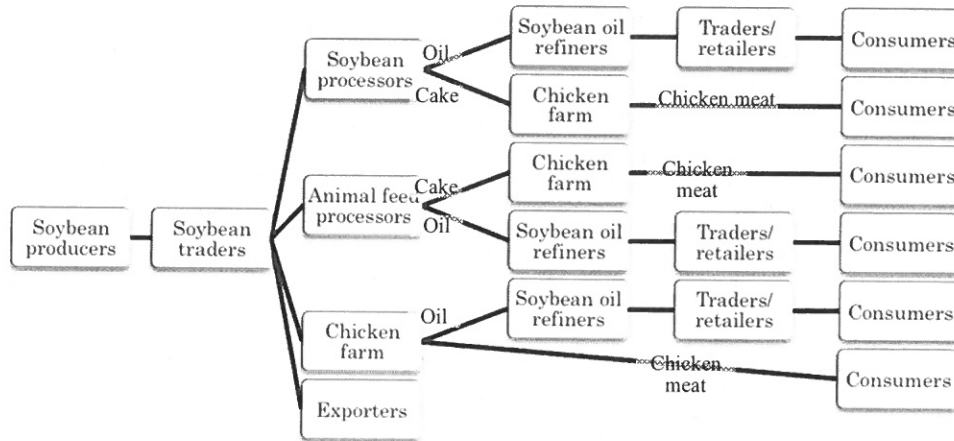


Figure 3.7.4 Value Chain of Soybean

### (5) Vegetables

2,500 labors will be employed at a planned fertilizer factory in Monapo district. Once its operation starts, demand of vegetable and other food crops for a catering service to this factory is expected. In Zone I and II, thus, it is anticipated to increase a number of labors working at urban area and SEZ as the result of facilitation of further investment in Nacala corridor. Consequently, increase of demand of vegetable and other food crop will be expected.

On the other hand, Malawian vegetables, such as tomato and onion are imported in districts along with Malawi border. Quality of Malawian vegetable is obviously better than local one. Malawi is favorable market for these districts in terms of proximity and accessibility to the market.

So, the strategies for vegetable sub-sector are;

For vegetable prevalently produced area and surrounding urban area,

- To challenge further improvement with quality, price and stable delivery in domestic market, especially in and around the Project Area in order to keep present competitive position.

For the districts adjacent to Malawi,

- To improve quality and profitability of vegetable in the districts adjacent to Malawi in order to compete with import vegetable, and to export to Malawi in future.

As an example, value chain of tomato is illustrated below. From a demand viewpoint, demand of vegetable based processed food in northern region is not high enough to invest in a processing facility. In a big consumption area, especially Maputo, processed food produced in northern region has a disadvantage by high transportation cost to compete with imported

processed products. So, processing of vegetable has to be considered, when local demand is started to increase.

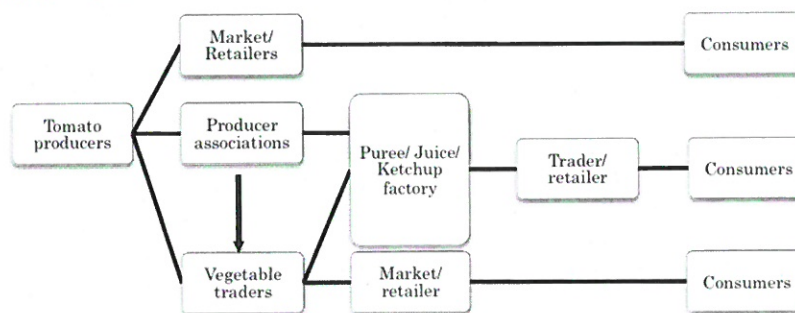


Figure 3.7.5 Value Chain of Tomato

### (6) Other crops

Other crops, such as groundnuts, beans, and sesame presently do not have certain extent of value chain, or are not expected to largely expand its value chain from current one during the planned period. Improvement of efficiency of transportation network and storage management can contribute to enhance competitiveness of these crops in both domestic and international markets.

#### 3.7.2. Supporting Service for Business Development

Performance of small and medium enterprises (SMEs) is a driving force for value chain development in rural area. In order to facilitate entering business and scaling up of existing business, various credit lines are provided. However, lack of business planning capacity and business management skills make access to credit services difficult, as well as high interest rate.

Support services including advices on business administration, are necessary as both a public and private service. Institute of Promotion of Small and Medium Enterprise (IPEME) is an institution under the Ministry of Industry and Trade, and has a role to advise for entrepreneurs how to materialize a specific business from business ideas, and for existing SMEs how to improve their business management. But, since IPEME has limited human resources, nationwide service deployment cannot be expected in short period. Therefore, quality Business Development Service (BDS) involving private sector human resources has to be developed utilizing IPEME as a trainer of potential service providers. Functions of BDS are, to advice on business planning and management, to analyze financial status, providing business related information, and introducing credit source for individual company, and matching stakeholders in value chain for a stakeholder group.

### 3.8. Strategy for Development of Agricultural Logistics

The basic strategy for improvement of logistics infrastructure in this context is considered to address the following issues.

- Improvement of access from farmland to assembling points and a consumption areas
- Decrease of losses during transportation and storage
- Efficient logistic management (lowering cost, shorter delivery time)

#### (1) Roads

Rehabilitation projects of national roads in the Nacala Corridor are implemented by the government. It is expected that the project will be implemented as planned.

For rural roads, in order to make an effective road network plan, transformation to settled farming and integration of farmland are desirable prior to planning work. Capacity building of district staff on planning, monitoring and evaluation of the rural road network has to be carried out.

#### (2) Railways

Rehabilitation and development of a line from Tete to Nacala Port through Malawi is underway by the private sector. It is expected to be completed in 2017. Once it starts service, it can be utilized for transportation of production surplus from the Nacala Corridor to regional and international markets in the future.

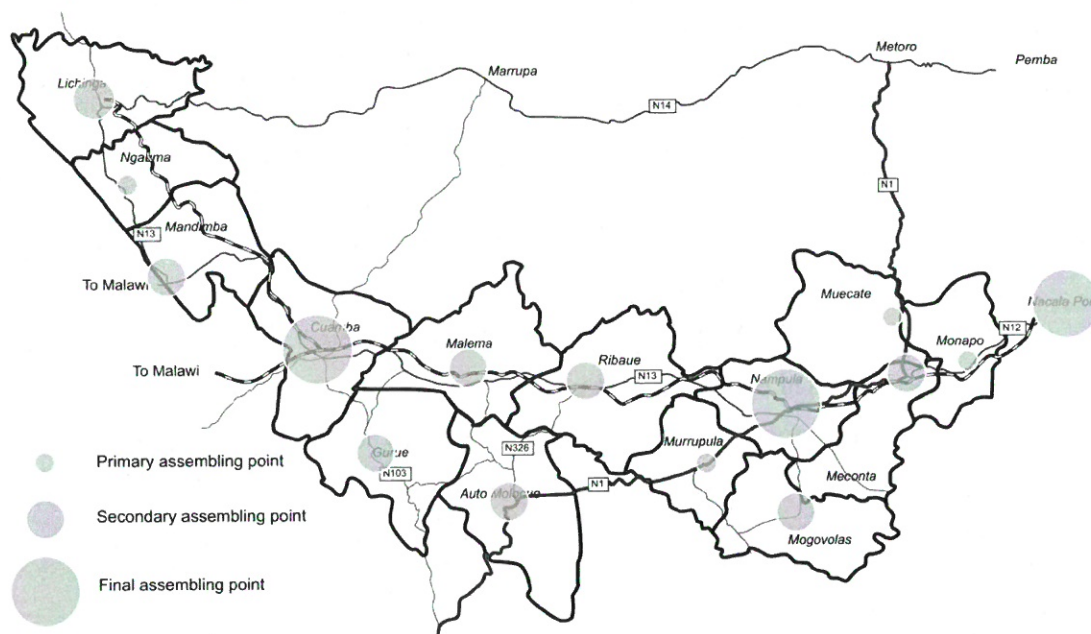
#### (3) Storage facilities

Table 3.8.1 shows the estimation of production, demand and surplus of maize in 2020 and 2030. Surplus of maize is substantial compared to the other crops. Cassava has a large volume surplus, but the harvesting period is much longer than maize. So, necessary storage facilities are primarily considered focusing on maize demand and surplus in each district. Maize surplus in Cuamba reaches 203,600 tons in 2030 followed by Gurue, Mandimba and Ngauma, with surpluses varying from 670,000 to 95,000 tons. On the other hand, maize demands in Nampula and Mogovolas are estimated at 80,600 tons and 77,200 tons respectively led by increases in population. Alto Molocue, Lichinga and Gurue make up the next consumption group with 38,200, 45,400 and 37,300 tons respectively. Storage facilities will be needed in all these areas. Areas where the surplus or consumption volume is high will be priority locations for a distribution network.

**Table 3.8.1 Production, Demand and Surplus Forecast of Maize Mills**

District	2020 (ton)			2030 (ton)		
	Production	Demand	Surplus	Production	Demand	Surplus
Monapo	41,200	27,400	13,800	50,250	31,400	18,850
Muecate	21,400	8,200	13,200	42,250	8,900	33,350
Meconta	42,600	13,900	28,700	77,500	15,700	61,800
Mogovolas	30,800	39,500	-8,700	72,500	77,200	-4,700
Nampula	58,200	68,500	-10,300	92,750	80,600	12,150
Murrupula	30,000	12,600	17,400	50,000	14,100	35,900
Ribaue	47,200	20,300	26,900	67,750	28,600	39,150
Malema	48,600	13,800	34,800	64,250	14,500	49,750
Alto Molocue	82,800	30,700	52,100	109,250	45,400	63,850
Gurue	86,200	31,000	55,200	131,750	37,300	94,450
Cuamba	152,200	18,700	133,500	227,000	23,400	203,600
Mandimba	65,600	14,200	51,400	110,500	18,000	92,500
Ngauma	42,800	8,300	34,500	79,250	12,200	67,050
Lichinga	62,400	27,300	35,100	87,500	38,200	49,300
Total	812,000	334,400	477,600	1,262,500	445,500	817,000

Based on the above estimation of demand and surplus of maize in each district in 2030, strategic assembling points are identified considering the present product distribution flow and rehabilitation plans of roads and railways, and are illustrated in Figure 3.8.1. Strategic assembling points are divided in terms of size and function. A primary assembling point is an assembling point at which products are collected from inside a district. A secondary one is an assembling point that is used for inter-district trade in addition to the function of a primary assembling point. The final assembling point is an assembling point for large consumption areas, inter-regional trade, long-term storage, and/or exports. The total required capacity for primary, secondary and final assembling points are considered to be 10,000 tons or less, 30,000 tons or less, and 30,000 – 100,000 tons, respectively.



**Figure 3.8.1 Strategic Assembling Points**

As mentioned in Sub-chapter 2.7.1, public storage facilities exist in each district of the Project Area. In order to improve the efficiency of the supply chain network and quality control of agriculture produce, the present public storage network should be rehabilitated or upgraded. Cuamba is expected to produce a maize surplus of about 134,000 tons in 2020 and 204,000 tons in 2030. Cuamba will become a grain supply center, which can distribute products to Malawi, the Pemba Corridor, and the central region as well as the Nacala Corridor. It may also need special support of larger-scale storage facilities by public investment.

As it is being done currently, these public storage facilities will be lent out to the private sector. In storage facilities of primary assembling points, priority is given to small to medium volume customers, especially farmers' groups, who cannot afford to invest in commercial scale warehouses, in order to improve their access to the storage facilities. So, one storage facility should consist of small capacity warehouses, about 100 tons each, so that many groups, individuals, and companies can utilize it. Basically, medium to large-scale storage facilities including grain silos will be invested in by private sector.

Post-harvest technology, especially appropriate storage techniques for quality control of products has to be taught to stakeholders involved in the supply chain of agriculture products.

#### **(4) Logistics**

Improvement of road conditions, as well as an increase in transaction volume, stimulates the private sector to participate more in logistic service businesses. This can help lower the current transportation cost, shorten the delivery time, and decrease the loss during transportation, which are major logistic constraints in the Project Area. The private sector has an important role in investment of logistic service businesses.

### **3.9. Strategy for Establishment of Farmers' Organizations**

#### **3.9.1. Necessity of Farmers' Organizations**

The PRODECER project is a representative example of development in the Brazilian Cerrado region. In the project, the cooperatives carried out various support measures such as sending children of members of existing agricultural cooperatives for settlement, and providing funds and agricultural processing facilities. This support was a major factor of the success. On the other hand, in the Nacala Corridor area the farmers' organizations such as agricultural cooperatives are not developed.

There are several factors impeding the increase of productivity and income of small-scale farmers. Mainly, small-scale farmers need (i) access to land and water; (ii) access to inputs (seeds, fertilizers, pesticides, etc.); (iii) access to markets (transportation); (iv) access to

knowledge (new techniques) and information (markets and buyers); (v) access to capital (funds to purchase materials, equipment and service), etc. It is impossible for individual farmers to solve these issues alone. However, even though the individual farmers have a weak awareness of their rights, when they are organized into a group and put their strengths together, they will be able to access information and extension services. Moreover, through cooperate harvesting and shipping, it might increase the chances of employing a middleman in the community to purchase or collect the products. Furthermore, if the group forms its own management board and is registered as a legal entity, they can open bank accounts and access credit. In this sense, it is indispensable that farmers organized into groups and associations.

However, the rate of organization for all farmers' households is only 2 to 8% in each district except in Gurue district (17.8%). The rates are 5.0% in Nampula province, 12.8% in Zambezia province, 5.2% in Niassa province, and 6.4% as the overall average of the Project Area. Most of the farmers' organizations face problems of poor management, limited focus on internal service, lack of knowledge about post-harvest and marketing, and lack of negotiation skills to develop partnerships. Extension services are available to less than 10% of farmers. The public extension service based in the districts does not have enough staff or finances and they focus on the production of food crops and leave out critical elements such as cash crops, marketing and management of the organization. Credit services are available to less than 1.2% of all farmers (1.2% in Nampula province, 0.4% in Zambezia province and 0.7% in Niassa province, 2010 INE). Financial institutions have limited outreaches in rural areas and they require unaffordable interest rates and collateral, so that small-scale farmers are excluded from credit service.

Furthermore, from the results of the inventory survey of farmers' organizations, it is clear that most of the farmers' organizations work only as receptors of government and NGOs support. A few farmers' organizations have conducted cooperate production and selling; but, they have received agricultural inputs free of charge, transportation support, salary or subsidy for staff from outside sources (government or NGOs). Therefore, when they lose the external support, their activities will decline. Few organizations can work with only their own member. On the other hand, the farmers' organizations have been absolutely necessary not only as a receptor of physical support such as agricultural inputs, but also as a receptor of technical assistance from MINAG until present. The National Agricultural Extension Program (PRONEA) is one of the major projects of the Extension Master Plan (2007-2016), and it contains activities regarding the organization of farmers. Therefore, it is important to integrate the organization of farmers is integrated with agricultural extension and the activities of PRONEA.

### **3.9.2. Organization of Farmers by Outgrower Model Project**

It was found clearly in the inventory survey that the actual main problem of small-scale farmers and associations is, “No buyer rather than market demands or no availability of market information, the buyers cannot come to the farm gate.” Therefore, it is necessary to focus on the market-oriented farming practices with awareness of the market and the transformation of consciousness from “produce and sell” to “produce to sell.”

Most company farms are involved in the production of cotton and tobacco under contract whereby they provide technical assistance and inputs to small-scale farmers and the farmers repay their loans at harvest time. This type of arrangement facilitates farmers’ access to inputs, a secure market and payment, and farmers agree to sell their cash crop to the company firms at an agreed price. Moreover, in an outgrower scheme, farmers deliver their production to large-scale farmers or company firms, traders or processors through contractual arrangements specifying a pre-determined price and a predefined quantity and quality. Generally, contract farming also includes provisions by the large-scale farmer or company firm/trader/processor of services such as agricultural inputs required by producers to deliver the agreed production, as well as some technical assistance.

In the process of promoting the various projects in the Nacala Corridor area, grouping of small-scale farmers for out-growing by large-scale farmers or company firms ensures purchase (market of farmers) of products and it benefits the small-scale farmers. Some ongoing projects by company firms have already shown a good result. The out-growing schemes shall be promoted by centering large-scale farmers or company firms, so that the large-scale farmers or company firms will respond with technical guidance and promote the grouping of small-scale farmers. These schemes provide support such as preferential loans for the large-scale farmers or company firms that accept outgrowing projects. The idea of the out-growing schemes is also one of the development strategies of MINAG.

On the other hand, in order to reduce the increasing economic disparities between the farmers participating the outgrowing projects and the other majority of small-scale farmers who cannot participate in the project, support for them must be considered. To achieve this, promotion of the formation of farmers’ organizations in collaboration with the agricultural extension activities by PRONEA and the formation of market-oriented agricultural cooperatives must be implemented in line with the new cooperatives law.

### **3.9.3. Clarification of Objectives for Farmers’ Organizations**

Formulating farmers’ organizations generates economic benefits for their members through collective activities. In most cases, the benefit is brought by securing production factors (access to land and water), access to knowledge (informal or through public or private extension), access to inputs thanks to reduced prices (due to reduced transportation costs), access to credit and sometimes accessing better markets by bulking production.

The farmers' organizations are composed of groups, which generally range from 10 to 60 people, who come together for one or several combined objectives. Parts of them have statutes to be defined the objectives and pay fees. But, basically they work on the basis of customary rules. In accordance with the common interest of its members, according to the strategy for the agriculture associative movement by DNEA, farmers' organizations are divided into the following seven association types:

- 1) Involving irrigators' associations
- 2) Agricultural marketing associations
- 3) Associations of the means of production
- 4) Associations for sharing the right of use and enjoyment of the earth
- 5) Associations for specific cultures linked to funding companies
- 6) Associations for management of natural resources and ecotourism
- 7) Mixed associations

As previously mentioned, in order for individual small-scale farmers to be able to have equal bargaining power with traders or processors, it is necessary for individual farmers to establish a voluntary organization or a cooperative society. If individual farmers don't have their own system to respond to variations of distribution or price formation by themselves, farmers will always have a passive attitude. From this perspective, it is also necessary for individual farmers to organize their own system. However, in the case of establishing farmers' organizations by themselves, it is important to ensure that farmers identify development issues by themselves and recognize the need for the organization of individual farmers as effective means to solve these issues, instead of thinking, "in the beginning, there is the Organization." By making them "find" the benefits of organization by themselves, the sense of ownership of the "farmers' organizations" would increase and lead to long-term sustainability.

In order to achieve the organization of farmers by the mid-term (2021) of ProSAVANA, human resources development for the core people of the farmers' organization is indispensable. However, these activities for developing the rural development actors should require not only short-term funding perspectives of 2-3 years, but also long-term training perspectives. Therefore, it is necessary to enhance the capacities of existing farmers' organizations in parallel to developing human resources of the core people for the new organization. In addition, support should be given to advance the transition from the existing farmers' associations to modern agricultural cooperatives based on the new cooperative law.

Similarly, in order to improve the operation and management of the existing farmers' organizations and to enhance its sustainability, it is also necessary to develop the human resources of its members. Therefore, since "human capacity development" is positioned as



an approach to organize small-scale farmers, a human capacity development program will be implemented. In addition, when promoting the organization of small-scale farmers in the future, it would be important to improve understanding amongst beneficiaries and to spend enough time to develop human resources who will be raising the awareness of all the core people and farmers.

#### **3.9.4. Human Capacity Development for Farmers' Organizations**

The reasons why activities of the farmers' organizations are not maintained continuously are the shortfall in human resources to lead the organization and the capacity shortage of each farmer more than the lack of economic resources. Organization of small-scale farmers has been carried out by external interventions by the government or NGOs. As a result, the organization's unity, sense of purpose, sense of responsibility and cooperation skills are weak. It strongly depends on the quality of members to organize small-scale farmers and to maintain the farmers' organizations continuously. Therefore, it is necessary to prepare the organization/grouping that can be performed voluntarily in the community. On this account, human resources development to make up the core people of farmers' organizations in the future is an essential activity. It is important to incorporate not only external intervention, but also utilization of traditional community values for human resources development.

In rural areas, traditional community values are still dominant. Traditional chiefs (Régulo, Mueune, etc.), who lead these values in their communities to deal with land issues, also play a coordinating role as police officer or town chairman. Core persons of the farmers' organizations or future community leaders are chosen from the adolescents recommended by a traditional chief or leaders of youth group. In other words, the formation of organizations is based on traditional culture, and the values of community and voluntary participation are useful in terms of maintaining sustainability and morals of farmers' organizations activities. Hence, human capacity development is the top priority before formation of the organizations.

Training activities on human capacity development will be carried out at an Administrative Post level (range participants to collectively self-help) at some educational facilities located in the center of region during a time when these facilities is not used . It is better that training be done daily for several consecutive days such as over one week. Lecturers are mainly responsible for the agricultural extension workers and graduates of the ProSAVANA Agricultural Academy to be newly established. Some training subjects will require human resources and funds from NGOs. Contents of training are agricultural technologies related to improving agricultural productions (seeds, fertilizers, pesticides and agricultural practice), organizational operations (leadership, management, accounting, marketing and negotiation), environmental considerations and literacy education which is directly linked to improving the living standard. In the Nacala Corridor area, many of 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 the training for these members should be done step-by-step. The required training will depend on the purpose of development progress, but it is expected that human capacity development will take a long time.

Because the objectives and activities of the Human Capacity Development Program are similar to that of PRONEA, the Program will support and be carried out in conjunction with PRONEA. Districts that are not target districts of PRONEA will implement the Program independently. In addition, after the end of PRONEA (from 2017) the Program will continue by itself. In addition, Farmer Field Schools were introduced in 2009 with support from FAO for farmer learning purposes and have shown positive results. This concept of farmer learning originally focused on integrated pest management and integrated soil fertility management. As the importance of market-orientation and a mind-set change from subsistence objectives for production to an agribusiness perspective has been shown, it is considered that this concept would be useful; thus, activities of Farmer Field Schools will be planned in the Program.

### **3.9.5. Support to Establish and Develop the Modern Agriculture Cooperatives**

Farmers' associations by small-scale farmers were organized from the 1990s onward. Associations are in principle non-profit organizations. Within the legal framework existing up to 2009/2010, the establishment, training and legalization of farmers' associations have been promoted by various agencies such as MINAG, donors and NGOs. The General Law of Modern Cooperatives (Law 23/2009) was approved in September 2009 and enacted in March 2010. According to the new law, cooperatives are autonomous and independent, based on the voluntary association of its members, and under their democratic control. The members are obliged to contribute to forming a basic capital stock in terms of goods and/or services towards an economic activity for mutual profit, but are also obliged to share the risks, with the joint aim of satisfying the members' needs and economic aspirations. The New Cooperative Law also provides for the transformation of existing farmers' associations into modern cooperatives if they comply with the requirements established in the law.

Main differences between the two legal forms of farmers' organizations are presented in Table 3.9.1 and compared against the farmers' shareholder corporation model.

**Table 3.9.1 Differences between Cooperatives, Associations and Corporation**

<b>Cooperatives</b>	<b>Associations</b>	<b>Corporation</b>
Unit of persons who organize themselves for the execution of an economic activity.	Unit of persons who organize themselves for non-economic reasons.	Mostly a shareholding capital investment company capital with economic objectives.
The main objective is providing operational services with fair and transparent margins for the members. The profit results from economic activities.	Main objectives are altruistic, non-lucrative and not-for profit, and can be about realizing social, cultural, sport and mutual assistance activities.	The main objective is maximizing profit.
Members and service delivery benefit from the net revenue made.	No financial net revenue is made.	The associates or shareholders in the capital investments made benefit from the net revenue (profit).
The surplus made is transferred to the members based, proportional to the amount of activities implemented and services used.	Any surpluses are not profits and are shared.	The profit obtained is distributed between the associates and shareholders, based on the capital invested.
The invested capital does not determine the management or decision-making (one member one vote).	The invested capital does not determine the decision-making (one member one vote).	The invested capital determines the management and the decision-making.
General assembly: The quorum is based on the number of members.	General assembly: The quorum is based on the number of members.	General assembly: The quorum is based on the amount of invested capital.
Administered by a general directorate of at least 2/3 of the members.	Administered by a reduced number of people.	Administered by a reduced number of people.

Source: A nova Lei das cooperativas. Desenvolvimento e negócios com princípios. AMPCM, 2011.

Although the association is not an appropriate legal form for farmers' organizations wanting to generate income/benefits, it is still the most widely used method of farmers' organizations. The main reasons for this are: (i) the relative novelty of modern cooperatives; (ii) the need to financially invest in the cooperatives (at least 50% of the assets by law have to be financial assets); and (iii) the capacity to manage cooperative enterprises. Some associations or unions of associations are developing into modern cooperatives based on the new law, in which normally the dividend is reinvested in the cooperative enterprises.

The Mozambican Association for the Promotion of Modern Cooperatives (AMPCM) was established in 2010 shortly after the proclamation of the new cooperative law. AMPCM is taking a lead role in implementing the new law through promoting and developing modern cooperatives as a sustainable form of wealth generation to target the multiple sectors. AMPCM is also promoting transition of the existing associations into cooperatives through capacity development (e.g., on cooperative legislation; business plan development; bookkeeping and auditing; and provision of judicial assistance; etc.). In Nampula and Niassa provinces, the cooperative development is actively supported by CLUSA. Although promoting the establishment of agricultural cooperatives based on the new law is an important issue of MINAG/DNSA, the new law is not well known in the rural areas, and the number of cooperatives registered under the new law is still very limited.

For organization of small-scale farmers necessary for agricultural development in the Nacala Corridor area, support for establishment of modern agricultural cooperatives and development of an efficient and effective business-like system of management and operation

need to be based on the new law. Main activities are to increase knowledge on and awareness of the new law and operation methods of relevant organizations and stakeholders of provinces and districts involved in the organization of farmers and establishment of agricultural cooperatives. Supporting the establishment of new agricultural cooperatives can be used as a model project for farmers' groups who wish to organize and support the transformation to new cooperatives from existing farmers' associations. After the new cooperatives are established, supporting the operation with soft loans through a financial system using the "credit for small and medium-scale company companies and farmers' associations" (improvement of ProSAVANA Development Initiative Fund) will be planned, and regular training sessions on human capacity development will be conducted for cooperative members. Human capacity development will focus on the business orientation of cooperatives.

### **3.10. Strategy for Land Administration**

#### **3.10.1. Land Reserve for Investment**

Various media have reported on land conflicts between investors and local farmers in the Project Area. While the land disputes do not seem to be a serious cause of declining new investments, it might be a barrier against potential investors in the future. Therefore, the public sector should play the role of mediator in mitigating the conflict between investors and local people.

Regarding the governmental administration of land management, it is recommended to establish an important principle: the government is responsible for the credibility of the information, which confirms the existence of "available" or unoccupied areas, so that they can be allocated to investors or potential applicants.

It is unlikely that there are areas without any claim for the right over them (customary occupation or good faith), so it is necessary to find ways to verify and confirm the rights to use the land in accordance with the provisions established by law. The areas of land confirmed as "available" will be registered in a "Land Reserve" to be destined for future allocations. The government, then, could issue a certificate outlining the available land (areas of public interest), and later, according to the strategic interest, divide the land for governmental projects or investments, according to agricultural land suitability, and issue DUATs to investors who are interested in the area for specific production.

An action in this sense, by the government, can create an environment of security and confidence for investments and mitigate future conflicts over land ownership.

A similar action can also be taken by the government in order to ensure possession and issuance of land titles (DUATs) to occupants of areas surrounding the “Land Reserve” in order to avoid future land conflicts between investors and neighboring community people. The demarcation and issuance of DUAT to all interested occupants around the “Land Reserve”, should grant the occupants equivalence of the rights to benefits provided to prospective investors.

Objectively, these actions could develop mutual trust and cooperation between communities, small-scale farmers and investors.

### **3.10.2. DUAT Acquisition among Small and Medium-scale Farmers**

DUAT acquisition for individual farmers shall be promoted, so that the government will be able to confirm the credibility of information on land use without difficulty. The present situation, that obscures the individual land use right of a certain plot of land, makes it difficult for the government to attain a reliable information on land use.

As mentioned in Chapter 2.2.7, land registration is difficult for farmers due to the cost and formalities. Because farmers feel that they are in an insecure position on land use, this could be a reason for the land conflict with the investors.

Moreover, registration of utilized land by farmers might have the effect promoting the transformation from shifting cultivation to settled farming. The secured land right will enhance the farmers’ awareness to maintain the land aiming at sustainable use and improved productivity. The acquisition of DUAT shall start in a community participatory manner in order to avoid overlap and conflict among farmers.

## **3.11. Strategy for Irrigation Development**

### **3.11.1. Basic Strategy for Irrigation Development**

#### **(1) Approach for Irrigation Development**

The Master Plan aims at promoting economic and social development through agricultural development in the Nacala Corridor, through realizing an increase in agricultural productivity and maximizing the effects of increased agricultural produce to the regional economy by involving small/medium scale farmers and private investment. The roles of the irrigation sector, in order to achieve the above development goal, are: i) to improve basic conditions of agricultural production through developing agricultural infrastructure such as irrigation systems, ii) to contribute to the increase of agricultural production and the revitalization of the regional economy, and iii) to manage the natural resources such as irrigation land and water resources appropriately so that the sustainability of the

development will be secured. In order to fulfill the role of the sector, the approaches shown below are adopted for irrigation development:

- To increase the actual irrigation area and agricultural production through effective use of the potential of the irrigation development.
- To realize sustainable irrigation development over the long term through appropriate operation and maintenance of irrigation facilities.
- To increase farmers' income through promoting irrigation farming of market-oriented products.
- To create income opportunity for small scale-farmers by producing cash crops with irrigation.
- To train small and medium leading farmers in the region through producing and selling cash crops with irrigation.
- To attract irrigation development corroborating with private investment.
- To secure sustainable irrigation development through appropriate management of land and water resources.

## (2) Basic Strategy for Irrigation Development by Zone

From the aspect of full use of the regional potential of irrigation development, the priority of irrigation development focuses on recovering the function and utilization of the existing irrigation systems through rehabilitation. The number, area in operation and potential area of existing irrigation systems are summarized by zone as shown below:

**Table 3.11.1 Number, Area in Operation and Potential Area of Existing Irrigation Systems**

Items	Zone I		Zone II	Zone III	Zone IV	Zone V	Zone VI
	A, B	C	A, B	A, B	A, B	A, B	A, B
Class <sup>1)</sup>	A, B	C	A, B	A, B	A, B	A, B	A, B
No. Systems	13	1	33	27	0	13	19
In operation (ha)	138	1,300	267	702	0	147	468
Potential area (ha)	800	2,000	1,400	1,728	0	267	551

1) Class A: Less than 50 ha of potential area, Class B: 50 ha to 500 ha, Class C: More than 500 ha

**Zone I** and **Zone II** have an advantage of being able to respond to the increasing demand for vegetables because of the increasing number of laborers working in urban areas of Nampula and SEZ of Nacala as well as the fertilizer factory planned in Monapo. By taking full advantage, these zones are expected to promote vegetable production by irrigation through rehabilitation of damaged and malfunctioned existing irrigation systems and promoting small pump irrigation. The expansion of the private banana garden in Monapo, which uses a modern irrigation system, is also expected in the future.

**Zone III** has a large potential of irrigation development by utilizing existing irrigation systems upon rehabilitation and improvement. The irrigation farming of vegetables such as onion and garlic is largely conducted and the area is considered as an advanced area of irrigation farming in the region. The development of irrigation in the zone is expected through expansion of irrigation area through rehabilitation of the damaged and malfunctioning existing irrigation system as well as by developing a new small irrigation system utilizing a pump and gravity system with abundant water resources in the river and spring water.

**Zone IV** is a mountainous area that has low potential for irrigation development. The possibility of introducing small vegetable irrigation using pumps or spring water is considered in the bottom of the valley, even though the area is limited.

**Zone V** has good access to Cuamba, which is expected to be a strategic assembling point in the future. By utilizing this advantage, the zone is expected to produce food and cash crops by irrigation. Due to the low potential of existing irrigation systems, the major emphasis of irrigation development of the zone will be put on the development of new pump/gravity irrigation using water of the Lurio tributaries and spring water at the foot of the mountains.

In **Zone VI**, production of potato, haricot beans and other vegetables by irrigation under the cool climate is to be promoted. The major emphasis will be put on the rehabilitation of the damaged and malfunctioning existing irrigation systems in Lichinga (Lichinga Sede and Chimbonila), while developing new irrigation systems is expected in Nguama and Mandimba.

### **3.11.2. Water Resources Development Potential and Management**

#### **(1) Identification of Water Resources Development Potential**

The possible water resources for irrigation development are summarized by zone as shown below. It is difficult to assess the water resources development potential accurately due to the defunct and malfunctioning observation network and lack of data.

The mean annual runoff of the Project Area is expected to be approximately 20 billion m<sup>3</sup>/year, which is largely surplus to the expected demand of irrigation development. Because most rivers have not yet been developed except for some running through the urban areas, the potential of water for future irrigation development is considered to be high. It is necessary to conduct basic investigation to grasp the development potential of water resources in parallel with development and reconstruction of the observation network and accumulation of hydrological data.

**Table 3.11.2 Possible Water Resources for Irrigation Development by Zone**

Zone I	Zone II	Zone III	Zone IV	Zone V	Zone VI
R. Monapo, R. Mecuburi	R. Meluli/ Namaita, R. Monapo	R. Ligonha, R. Lurio and tributaries	-	R. Lurio and tributaries	R. Lugenda and tributaries, R. Luchengo

The Monapo River, which is one of the major water resources of Zone I and Zone II, is the most developed river in the region due to the concentration of the population. The river was developed for urban and rural water supply, industrial water and irrigation for large-scale farms as well as small pump irrigation. Considering with the expected increase of water demand caused by population increase and industrial development, only rehabilitation of existing irrigation systems and small pump irrigation are possible and new development of irrigation systems is not realistic in these zones.

In Mandimba of Zone VI, the Lago Chiuta, which is located at the upstream border of the Lugenda River Basin near the national boundary with Malawi, can be considered as a possible water resource for large-scale irrigation development. It is necessary to conduct an investigation and evaluation of the possibility along with the potential for developing the marshy area along the upper Lugenda River.

## (2) Strengthening Water Resources Management

Management of water resources is essential for sustainable use of natural resources and water distribution in a manner that is appropriate and fair. At present, development of water resources remains at a much lower level than the potential, except for some rivers running through high population density areas. Thus, even though accurate water resource management is not applied, no serious conflicts or trouble has occurred. Considering the future development of industry and agriculture as well as the population increase of the Nacala Corridor area, the establishment of appropriate water resources management is considered a primary task.

- Development and re-construction of a hydrological observation network (steady implementation of development plan of ARA-CN and ARA-N)
- Strengthening of the water license system: include small and medium irrigation systems of less than 500 ha in the water license system, even though the water fee will not be charged. Build and maintain a database of water licenses and actual water use, in corroboration with MINAG-DPA.
- Formulation of a water master plan including water destitution plan for the rivers where intensive development is expected such as the Monapo River.



### **3.11.3. Irrigation and Drainage Development**

#### **(1) Rehabilitation of Damaged and Malfunctioning Existing Irrigation Systems**

##### **1) Priority of rehabilitation**

From the aspect of full use of existing irrigation development potential, the priority of the irrigation development shall be put on the rehabilitation of damaged and malfunctioning existing irrigation systems to recover their function.

Zones II, III and I are set as priority zones of preferential rehabilitation work, because these zones have a large potential for irrigation development by rehabilitating existing systems, which is indicated by the difference between the potential area and the area in operation.

The priority of the rehabilitation will be decided considering the potential development area of the system, the present situation of land use in the beneficiary area (possibility of land consolidation for improving effectiveness of canal system), road conditions (access to potential market), condition of farming activity and farmers' organizations, etc.

##### **2) Rearrangement of irrigation plots and separating them from rain-fed plots through land consolidation**

The canal network is defunct and abandoned in some of the existing irrigation systems, and only the land near the water source is irrigated. In such areas, irrigation plots and rain-fed plots are mixed, which causes difficulty in managing irrigation land appropriately and in increasing the efficiency of water delivery.

Along with reconstruction of the canal network, it is necessary to rearrange the irrigation plots and to separate irrigation and rain-fed plots to cope with the new canal network. Rearrangement of irrigation plots through land consolidation will contribute to improvement towards effective and efficient water management as well as appropriate irrigation land management. Through effective land and water use in the system, the actual irrigation area will be expanded. The increased irrigation land will be distributed to farmers in the community and will contribute to increasing their farming scale. By generating extra irrigation land and concentrating on motivating farmers through rehabilitation and land consolidation, leading farmers of irrigation farming will be trained adequately.

##### **3) Improvement of inventory of irrigation facilities and creating a data base**

At present, the inventory of irrigation systems is developed by DPAs; however, the information collected is neither sufficient nor kept up to date. It is necessary to improve the contents of the inventory and create a database as well as adequately manage the information in order to provide sufficient information for planning future irrigation development and the management of irrigation systems.

## **(2) Improvement of Technical Capability for Construction, Operation and Management of Hydraulic Structures**

One of the major reasons of malfunctioning of hydraulic structures is attributed to the lack of adequate skill and technology in construction and repairing work at each level, i.e., the administrative level, local construction companies and local community and farmers. In order to proceed with the development of irrigation facilities and ensure sustainable use of irrigation systems, it is essential to improve the skills and technology of above the actors at each level.

### **1) Public administration in charge of irrigation systems**

The technical capability of public administration in charge of irrigation systems shall be increased in the management of structures and facilities, project planning, designing and investigation, construction supervising, and guidance of farmers. DPA has the responsibility of above activities at the provincial level with the collaboration of SDAEs. The number and ability of staff members of the irrigation section of DPA shall be increased to cope with the increasing tasks for management of irrigation projects as well as for securing the budget for staff activities. In addition, it is necessary to enhance the support of the national administration for technical service of DPA. Support at the national level is expected through the development of technical guidelines and standard designs of hydraulic structures and irrigation facilities, enhancement of technical guidance and advice to the irrigation section of DPA, and appropriate guidance on irrigation development and technical support. The National Institute of Irrigation (INIR) has been established under MINAG for the purpose of overall management and improving technology of the irrigation development. Provincial level substructures of the INIR in Nampula, Lichinga and Zambezia will be set up in the early stages of development.

### **2) Local construction companies**

Construction of hydraulic structures using inadequate skills and technology causes malfunctions and damage to the structures. It is necessary to find a local construction company that has the sufficient skills and technology required to construct hydraulic structures for irrigation systems. Improvement of procurement procedures by introducing a qualification system for hydraulic construction, enhancement of technical guidance and inspections of local construction companies by the public administration are required.

### **3) Local community and farmers**

Regular maintenance and simple repair of the irrigation facilities is conducted by the community and irrigation users, i.e., farmers' groups or associations. In addition, simple hydraulic structures are sometimes constructed by members of the community and water users. The skills and technical capacity of the community and users of the irrigation facility are to be developed. In addition, capacities will be improved for arranging such work by

member's labor contribution, through training of leaders of the community and irrigation users on construction of simple facilities and by enhancing the field guidance by SDAE extension officer and inspections by the DPA irrigation section.

### **(3) Sustainable Use of Irrigation Facilities through Strengthening Farmers' Associations and Formulating Water Users' Associations**

Irrigation systems in the Project Area are small and medium-scale systems except for one private large-scale system for a banana plantation. The responsibility of operation and maintenance of the systems is held by the irrigation users and user groups. In general, small and medium irrigation systems are operated and maintained by the community, farmers' groups or farmers' associations. By enhancing the capability of user groups, appropriate operation and maintenance of irrigation facility will be carried out by the groups, so that the aim of maintaining adequate function of the irrigation systems over the long term and utilizing the system sustainably will be achieved.

In principal, the operation and maintenance shall be carried out by the user groups in a self-sustained manner, which is done through the collection of water fees and arrangement of members' contribution to labor work and/or material. Thus, the user groups are required to have an adequate capability to manage the organization. In addition, the user groups is expected to be a receiving body of technical support and extension service on irrigation and facilities by the public administration. The following activities shall be promoted in the Master Plan:

- Organizing farmers' groups into associations in cases where farmers' groups own and operate the irrigation system
- Legalization of farmers' associations that have the function of water users' associations
- Organizing water users' associations by unionization of associations in cases where there is a medium-sized irrigation system used by several associations and/or groups
- Improving skills and technology of associations for operation and maintenance of irrigation facilities
- Enhancing organization management for irrigation facilities including the collection of water fees as well as arranging member's participation in management
- Increasing the efficiency of water use though improving water management in the field as well as in the canal system.

### **(4) Promotion of Small Irrigation Systems using Pump**

In parallel with the rehabilitation and recovery of existing irrigation systems, small-scale individual irrigation with small pumps for vegetables is promoted in the farmland along the rivers, streams, lakes and marshes that have easy access to surface water. At present, manual

irrigation using a watering can is popular in such areas and the required manpower for irrigation limits the size of the irrigation plot for small-scale farmers.

Vegetable production with irrigation will be promoted to small-scale farmers through introducing small pumps and technical guidance on irrigation practice, so that farmers can increase their cash income. Because the demand for vegetables including foliage plants is expected to increase due to the increasing number of laborers working in urban areas of Nampula and SEZ of Nacala and the planned fertilizer factory in Monapo, vegetable production with small pump irrigation is encouraged in Zone I and Zone II.

Small pumps are principally owned by farmers individually; however, shared use among farmers or renting by owner can also be considered. The work efficiency of irrigation will be further increased by adopting water storage tanks or farm ponds. Through the following support to small-scale farmers by the public administration, vegetable production with small pumps will be promoted:

- Financial support to small-scale farmers for procurement of pump equipment and fuel
- Technical guidance on effective water use and farming practice of vegetable crops,
- Stable and supported provision of vegetable seeds
- Organizing small-scale irrigation farmers into associations and support them regarding market channel development through matching of heavy buyers or contracts.

#### **(5) Development of New Small-scale Irrigation Systems**

The priority of development is principally put on the rehabilitation of existing irrigation systems. Besides the rehabilitation, irrigation systems will be developed in the areas that have an advantage for new development.

Zone III, where irrigation farming is popular among farmers and produces a large amount of vegetables such as onion, garlic and other crops, has potential for newly developed small-scale irrigation systems utilizing the abundant surface water along with rehabilitation of existing systems. Zone V is also considered as a potential area for newly developed small-scale irrigation systems by taking full advantage of markets located close to the expected strategic assembling point of the region. In these zones, the market for onions, garlic, tomatoes and other crops for urban areas such as Nampula and Nacala as well as exports to Malawi in the future is considered to be promising.

While large-scale irrigation development with large investment is not realistic, there is a possibility to develop small-scale irrigation systems by utilizing spring water or pumping up river or stream water in combination with water storage tanks and small canal networks. Such small and simple irrigation systems can be developed through the initiative of local leading farmers and farmers' associations/cooperatives. The development of small-scale irrigation systems initiated by local core farmers is also expected to contribute to training the leading farmers of small and medium irrigation systems.

## **(6) Irrigation Development by Private Investment**

Promising crops suitable for large-scale private investment such as soybean and maize are expected to be cultivated with rain-fed systems as a basic strategy due to the climate conditions of the Project Area. Considering the variability of both the period and amount of rainfall, the productivity of rain-fed crop cultivation will significantly fluctuate from year to year. Supplemental irrigation can stabilize the productivity of rain-fed crops at a favorable level. It will contribute to the advantage of a steady supply in the market as well as to reducing the risks of farm management. Furthermore, full irrigation of crops by using modern irrigation technology such as center pivot sprinkler systems and liquid fertilizer enables accurate cultivation management in the field and contributes to increase of the quality and quantity of products. Crops that are well managed and have a higher quality will have an advantage in the market.

The decision whether to apply irrigation and what type to use will be made not only by considering technical issues, but also by considering cooperative strategies such as crop selection, characteristics of the market, relationship with sales channels, and business investment. Thus, private investment will be promoted through providing the necessary information to examine the business plan such as the development potential of water resources and suitable land for irrigation through building a database.

### **3.12. Strategy for Improvement of Roads and Social Infrastructure**

#### **3.12.1. Access Road Improvement**

Roads and bridges are the primary requirements for conducting all activities that ensure socio-economic development; therefore, one of the specific objectives of the government in this area is to ensure the rehabilitation of access roads below regional road level that are of vital importance for the movement of people and goods.

By improving poor road conditions, the benefits below can be expected.

- Shorten time for traveling
- Increase chance to sell the products
- Increase collected amounts of product and its efficiency
- Reduce the transportation cost
- Increase selling price of products at farm gate (for farmers)
- Reduce product losses in both storage and transportation
- Improve quality of products
- Increase access to agricultural inputs, markets, public services, etc.
- Solve isolated situations regarding access.

On the other hand, negative impacts may occur if the road is constructed without proper consideration of the following:

- Population drain to urban areas

- Uncontrolled /illegal land reclamation, deforestation or garbage dumping
- Destruction of traditional culture
- Any negative impact that will harm natural resources

The road improvement should be implemented based on the points and steps below.

### **(1) Capacity Development for Road Planning Considering Agricultural Strategy**

In the road classification system in Mozambique, roads that link to district centers or administrative posts are categorized as regional roads. Other minor roads are categorized as non-classified roads (hereinafter called NC roads).

National road and regional road improvement is planned by ANE. The NC roads are under the jurisdiction of the district administration and their maintenance cost is funded by a road fund. However, a budget for the improvement of NC roads is not allocated by the road fund so it needs to be classified as a specific project financed by the Mozambican government or other donors.

In road improvement planning, every road is given a priority ranking. In order to prepare the road plan reflecting the local agricultural plan due to the dominant economic activity in rural areas, the actors should work jointly to prepare the strategic plan, including ANE, who is in charge of roads, DPA for local agriculture and MPD for planning.

The plan should be prepared based on demands from local districts using a bottom-up approach. However, the plan should ensure consistency with provincial or regional strategies.

### **(2) Priority for Improvement**

#### **1) Roads to increase market access**

Roads connecting production areas of specific products and their markets will be improved according to the priority. The benefits like cost reduction, shortened transportation time or quality improvement might be expected quickly if the roads are constructed in an existing production area. In particular, the following idea is being considered for the Project Area.

- To pave roads connecting production sites and markets or major roads to the market in Gurue in Zone IV, in order to increase the quality of vegetables in the market.
- To strengthen roads and construction of bridges for soybean cluster development in Zone V aiming to allow heavy vehicles to travel between cluster areas and the surrounding production areas.
- To improve roads connecting production areas and processing sites or consuming places. It will target specific crops for which quality is strongly dependent on the length of the time after harvest like cassava or those for which value is easily decreased due to transportation damage like vegetables.

## **2) Roads and bridges to secure accessibility throughout the year**

Securing year-round transportation is required but it is one of the big challenges. Generally, 15 to 17% of the total length of roads is impassable in rain season. The major causes of the impassability are poor drainage on steep slopes or lower sections part and the lack of bridges.

The poor drainage causes deep erosion of the road and prevents passage of traffic. It also makes the road slippery resulting in an increased possibility of accidents. In order to mitigate this, drainage improvement and partial pavement is required, especially if heavy trucks use the road. Moreover, there are many seasonal streams in the Project Area; so many communities are isolated during the rainy season. In these areas, the prices of the products fluctuate greatly between the beginning of harvest season and the end of rainy season. Year-round transportation will increase the opportunity for farmers to get more profit.

Therefore, this aspect is important in hilly areas of Zones III, IV and VI.

## **3) Roads to support new development**

The road network should be developed in step with the development strategy of other sectors. Access roads are essential infrastructure to attract investors for new strategic development areas for agribusiness such as special economic zone (SEZ). Moreover, roads connected to several potential communities for production help improve the production areas. For example, a numbers of communities are located near rivers without access roads in Malema, Alto Molocue, Mandimba and Lichinga. Production area for vegetables or other irrigated crops can be created if the communities are connected by roads.

## **4) Roads to make distribution network centering around storage**

In the distribution of agricultural products, the products are stocked at production areas in small portions individually. Then, they are gathered and sent to an administration post then on to the district center. Regarding agricultural inputs, the distribution might be inverted.

Therefore, the roads connecting district centers and administration posts should be suitable for year-round truck transportation.

District centers in Mogovolas and Meucate have no plans to pave the roads, even though other district centers in the Nacala Corridor area will be connected to others with paved roads after completion of roads N8, N13 and N14. Therefore, the roads to both district centers also need to be improved.

## **5) Road upgrades to correspond with development**

The required level of road changes depending on the development of agribusiness. The priority in the strategic plan should be revised periodically. For example, a large rice milling plant has been constructed in Mogovolas to process paddy in Moma and Angoche districts;

thus, the traffic from Mogovolas to Nampula might increase led by the demand for rice. Therefore, a paved road between Mogovolas and Nampula is required.

### **(3) Required Activities Support Rural Road Development**

The Government of Mozambique implemented a rural road implementation program (RRIP) from 2008 to 2011 in order to find solutions to reduce construction costs. Through the program, various materials and methods to be used for surfacing were found but more research and development are required.

Such kinds of research and development, for example road improvement with sand bags or surfacing with stones, etc. are required to achieve road development driven by the community.

### **3.12.2. Social Infrastructure Improvement**

Social infrastructure improvement is considered according to two groups. One is required infrastructure for the areas supporting agribusiness development like cluster developments. The other is the necessary infrastructure for rural society. These improvements are not considered directly in the Master Plan, but must be considered in activities of projects included in the Master Plan.

#### **(1) Required Infrastructure for the Areas Supporting Agribusiness Development (Urban Areas)**

As written in chapter 2.7.2, the power supply capacity is close to the limit in Nampula and Nacala areas, and the water supply has reached its limit in Nampula, Nacala, Cuamba and Lichinga.

As far as agribusiness promotion in some limited areas, required amount of water may be secured with supplementary use of groundwater, if investors who require a large amount of water, such as beverage factories or beer plants do not enter these areas. Nevertheless, dam construction for surface water development, as described in each F/S of the water supply development plan, should proceed.

Regarding the power supply, strengthening of the distribution facilities in Nampula substation has a high priority, because the electricity is supplied through Alto Molocue and Nampula to the east of the Project Area including the Nacala area. Building a new distribution line will be advantageous considering the increased large-scale demand from cluster development.

#### **(2) Social Infrastructures in Rural Areas**

Required social infrastructure development in rural areas can be categorized into hard components such as water supply and electricity, and those to be combined with soft components such as education and health.



## 1) Measures to be combined with soft components

- Reinforcement of education facilities in rural areas and securing the necessary number of teachers
- Promotion of adult education to improve the literacy of women
- Strengthening measures to combat HIV/AIDS, especially to prevent the spread of infection.
- Reinforcement of medical facilities in rural areas and securing the necessary number of medical staff
- National level human resource development in medical sector through establishment of medical colleges or medical technical school.

## 2) Hardware Measures

- Increasing rural water supply facilities in order to improve safe access to water
- Promotion of rural electrification with renewable energy (strengthen FUNAE)
- Capacity development of community and local governments aiming at implementing community driven infrastructure development.

## 3.13. Compliance with RAI Principles

### 3.13.1. Focus in the Present Report

As described in earlier chapters, promotion of private investment is one of the basic approaches of agricultural development in the Nacala Corridor, especially for the improvement of productivity and increase in production.

In ProSAVANA, the concept of RAI (responsible agricultural investment) will be fully adopted in the private investment projects in agriculture / agro-industry sector, in accordance with the internationally accepted “Seven key principles of RAI” (see Table 2.8.1). For this purpose, “ProSAVANA Guideline on RAI” will be elaborated as an annex to the “Data Book for Private Investors” by June 2013.

However, it is important to understand that RAI principles are of a voluntary nature and its successful application depends on the self-regulation of investors and proper enforcement of existing legislation by the government. *In fact, the Government of Mozambique already has a number of laws and regulations that can respond to most principles of RAI, if properly enforced.*

As reported in the Interim Report 1 and many other publications, recent large-scale private investment projects in the agriculture and forestry sector are facing conflict with local communities not only in the Nacala Corridor area, but also in all of Mozambique. Major issues include: disagreement on land delimitation, involuntary resettlement, delayed payment of compensation, perceived threat to food security, weak compliance with investor-community partnership agreement, and so on. This situation is attributable to

complex reasons, but it will be helpful to divide the problems as follows: (1) planning, consultation, assessment and licensing stages; and, (2) implementation, monitoring, supervision and correction stages.

Generally speaking, stage (2) seems to include more problems and difficulties than stage (1), since Mozambique is known to have well-structured legal procedures on DUAT and EIA but seriously lacks in budget, staff and capacity to enforce proper supervision required to protect the natural environment as well as civil society's rights and livelihood.

### **3.13.2. Planning, Consultation, Assessment and Licensing Stages**

One of the fundamental problems for civil society and communities is the fact that investors' project proposals and the "exploitation plans" submitted during DUAT application are officially secret and inaccessible. Communities do not have other options than to wait for limited opportunities of public consultation during DUAT and EIA processes by the investor. Public consultation itself is also criticized in many cases for poor consensus building and vagueness of investor-community partnership agreements, which are not legally binding. Moreover, weak coordination among governmental institutions sometimes result in overlapping DUATs. Therefore, the government should be involved this procedure more actively.

As for licensing, the situation is more confusing due to structural contradiction: although Environmental License is defined to precede any other licensing (Article 15 of Environment Law: law no. 20/97), the approval for investment proposal is first required in cases of foreigners who want to acquire provisional authorization of DUAT (Article 11 of Land Law: law no. 19/97), which in turn is required to be annexed to EIA report for environmental licensing (Ministerial Order no. 129/2006 by MICOA). In reality, some investment projects get started without waiting for the time-consuming EIA clearance and official issuance of environmental license because an approved investment project is required to commence its implementation within 120 days (Decree no. 43/2009). In addition, provisional authorization of DUAT might be revoked if the project does not show progress according to the exploitation plan without justifiable reason in a period of two years (Article 27 of Land Law: law no.19/97). It is not easy to correctly understand the complex interrelation of these three procedures (investment project approval, provisional authorization of DUAT and environmental license), which go through almost in parallel but with different time spans from application to authorization. According to several interviews held with the officials of MICOA, MINAG, CPI and CEPAGRI at central and provincial levels, such confusion is prevailing over not only investors but also the officials themselves. In fact, in Zambézia province, the Study Team has been informed that at least two large-scale commercial farming projects are operating without having submitted the EIA report or acquiring an environmental license despite the official request from DPCA.

A fundamental restructuring of legal and administrative systems would be necessary to tackle the problems described above, which will require quite a long-term effort by the central government. Therefore, in the context of ProSAVANA-PD, the Study Team would recommend as a second-best alternative the improvement of the supervision system through capacity development and technical assistance.

### 3.13.3. Implementation, Monitoring, Supervision and Correction Stages

Principal legal instruments and mechanisms to supervise private investment projects in the agriculture and agro-industry sector (not including forestry) are summarized in Tables 3.13.1 and 3.13.2.

**Table 3.13.1 Authorization, Supervision and Penalty in Relation to Licenses and Standards\***

License / Standard	Authority	Methods of control	Penalty for infraction
<b>Common cases (basic requirements)</b>			
Investment Project Authorization	CPI, GAZEDA	Monitoring	Revocation
DUAT	MINAG, Cadastre Services**	Supervision	Revocation
Environmental License	MICOA	EIA, Inspection, Audit	Fine, Civil/Penal punishment
District Land-Use Planning	MICOA, District government	Supervision	Fine, Termination or demolition of infraction activity
Industrial Activities License	MIC	Supervision, Inspection	Fine, Revocation, Closure of the infraction activity
Emission / Effluent Quality Standard	MICOA	Supervision (analysis, field survey, scientific assessment)	Fine, Closure of the infraction activity
<b>Specific cases (other special requirements)</b>			
Water Use and Discharge License	ARA	<i>Unclear</i>	Fine, Revocation
Groundwater Exploitation License	ARA, Sector agencies (health, public works, environment, etc.)	Supervision	Fine, Revocation, Termination of infraction activity
Dam Construction / Operation License	ARA	Supervision	Fine, Administrative punishment
Agrochemical Import / Distribution / Use / Storage Authorization	MINAG	Inspection, supervision	Fine, Confiscation, Penal punishment
Resettlement Plan	MICOA	Supervision	Fine, Administrative punishment
Private Works License (construction / use)	Municipality, District government	Supervision	Suspension, Revocation, Fine, Termination or demolition of infraction activity

\* This table does not include the supervision systems by MITUR on the protected areas and by MINAG on the forestry exploitations.

\*\* Cadastre service means public services in charge of implementation and updating of National Land Cadastre at central or local levels.

Source: Study Team

Table 3.13.2 Supervision Mechanism of Critical Processes

Legal base	Stipulations
Investment Law (Law no.3/93)	<ul style="list-style-type: none"> <li>✧ CPI and GAZEDA are responsible for providing investors with <b>assistance and monitoring</b> to verify the fulfillment of the terms and conditions of project authorization, as well as the provisions of Investment Law and other complementary legislation.</li> <li>✧ Project authorization could be <b>revoked</b> when it is revealed that the project is failing to fulfill the above conditions.</li> </ul>
Investment Law Regulations (Decree no.43/2009)	
Land Law (Law no.19/97)	<ul style="list-style-type: none"> <li>✧ Provisional authorization of DUAT for economic activities could be <b>revoked</b> by Cadastral Services** when it is revealed that the project is failing to implement the exploitation plan without justifiable reason in a period of 2 years (foreign investment) or 5 years (domestic investment).</li> <li>✧ Cadastral Services have competence to <b>supervise</b> the compliance with the provisions of Land Law Regulations, to detect infractions and make respective statement.</li> <li>✧ Department of Regulation and Control, under the National Directorate of Land and Forest (DNTF), has competence to <b>oversee and guarantee</b> the fulfillment of the legislation about land, forest and wildlife, as well as to support the supervision services by the local state organs.</li> </ul>
Land Law Regulations (Decree no.66/98)	
MINAG Internal Regulations (Ministerial Order no.91/2006)	
EIA Process Regulations (Decree no.45/2004)	<ul style="list-style-type: none"> <li>✧ DNAIA should ensure that information related to environmental licensing is <b>available to the public</b>, and proceed with the review of EIA studies in collaboration with public entities, interested private sector and civil society.</li> <li>✧ Environmental license becomes <b>invalid</b> when it is revealed that the project is failing to start within 2 years from the issuance.</li> <li>✧ The project entity would be <b>fined and punished</b> by civil and penal laws in such cases as: <ul style="list-style-type: none"> <li>- Implementation of activities without environmental license;</li> <li>- Application of the project to environmental licensing process after its commencement;</li> <li>- Alteration of activities after issuance of the environmental license without prior authorization;</li> <li>- Provision of fraudulent, altered or omitted information during EIA process;</li> <li>- Failure to implement mitigation or compensation measures, non-compliance with the conditions of environmental license.</li> </ul> </li> <li>✧ Environmental <b>inspection and audit</b> are explained in more detail below.</li> </ul>
Environmental Inspection Regulations (Decree no.11/2006)	
MICOA Internal Regulations (Ministerial Order no.265/2009)	
Environmental Audit Regulations (Decree no.25/2011)	
Territorial Arrangement Law (Law no.19/2007)	<ul style="list-style-type: none"> <li>✧ District Land Use Plan (PDUT) establishes not only spatial structure but also norms and rules to be observed for its materialization. Any license, work or land-use against PDUT would be <b>fined and punished</b>, and such works can be compulsorily terminated or demolished. District governments as well as MICOA are responsible for the <b>supervision</b>.</li> <li>✧ Any development agent should conduct, along with communities, the delimitation and titling of respective community area in order to avoid conflict (an example of the <b>norms and rules</b> set by district government).</li> </ul>
Territorial Arrangement Law Regulations (Decree no.23/2008)	
Industrial Activities Licensing Regulations (Decree no.39/2003) (plus, Ministerial Order no.134-D/2003)	<ul style="list-style-type: none"> <li>✧ MIC has competence to <b>supervise</b> the licensed industrial establishments through inspections either with or without notice.</li> <li>✧ Infractions of the provisions of Industrial Activities Licensing Regulations, including environmental risks, would be <b>fined and punished</b>. Such industrial establishments would be ordered to stop or close the operation, and the license would be <b>revoked</b>.</li> </ul>
Resettlement Process Regulations (Decree no.31/2012))	<ul style="list-style-type: none"> <li>✧ "Technical committee for assistance and <b>supervision</b> of resettlement" consists of the representatives of different sectors (Territorial arrangement, Local administration, Public works and housing, Agriculture, district government) with respective responsibility.</li> <li>✧ Resettlement process is subject to <b>supervision</b> by the Environmental Inspection and other inspections for specific materials. Infractions of the provisions of Resettlement Process Regulations, including the failure to fulfill the resettlement plan, would be <b>fined and punished</b> administratively.</li> </ul>

Environment Law (Law no.20/97)	<ul style="list-style-type: none"> <li>✧ Citizens who might find infractions of the provisions of Environment Law and any other environmental legislation have an <b>obligation</b> to inform the fact to the police or administrative officials.</li> <li>✧ Citizens who might consider themselves offended in their rights to an ecologically balanced environment can request immediate <b>suspension</b> of the causal activity.</li> <li>✧ Citizens who might suffer, as a consequence of violation against the environmental legislation, personal offense or damage to properties, including loss of harvest or profit, can <b>prosecute</b> judicially the violator and request respective repair or compensation.</li> <li>✧ The Public Prosecutor's Office (Ministério Público) is responsible for the <b>defense</b> of environmental values protected by Environment Law.</li> </ul>
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Source: Study Team

Despite so many well-structured legal instruments, it is evident that weak law enforcement is resulting in environmental degradation as well as threatened livelihood of the communities in many cases. Broadly speaking, operational schemes of the supervision can be divided into: (i) joint supervision by CPI – CEPAGRI – DNTF, and (ii) environmental inspection and audit by MICOA, which are usually conducted in a separate and inharmonious manner.

According to interviews held with the officials of CPI, CEPAGRI and DNTF at the central level, the monitoring and supervision of the agricultural investment projects are actually not meeting the required frequency. A joint team is formed among the three institutions, including central and provincial levels, to visit the projects only once or twice a year, though the ideal frequency is thought to be every three months. CPI participation is rather irregular as well. The most important points for verification during their visit include: progress of the project according to the exploitation plan; fulfillment of the investor-community partnership agreement; and, compliance with the proposal on job opportunity for Mozambicans and foreigners, etc. The legislation provides that investment project authorization as well as provisional authorization of DUAT can be revoked<sup>2</sup> when serious infraction, non-compliance or irregularities are revealed; however, in reality, most cases end in receiving the corrective recommendations from the supervision team, and application of definitive revocation seems to be still below the expected level<sup>3</sup>.

Environmental inspection and audit by MICOA are other powerful tools of the government to protect the natural and social environments, if properly applied. The relatively complicated system is explained in Table 3.13.3. As shown, environmental inspection covers a wider range and has a stronger legal competence than environmental audit.

<sup>2</sup> As an example, a large-scale bio-fuel investment project in Gaza province obtained provisional authorization of DUAT for 30,000 ha in 2007 (Resolution no.54/2007). However, it was revoked due to non-compliance with the exploitation plan without justifiable reasons (Resolution no.88/2009).

<sup>3</sup> In 2009, a total of 950 land plots in Mozambique covering approximately 540,000 ha underwent the supervision by DNTF. As a result, DUATs were revoked in 197 land plots covering 22% of the supervised area due to underdeveloped use. (Source: 1<sup>st</sup> monitoring report of good governance on the management of environment and natural resources in Mozambique 2010-2011, CTV)

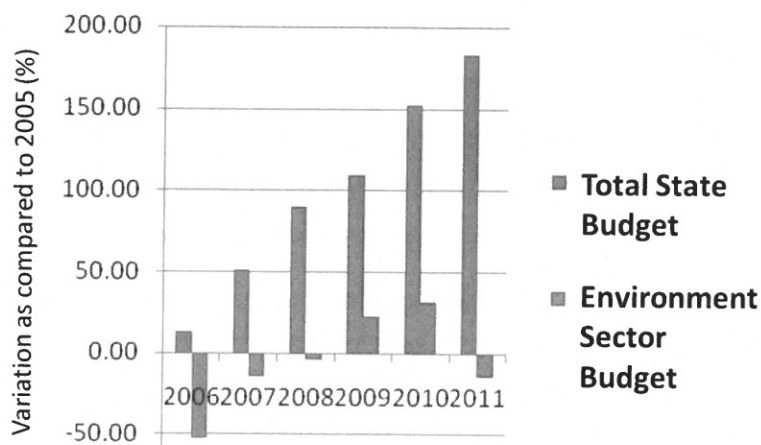
**Table 3.13.3 System of Environmental Inspection and Audit**

<b>Environmental Inspection</b>	
Legal base	<ul style="list-style-type: none"> <li>✧ MICOA Internal Regulations (Ministerial Order no.265/2009), Articles 4 and 5</li> <li>✧ EIA Process Regulations (Decree no.45/2004), Article 24</li> <li>✧ Environmental Inspection Regulations (Decree no.11/2006), Articles 1, 3, 11 and 19</li> </ul>
Responsible agency	Department of Environmental Inspection (under General Inspection) of MICOA
Objective	<ul style="list-style-type: none"> <li>✧ To ensure compliance with the laws and regulations of environmental issues.</li> <li>✧ To control fulfillment of the recommended mitigation measures for reduction or removal of negative effects of any activities related to environment.</li> <li>✧ To mobilize legal mechanisms, in coordination with other competent agencies, to order termination, demolition or cancellation of the activities which deteriorate environmental quality.</li> <li>✧ To control the process of EIA, environmental licensing, environmental audit and resettlement.</li> </ul>
Procedure	<ol style="list-style-type: none"> <li>(1). Each investment project submits an 'Environmental Management Plan (PGA)' along with an EIA report.</li> <li>(2). Once the environmental license is issued and the activities get started, the project side has the responsibility to carry out environmental monitoring according to PGA and inform the results to MICOA or DPCA.</li> <li>(3). Based on this information, MICOA conducts environmental inspection regularly and makes statement for sanction in case of violations. All violations against legally protected environmental values which are subject to penal procedure shall be informed to the Public Prosecutors Office (Ministério Público).</li> </ol>
Obligations	The inspection mission in its first visit leaves recommendations for corrective measures when the irregularities are not serious. A second visit is conducted within a determined period, and if it is revealed that the irregularities are left without correction, such cases will result in fines or punishments.
<b>Environmental Audit</b>	
Legal base	<ul style="list-style-type: none"> <li>✧ MICOA Internal Regulations (Ministerial Order no.265/2009), Article 19</li> <li>✧ EIA Process Regulations (Decree no.45/2004), Article 24</li> <li>✧ Environmental Audit Regulations (Decree no.25/2011), Articles 3, 6, 7, 8 and 15</li> </ul>
Responsible agency	Department of Environmental Audit (under DNAIA) of MICOA
Objective	✧ To provide a management tool to evaluate the process of environmental protection and control, the management system and its functional state in a systematic, documented and objective manner.
Procedure	<ol style="list-style-type: none"> <li>(1). <b>Public environmental audit</b> is carried out by MICOA for the ongoing activities of Category A, B and C. The environmental monitoring reports submitted by the project side shall be reviewed regularly.</li> <li>(2). <b>Private environmental audit</b> is carried out by the project entities themselves for its activities potentially harmful for the environment. In case of the projects of Category A or B, the audit shall be conducted at least once a year to ensure the projects' conformity with the provisions of environmental legislation. The project entities shall contract auditors who did not participate in the EIA process as consultant.</li> <li>(3). MICOA can command environmental audit for any activities, in collaboration with other sector agencies, which had become operational without going through EIA process, when damage to the environment is anticipated.</li> </ol>
Obligations	The recommendations given by the environmental audit must be fulfilled obligatorily. The audited entities must prepare an Action Plan and present it to MICOA explaining the mechanism, resources and period to respond to the recommendations, within 30 days after receiving the audit report. Failure to comply with this plan would result in fines or punishments.

Source: Study Team

According to interviews held with the officials of MICOA at central and provincial levels, the environmental inspection and audit of the private investment projects are actually not meeting the ideal frequency, which is thought to be every six months. The serious lack of

budget (see Figure 3.13.1), trained staff, equipment and expert capacities are the principal reasons for such insufficient supervision, and the result is endangered continuity of the natural resources and numerous conflicts between investors and communities that are left without a satisfactory legal solution.



Source: Adapted from "1<sup>st</sup> monitoring report of good governance on the management of environment and natural resources in Mozambique 2010-2011" by CTV

**Figure 3.13.1 Variations of State Budget and Environment Sector Budget**

It is pertinent to cite an important remark by CTV<sup>4</sup> on this point: *“Environmental licensing of the activities may put into danger the continuity of natural resources when it is not accompanied by corresponding capacity of control and supervision. ... Environmental license should not be issued unless the capacity of supervision is previously guaranteed, at the risk of significant damages of economic, social and environmental character.”*

#### **3.13.4. Need for Capacity Development and Technical Assistance on the Supervision Mechanism**

Suggestions to overcome the weakness of supervision mechanism include alternatives that will require a modification of current legislation and other options that could be implemented without structural reform.

The former consists of two pillars: (i) clarification of the legal status of the investor-community partnership agreement; and, (ii) allocation of a part of the licensing taxes and the imposed fines as an exclusive budget for environmental inspection and audit.

Land Law Regulations (Decree no.66/98) define, in its Articles 24 and 27, that the ‘District Administrator’s Observation’ is required as part of the DUAT application process and that the observation shall include the terms of partnership between the DUAT applicants and the existing DUAT holders by occupancy. However, it is unclear whether this partnership

<sup>4</sup> Source: Extracted from “1<sup>st</sup> monitoring report of good governance on the management of environment and natural resources in Mozambique 2010-2011” by CTV

agreement makes part of the ‘exploitation plan’ that is subject to the supervision (and eventual revocation of DUAT) by the Cadastre Services. It is desirable to establish legal provisions, as an addendum to the Land Law Regulations, on the obligation to comply with the investor-partnership agreement, mechanism of supervision, system of grievance redress and penalty for the failure to fulfill the terms of agreement.

A drastic increase in budget allocation for the environmental inspection and audit is highly unlikely. To cope with this shortage, canalization of a certain percentage of taxes and fines as financial source of the supervision will be a recommendable strategy. Currently, the licensing taxes and imposed fines for violators are distributed as follows:

**Table 3.13.4 Distribution of Revenues from Taxes and Fines**

Fiscal Revenue	Distribution
DUAT authorization tax (provisional / definitive), Annual DUAT tax	40% for the state account 60% for Cadastre Services
Environmental Licensing taxes	
Fine imposed by EIA Process Regulations	
Fine imposed by Environmental Inspection	40% for the state account
Fine imposed by Environmental Audit	60% for FUNAB
Fine imposed by Resettlement Process Regulations	
Fine imposed by Emission/Effluent Quality Standards	
Environmental auditors' certification tax	60% for the state account 40% for FUNAB
Taxes related to Territorial Arrangement	60% for the state account 20% for FUNAB 20% for Districts and competent autonomous organs
Fine imposed by Territorial Arrangement supervision	40% for the state account 20% for FUNAB 40% for Districts and competent autonomous organs
Industrial Activities Licensing tax	35% for the state account 65% for improvement of the industrial licensing*
Fine imposed by Industrial Activities Licensing Regulations	50% for the state account 25% for the actors involved in the process* 25% for the fund to promote improvement of the service*

\* Further details are to be determined by the Minister of Industry and Commerce.

Source: Study Team

As shown in Table 3.13.4, FUNAB (Environmental Fund) has several revenue sources derived from licensing taxes and different kinds of fines; however, subsidization or promotion of environmental inspection and audit are not explicitly stipulated as FUNAB's competence in its organizational statute (Decree no. 26/2011). It is desirable to establish legal provisions, as part of the FUNAB Internal Regulations, which are yet to be approved, and administrative schemes which enable the transfer of certain funds for MICOA (General Inspection, DNAIA and DPCAs) and other relevant authorities as an exclusive budget to guarantee the implementation of supervision, environmental inspection and audit with required frequency and effectiveness<sup>5</sup>.

<sup>5</sup> This is not a new idea: Article 21 of Environmental Inspection Regulations as well as Article 85 of the Territorial Arrangement Law Regulations stipulate that, “the minister who superintends the coordination of environmental affairs will define, through an



On the other hand, it is also recommendable to explore more practical alternatives that do not require structural reform of current legislation. *It will take the form of a series of actions on the capacity development of involved agencies and the technical assistance by experts, which is also expected to contribute to the fulfillment of the “ProSAVANA RAI Guidelines.”* Some key elements of the required actions are as follows:

- Training of the government officials, especially Cadastre Services and MICOA, on the effective supervision methods for agriculture / agro-industry projects
- Exchange of experience among different regions and projects;
- Partial outsourcing of the supervision service, especially the promotion of certified private environmental auditors
- Provision of vehicles and ICT equipment for the exclusive use of inspectors and auditors
- Improvement of the documentation standards and information disclosure system, which will enhance the accessibility and transparency of investment proposals, EIA reports, environmental licenses and supervision reports
- Financial reinforcement either through direct funding by donors or budget canalization from FUNAB
- Contracted consulting service to support the government officials in the implementation and management of the supervision.

These activities might be implemented in a package as one of the cross-cutting components of the Master Plan. Another option will be to attach a specialized “supervision support team” to the ProSAVANA headquarters, which will cover the above functions and play a neutral role among the government, investors and communities.

By applying the above activities, it is expected that a large part of the RAI principles and requirements will be met, namely: (1) respecting land and resource rights; (3) ensuring transparency, good governance, and a proper enabling environment; (4) consultation and participation; (6) social sustainability; and, (7) environmental sustainability. However, strengthened supervision mechanisms alone will not be enough and a good effort towards self-regulation and an active approach by the local community on the agribusiness side will be necessary to respond to the other RAI principles, namely: (2) ensuring food security; and, (5) responsible agro-enterprise investing.

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order, the amount of the revenue derived from taxes and fines to be allocated to FUNAB for the strengthening of environmental inspection services.” One of the plausible examples of this is Article 28 of Resettlement Process Regulations which provides that “FUNAB will subsidize the expenditure of technical committee for assistance and supervision of resettlement up to 20% of its revenue derived from the fine imposed on violation cases of resettlement.”



# CHAPTER 4 COMPONENTS OF AGRICULTURAL DEVELOPMENT MASTER PLAN (DRAFT)

## 4.1. Components of Master Plan

Based on the basic strategies described in Chapter 3, the Development Master Plan will consist of projects below.

**Table 4.1.1 Projects of Agricultural Development Master Plan in Nacala Corridor**

Basic Approach	Strategy	Project	
Improvement of Basic Condition of Production and Social & Agricultural Infrastructures	<ul style="list-style-type: none"> <li>Improvement of Technical Supporting System</li> </ul>	1. Project for Strengthening of Agricultural Research	
		2. Project for Strengthening of Agricultural Extension Services	
		3. Project for Land Registration of the Small and Medium Scale Farmers	
	<ul style="list-style-type: none"> <li>DUAT Acquisition among Small and Medium-Scale Farmers</li> </ul>	<ul style="list-style-type: none"> <li>Improvement of Access to the Agriculture Financing/Credit</li> </ul>	4. Project for Establishment of Financial System for Agriculture
			5. Project for Financial Support System for Large Investors
			6. Project for Establishment of Financial Support System for Small and Medium Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund)
			7. Project for Establishment of Financial Support System for Individual Farmers
			8. Project for Capacity Development of Business Development Service
	<ul style="list-style-type: none"> <li>Supporting Service for Business Development</li> </ul>	<ul style="list-style-type: none"> <li>Development of Social &amp; Agricultural Infrastructures</li> </ul>	9. Irrigation System Rehabilitation Project
			10. Project for Enhancement of Water Users' Organizations
	Increased Agricultural Production	<ul style="list-style-type: none"> <li>Transformation from Shifting Cultivation to Settled Farming</li> </ul>	11. Project for Improvement of Irrigation Technology and Construction Quality
			12. Project for Improvement of Access Roads for Agricultural Activities
13. Project for Establishment of Preferential Credit to Support Agricultural Mechanization Service Provider			
<ul style="list-style-type: none"> <li>Improvement of Access to Agricultural Inputs</li> </ul>		<ul style="list-style-type: none"> <li>DUAT Acquisition among Small and Medium-Scale Farmers</li> </ul>	14. Project for Capacity Building of Seed Growers
			15. Project for Improvement of Accessibility to Fertilizer
			16. Model Villages Project
			17. Pilot Project for Improvement of Small-Scale Farmers
<ul style="list-style-type: none"> <li>Priority Crops and Their Opportunity</li> </ul>		<ul style="list-style-type: none"> <li>Partnership between Local Farmers and Agribusiness</li> </ul>	18. Project for Vegetable Production Model
			19. Project for Renewal of Cashew Trees and Improvement of Inter-cropping System
			20. Tea Industry Revitalization Project
<ul style="list-style-type: none"> <li>Support for Establish and Develop the Modern Agriculture Cooperative</li> </ul>		<ul style="list-style-type: none"> <li>Support for Establish and Develop the Modern Agriculture Cooperative</li> </ul>	6. Project for Establishment of Financial Support System for Small and Medium Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund) (aforementioned)
			21. Modern Agriculture Cooperatives Formulation and Development Project
Development of Agribusiness	<ul style="list-style-type: none"> <li>Formulation of Value Chain</li> <li>Land Reserve for Investment</li> <li>Capacity Development and Technical Assistance on the Supervision Mechanism on Land and Environment Law Enforcement.</li> </ul>	22. Establishment of a Support Organization for Investment and Value Chain Development	
		23. Project for Land Reserve for Investment and Territorial Planning	
		24. Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement	
		25. ProSAVANA Agriculture Special Economic Zone Project	
	<ul style="list-style-type: none"> <li>Formulation of Value Chain</li> <li>Improvement of Infrastructure of Agricultural Logistics</li> <li>Cluster Development</li> </ul>	<ul style="list-style-type: none"> <li>Improvement of Infrastructure of Agricultural Logistics</li> <li>Cluster Development</li> </ul>	26. Project for Rehabilitation of Agriculture Storage Facility
			27. Project for Standardization of Agriculture Products
			28. Market Information Access Improvement Project

29. Soybean Cluster Development Project		
Basic Approach	Strategy	Project
Sustainable Use of Natural Resources	<ul style="list-style-type: none"> <li>• <i>Compliance with RAI Principles</i></li> <li>• <i>Identification of Water Resources Development Potential</i></li> <li>• <i>Strengthening Water Resources Management</i></li> </ul>	30. Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)
		31. Basic Study for Water Resource Management
Capacity Development of Human Resources	<ul style="list-style-type: none"> <li>• <i>Improvement of Technical Supporting System</i></li> <li>• <i>Improvement of Access to Agricultural Inputs</i></li> <li>• <i>Human Capacity Development for Farmers' Organizations</i></li> </ul>	32. Project for Training of Distributors of Agricultural Inputs
		33. ProSAVANA Agricultural Academy (Agricultural Development Centre) Project
		34. Project for Human Capacity Development for Farmer's Organization
		35. Project for Capacity Development of District Governments

## 4.2. Activities for Improvement of Basic Condition of Production and Social and Agricultural Infrastructure

### 1. Project for Strengthening of Agricultural Research

Project Title	Project for Strengthening of Agricultural Research																																		
Background	Transition from shifting cultivation to settled farming is an urgent need, in view of the rapid population growth and limitation of available farmland in the Nacala Corridor. An increase in land productivity through fertilization, improved production techniques of traditional crops, introduction of new crops or cultivars and reactivation of livestock farming are the keys to succeed. The role of agricultural research is becoming more important than ever to develop adequate technologies to respond to these needs.																																		
Objectives	To enhance the research capacity of IIAM and improve enabling conditions toward advanced technology development on the priority crops, cultivars and livestock species under ProSAVANA, in terms of quantity and quality.																																		
Project Goals	Appropriate agricultural technology is developed and transferred in the Nacala Corridor (*the same project purpose as ProSAVANA-PI).																																		
Expected Output	1. IIAM branch stations in the Nacala Corridor are rehabilitated and equipped. 2. IIAM field operators are trained on research support activities. 3. Research programs are expanded to strategic themes for Agricultural Development in the Nacala Corridor.																																		
Main Activities	<ol style="list-style-type: none"> <li>1) Infrastructure rehabilitation of IIAM branch stations <ul style="list-style-type: none"> <li>- Basic infrastructure and equipment such as electricity, water supply, offices and warehouses</li> <li>- Specialized infrastructure and equipment for specific crops and animals of each region</li> </ul> </li> <li>2) Training of IIAM field operators on research support activities <ul style="list-style-type: none"> <li>- Operation and maintenance of machinery and equipment</li> <li>- Maintenance of experimental fields, crops and animals</li> <li>- Financial support to contract skilled operators</li> </ul> </li> <li>3) Expansion of research programs on strategic themes for Agricultural Development in the Nacala Corridor <ul style="list-style-type: none"> <li>- Utilization of farm inputs for settled farming</li> <li>- Introduction and adaptation of non-traditional crops and cultivars</li> </ul> </li> </ol>																																		
Implementation Period	<p>ProSAVANA-PI: until 2016</p> <p>Infrastructure rehabilitation and training of field operators: 2017 – 2018</p> <p>Expansion of research programs: 2019 – 2030</p> <table border="1" style="width: 100%; text-align: center;"> <tr> <td>2014</td><td>'15</td><td>'16</td><td>'17</td><td>'18</td><td>'19</td><td>'20</td><td>'21</td><td>'22</td><td>'23</td><td>'24</td><td>'25</td><td>'26</td><td>'27</td><td>'28</td><td>'29</td><td>2030</td> </tr> <tr> <td>←</td><td></td><td>→</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030	←		→														
2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030																			
←		→																																	
Prioritized Area (candidate)	<p>Coverage of IIAM Northeast Zonal Center: Nampula, Mapupulo, Namapa, Nacaca, Namialo, Nassuruma, Nametil, Ribaue</p> <p>Coverage of IIAM Northwest Zonal Center: Lichinga, Mutuali, Gurue, Mutequelesse, Matama</p>																																		
Implementing Agency/ Related Organization	IIAM (Northeast and Northwest Zonal Centers), INCAJU, IAM plus, ABC-EMBRAPA and JICA-NTCI/JIRCAS as ProSAVANA-PI actors																																		
Relevant Plans/ Projects	<p>PEDSA 2011 – 2020</p> <p>Strategic Plan of IIAM 2011 – 2015 (Headquarters; Northeast Zonal Center; Northwest Zonal Center)</p> <p>ProSAVANA-PI from 2011 to 2016</p>																																		
Remarks	<p>ProSAVANA-PI has the following 5 components:</p> <ol style="list-style-type: none"> <li>1. Strengthening of research capacity of IIAM Northeast / Northwest Zonal Centers</li> <li>2. Evaluation of natural resources and socio-economic conditions in the Nacala Corridor</li> <li>3. Development of soil improvement technology for the Nacala Corridor</li> <li>4. Development of appropriate cultivation technology for the Nacala Corridor</li> <li>5. Implementation and validation of new agricultural technology in the demonstration units.</li> </ol>																																		

## 2. Project for Strengthening of Agricultural Extension Service

Project Title	Project for Strengthening of Agricultural Extension Services																
Background	<p>One of the major challenges to the implementation of competitive market-oriented agriculture in the Project Area, as well as the rest of the country, is the transformation of the current shifting cultivation to settled cultivation by an intensive system. For this to be possible, it is necessary to adopt a series of measures to provide appropriate conditions to enable the farmers to achieve the transformation, such as, juridical assurance of land use, access to inputs and especially access to production technology through agile and efficient agricultural extension services.</p> <p>Agricultural extension in Mozambique historically focused on commercial and export cash crops, such as cotton, tobacco and sugarcane, mainly financed by the corresponding crop sectors before independence. In 1987 when the country's economic system was liberalized, the public extension system was finally established. The extension services in Mozambique, therefore, are highly dependent on the non-governmental sector, such as NGOs and service providers mainly associated with concession holder groups of specific cash crops. In 2012, only 32.1% of extension agents belonged to the public sector (MINAG/DNEA).</p> <p>PRONEA (2012-16), as the operational program of the Agricultural Extension Master Plan, is being implemented to consolidate the agricultural extension services involving the private sector in 42 selected districts distributed throughout the provinces in the country. PRONEA, as a matter of strategy implementation, is going to cover only 9 of 14 districts in the Project Area.</p>																
Objectives	To enhance productivity and market access of small-scale and emerging farmers.																
Project Goals	Strengthen the agricultural extension service to expedite the transformation of extensive farming to intensive and market-oriented farming in the Project Area																
Expected Output	<ol style="list-style-type: none"> <li>1. Allocation of able extension workers in all target districts in the Project Area.</li> <li>2. Empowerment of extension workers and farmers.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Empowerment of extension workers not only in the public sector, but also in NGO and private sectors, including equipment supply necessary for the services.</li> <li>2. Empowerment of individual farmers and farmers' organizations.</li> <li>3. Provision of better extension services at provincial and district/local-levels through public, private and NGO agents</li> <li>4. Restart of agricultural extension programs on radio or TV.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts																
Implementing Agency/ Related Organization	MINAG/DNAE, SPEA, SDAE, NGO's and private companies who provide technical support to farmers																
Relevant Plans/ Projects	PNISA, PRONEA Strengthening Agricultural Research ProSAVANA Agricultural Academy (Agricultural Development Centre)																
Remarks	This project aims at strengthening agricultural extension services in the 14 districts, performing the actions in PRONEA and complementing other actions.																

## 3. Project for Land Registration of the Small and Medium Scale Farmer

Project Title	Project for Land Registration of the Small and Medium-Scale Farmers																
Background	<p>The lands are treated, from the standpoint of the Strategic Plan for the Development of the Agricultural Sector (PEDSA, 2010/2019), as a natural resource with potential to develop the agricultural sector in Mozambique for over the long-term. The same PEDSA states that there are 36 million hectares of arable land in the country, of which 10% is currently cultivated. Meanwhile, the National Investment Plan for Agricultural Sector (PNISA) considers that there are 3.9 million hectares in use, with 90% of the area used by the household sector. The PNISA estimates further that there are 3.6 million farms in the country, of which about 98% are small-scale farms and 96.9% of the occupied areas do not have the title for use and enjoyment of land (DUAT). This means that, nationally, there are 3.4 million farms without DUAT.</p> <p>Using these percentages for the area of the Regional Development Plan of the Nacala Corridor, it can be stated that there are approximately 1.06 million small farms without proper title DUAT. This reality, which arises from the legal regime of Mozambican land, (where the request for title for occupations that occur through customary practices and by usufruct is voluntary) added to the increasing demand for land, have contributed to the increased uncertainty regarding land tenure (since it is not mapped or delineated, even without DUAT) and the increase in land conflicts, especially in some areas called "hotspots".</p> <p>The issue of land titling is understood as a constraint to be addressed before other actions to assign farmers to specific lands and requires long-term actions (during the period up to 2030) and quick impact ones in the short term.</p>																
Objectives	To create environment of mitigating confliction of the land use right between neighbors of farmers and between farmers and investors																
Project Goals	<ul style="list-style-type: none"> <li>• Mitigate the insecurity and fragility of small farm (small scale farmer) and ensure the right related to the use of the land and possession of the properties on the land;</li> <li>• Dissemination of intensive cultivation to small scale farmers</li> <li>• Create an environment of cooperation and integration between the small scale farm and new investors;</li> <li>• Facilitate the identification of areas for the promotion of agriculture by large farmers, private companies and medium scale farmers with leading experience (initial phase of the transition to an intensive agriculture).</li> </ul>																
Expected Output	<ol style="list-style-type: none"> <li>1. Providing land title (DUAT) to small and medium-scale farmers.</li> <li>2. Create an environment of cooperation and integration between the small-scale farmers and new investors.</li> <li>3. Dissemination of intensive cultivation to small farmers.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Provision of land titles (issue of DUATs) to small-scale farmers for transition to a settled agriculture or intensive cultivation <ul style="list-style-type: none"> <li>- Survey of farmers without DUAT (the target area will be provided by SPGC or around Model Village Project (Project No. 16)</li> <li>- Community consultations, formation processes and consolidation of each DUAT</li> <li>- Free expense for land registration for small farms (up to 5 ha)</li> </ul> </li> <li>2. To support farmers in the target area through provision of inputs and extension services in order to the transition to intensive cultivation.</li> <li>3. Monitoring of land use by SPGC of each province</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts will be prioritized in three provinces																
Implementing Agency/ Related Organization	DNTF (supervising the progress and technical support), SPGC of each province (Main implementer of this project), MCA projects (Providing their experience in Monapo and Malema)																
Relevant Plan/ Projects	Land Tenure Service Project by Millennium Challenge Account - Mozambique																
Remarks																	

## 4. Project for Establishment of Financial System for Agriculture

Project Title	Project for Establishment of Financial System for Agriculture																
Background	<p>The existence of an institutionalized system of credit is a major factor in promoting economic development, allowing the entrepreneur to obtain financial resources through this instrument for the realization of a productive activity. In the case of agriculture, the existence of a system of credit is crucial to the development of the activity, because the producers did not have the resources for investments, thus hindering the increase of productive capacity and/or efficiency of yields.</p> <p>Agriculture has fundamental importance in the Mozambican economy, as more than two thirds of its population depends on this activity for subsistence. Being a high-risk and low-income activity, there is a need for government incentives for investment in production and storage, since it lacks attractiveness for commercial banks under current conditions. The government then needs to establish an agricultural financing structure that enables these institutions to offer credit with favorable terms to the agricultural sector, creating a specific legal normative for agricultural finance to the Nacala Corridor.</p>																
Objectives	To establish an integrated agricultural credit system for financing crop defrayal and investment in the Nacala Corridor.																
Project Goals	To allow the banking institutions to offer credits to producers in privileged conditions for agricultural financing, through established normative procedures.																
Expected Output	<ol style="list-style-type: none"> <li>1. Legal framework survey of Mozambican credit system</li> <li>2. Proposition and approval the credit system relating to the Nacala Corridor</li> <li>3. Implementation of agricultural credit system</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Survey of Mozambican legal framework of credit system.</li> <li>2. Analysis of legal framework and proposal formulation of an established credit system for the Nacala Corridor. Existing credit services supported by the public shall be integrated into the system.</li> <li>3. Approval the proposed normative credit system by the government and disclosure of it to credit institutions and producers.</li> <li>4. Training for rural extension workers for elaboration of technical and financial proposals of investments and crop defrayal.</li> <li>5. Support for credit institutions on analysis of technical and financial proposals.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Nacala Corridor.																
Implementing Agency/ Related Organization	Banco de Moçambique (Central Bank) , MINAG, DPA's, SDAE's, Credit institutions																
Relevant Plan/ Projects	PRONEA																
Remarks																	



## 5. Project for Financial Support System for Large Investors

Project Title	Project for Financial Support System for Large Investors																
Background	The volume of credit to the agricultural sector accounted for only 6.5% of the total volume of the national economy in 2010. In addition, few districts have formal banking facilities, and even when loans can be accessed from Financial Institutions (IFs), the interest rate is usually higher than 25%, making it practically unfeasible to use the credit. Microfinance Institutions (MFIs) provide lower rates; however, the volume of credit granted is not adequate enough to respond to the demand for agricultural credit. In order to implement the Agricultural Development Plan in the Nacala Corridor, a financial support system for investors is a key factor for economic development, agribusiness, generating new employment and acquisition of foreign currency through exports.																
Objectives	To create a financial support system with special credit lines to provide the complex agribusiness (clusters) with claims directed at production, processing, preservation and marketing.																
Project Goals	Finance the entire agribusiness complex.																
Expected Output	<ol style="list-style-type: none"> <li>1. Create a Financial Institution (IF) for financing to investors.</li> <li>2. Increase financing for the production lines.</li> <li>3. Create an institution specializing in agricultural insurance and agribusiness.</li> <li>4. Investment and efficient management of the PPPs.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Promote an investment fund specializing in agribusiness with priority for clusters.</li> <li>2. Increase budgetary allocation MINAG to a minimum of 10% of the state budget.</li> <li>3. Focus on special credit lines in the clusters and expand their impact on all activities in the value chain of agribusiness.</li> <li>4. Use part of the surcharges on exports of raw materials and customs duties on imports of raw materials, intermediates and final products to create a guarantee fund for agribusiness.</li> <li>5. Create or encourage the private sector to invest in agricultural insurance institutions that cover the entire value chain of agribusiness.</li> <li>6. Create a fund for "Matching Grant" to support the installation of service providers in the clusters.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area	All 14 districts.																
Implementing Agency/Related Organization	MINAG, private enterprise - IFs (banks) and private funds																
Relevant Plan/Projects	PDSA - Strategic Plan for the Development of the Agricultural Sector; PNDA - National Plan for the Development of Agribusiness; Nacala Fund																
Remarks																	

## 6. Project for Establishment of Financial Support System for Small and Medium-Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund)

Project Title	Project for Establishment of Financial Support System for Small and Medium-Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund)
Background	<p>The ProSAVANA Development Initiative Fund (PDIF) was launched in September 2012 as a pilot project, aiming involving small-scale farmers in the commercial agriculture value chain through contract farming with agribusiness companies, which would result in increased productivity and better market access for small-scale farmers. A soft loan scheme, with an annual interest rate of 10%, has been introduced to support the efforts of small-medium sized agribusiness enterprises to expand their businesses, and can be used to acquire necessary machinery or facilities as well as purchase crops from farmers. As of November 2012, four companies have received loans from PDIF to carry out the production of maize, soybean, groundnuts, beans and sesame as well as seed multiplication involving small-scale farmers with various contract-farming arrangements.</p> <p>1) PDIF for small and medium-sized agribusiness enterprises</p>

	<p>Reflecting the lessons from the PDIF pilot projects, PDIF will be transformed into a formal funding scheme to support local agribusinesses/agro-industries in promoting contract farming, involving small-scale farmers in commercial agriculture as well as accelerating investment in agro-processing industries. In order to formalize PDIF, the capital amount should be increased by mobilizing the Counterpart Fund<sup>1</sup> managed by the Ministry of Agriculture or grant assistance from donors.</p> <p>2) PDIF for farmers' organizations</p> <p>Concerning the impacts on improved agriculture productivity as well as the transition to intensive fixed cultivation across wider areas in the Nacala Corridor, it is recommended that modality be created under PDIF to allow farmers' organizations (farmers' associations or cooperatives) to access low-interest loans with reasonable conditions. Using the soft loans provided by PDIF, farmers' organizations will invest in small-scale irrigation systems, agricultural machinery, and processing facilities so as to introduce improved agriculture production systems. The soft loan will also ease the financial burdens of farmers' organizations when purchasing crops from group members during the harvest.</p>																																		
Objectives	<ol style="list-style-type: none"> <li>1) To formalize the PDIF mechanism for small-medium sized agribusiness enterprises to promote agribusiness investments involving small-scale farmers.</li> <li>2) To establish an affordable financial mechanism for farmers' organizations that allows them to invest in improving the production system.</li> </ol>																																		
Project Goals	<ol style="list-style-type: none"> <li>1) Agribusiness initiatives/investments through the involvement of groups of small-scale farmers in commercial production are expanded via the efforts of agribusiness enterprises.</li> <li>2) Capacity of farmers' organizations to improve agriculture productivity and marketing is strengthened by accessing to the affordable finance system.</li> </ol>																																		
Expected Output	<ol style="list-style-type: none"> <li>1. PDIF is transformed into a formal financial system for agriculture development in the Nacala Corridor.</li> <li>2. A modality to support farmers' organizations is established under PDIF and is operational.</li> </ol>																																		
Main Activities	<ol style="list-style-type: none"> <li>1. Mobilize additional capital for PDIF.</li> <li>2. Consult with concerned government authorities to select potential financial institutions that would operate the PDIF.</li> <li>3. Develop criteria and conditions for PDIF specific agribusiness enterprises and farmers' organizations (e.g. the criteria to be applicable for the loan, the maximum amount of the loan, the interest rates, and the conditions for the provision of collateral).</li> <li>4. Form the PDIF operational unit to oversee the fund's operation and provide technical advisory support to clients of PDIF.</li> <li>5. Begin operations of the PDIF.</li> <li>6. Conduct regular monitoring and evaluation for the fund's operations and project implementation.</li> </ol>																																		
Implementation Period	<table border="1"> <tr> <td>2014</td><td>'15</td><td>'16</td><td>'17</td><td>'18</td><td>'19</td><td>'20</td><td>'21</td><td>'22</td><td>'23</td><td>'24</td><td>'25</td><td>'26</td><td>'27</td><td>'28</td><td>'29</td><td>2030</td> </tr> <tr> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030																	
2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030																			
Prioritized Area (candidate)	All 14 districts. This should be further discussed with the concerned government authorities regarding the coverage of areas (whether the coverage could be extended to other districts along the Nacala Corridor), and the source and amount of funds available for PDIF.																																		
Implementing Agency/ Related Organization	MINAG, DPA in Nampula, Niassa and Zambezia, Private financial institutions, ProSAVANA Development Initiative Fund Operation Unit, ABC, JICA, Donors																																		
Relevant Plan/ Projects	PNISA																																		
Remarks																																			

<sup>1</sup> A part of the payment from the sale of agriculture machinery or inputs granted by the Government of Japan through Food Assistance and Food Production Grants is accumulated in an account for the recipient country (the Ministry of Agriculture).

## 7. Project for Establishment of Financial Support System for Individual Farmers

Project Title	Project for Establishment of Financial Support System for Individual Farmers																
Background	Promoting the transformation of the current cultivation system from extensive shifting cultivation to intensive fixed cultivation is the key strategy proposed in the Master Plan for the improvement of agriculture production through the introduction of improved farming techniques along with agriculture inputs and services. However, it has been observed that the critical barrier limiting access to such inputs and services is the lack of affordable and accessible credit facilities for individual farmers. Therefore, the project proposes the introduction of a short-term soft loan with conditions adapted to the agricultural production cycle in order for individual farmers to access financial services necessary to improve agriculture productivity. Soft loans will also be utilized to promote small-scale agribusiness activities by individual farmers in their efforts to start businesses. The soft loan scheme will be introduced by the government using donors' financial contributions, or its own funds, through the provision of subsidized credit lines to commercial banks or micro-finance institutions, which will manage this agricultural credit. As for the source of this credit, one potential option could be the mobilization of the District Development Fund (FDD), which would be transferred to private financial institutions as a trust fund.																
Objectives	To establish an affordable and accessible financing mechanism for individual farmers that allows them to invest in agriculture services in order to improve the production system.																
Project Goals	Agriculture productivity and household income of individual farmers is improved through the introduction of agriculture inputs and services in production, which in turn results in the promotion of the fixed cultivation system.																
Expected Output	1. Sources for the agricultural credit are secured. 2. A financial mechanism (soft loan scheme) to support individual farmers is established and operational.																
Main Activities	1. Mobilize financing sources. 2. Consult with concerned government authorities to select potential financial institutions that would provide agriculture credit. 3. Develop criteria and conditions for the credit (e.g. the maximum amount of credit, interest rates, repayment terms, conditions on the provision of collateral). 4. Begin operating the agriculture credit. This credit will also be utilized as start-up funds for small-scale agribusinesses by individual farmers. 5. Conduct regular monitoring and evaluation of loan operations.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts. This should be further discussed with the concerned government authorities regarding the areas of coverage, and the source and amount of the funds available for the credit scheme.																
Implementing Agency/ Related Organization	SDAE, Provincial governments of Nampula, Niassa and Zambezia, MINAG, Private financial institutions (commercial banks or microfinance institutions), Donors  Private financial institutions should be involved in the operation of the agricultural credit, which could ensure transparency in the screening process for loan proposals and efficiency in operations. Since the coverage of bank branches at the district level is quite limited in the Nacala Corridor, this might require the involvement of several commercial banks or microcredit institutions in the operating of the credit for individual farmers. SDAE, with support from provincial governments, will oversee operations by conducting regular monitoring and annual audits, in addition to regulations and obligations required by the central government.																
Relevant Plan/ Projects																	
Remarks																	

## 8. Project for Capacity Development of Business Development Service

Project Title	Capacity Development of Business Development Service																
Background	<p>Performance of small and medium enterprises (SMEs) is a driving force for value chain development in rural areas. In order to facilitate new businesses and expansion of existing businesses, various credit lines are provided. However, in addition to the high interest rate, the lack of business planning capacity and business management skills make access to credit services difficult.</p> <p>Support services, called Business Development Service (BDS), in which advices on business planning, company finance, and business management are included, are necessary as both a public and private service. The Institute of Promotion of Small and Medium Enterprises (IPEME) is an institution under the Ministry of Industry and Trade, and has a role to advise entrepreneurs how to materialize a specific business from business ideas, and for existing SMEs, how to improve their business management. But, since IPEME has limited human resources, nationwide service deployment cannot be expected in a short period. Therefore, a quality BDS involving private sector human resources has to be developed utilizing IPEME as the trainer of potential service providers. Functions of BDS are: to advise on business planning and management, to analyze financial status, to provide business related information, to introduce credit sources for individual companies, and to match stakeholders in the value chain for a stakeholder group.</p>																
Objectives	To effectively manage small and medium businesses, which are developed or expanded, to contribute to rural socioeconomic development.																
Project Goals	Quality business development service for SME is provided by private service providers.																
Expected Output	<ol style="list-style-type: none"> <li>1. Capacity of staff in business development service of IPEME as trainers on business development service is strengthened.</li> <li>2. Quality business development service is provided by a number of private service providers.</li> <li>3. Related organizations/institutions for business development function well in coordination with each other.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To conduct a series of training sessions on business administration and support schemes for IPEME trainers.</li> <li>2. To invite private BDS providers and train them on business administration and schemes by both OJT and Off-JT.</li> <li>3. To facilitate the Chamber of Commerce (CoC) in three provinces for enhancement of their functions.</li> <li>4. To facilitate related organizations/institutions, such as BDS, CEPAGRI, CPI, GAPI, IPEX, and provincial CoC.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts																
Implementing Agency/ Related Organization	IPEME, CEPAGRI, CPI, GAPI, IPEX, and provincial CoC																
Relevant Plan/ Projects	One village one product project (JICA)																
Remarks	Trained BDS providers can be hired by the ProSAVANA coordinating organization for facilitation of small and medium business development.																

## 9. Irrigation System Rehabilitation Project

Project Title	Irrigation System Rehabilitation Project																
Background	Irrigation development is expected to improve the basic conditions of agricultural production and to contribute to the increase of agricultural production and the revitalization of the regional economy. More than 55% of irrigation land that was once developed and equipped with irrigation systems is not in-use due to damage and malfunctioning of the systems. These defunct irrigation areas have the potential for recovery of irrigation farming through rehabilitation of the facilities. In order to increase the effectiveness and efficiency of irrigation systems, it is necessary to re-arrange the plots and re-construct the systematic canal system in addition to rehabilitating the system.																
Objectives	To increase the actual irrigation area and agricultural production through rehabilitation of the existing irrigation system.																
Project Goals	Malfunctioning and damaged irrigation systems recover their function and the systems are used appropriately and effectively. Good practice of construction of irrigation facilities, management of irrigation systems, and irrigation technology in field and farm management of irrigation farming will be demonstrated in a pilot area.																
Expected Output	1. Existing irrigation systems are rehabilitated and the function is recovered. 2. Pilot irrigation areas are established and utilized for technical extension of irrigation development.																
Main Activities	1. Rehabilitation of irrigation systems 1-1 Investigation of irrigation development potential, improving inventory of irrigation systems, creating and maintaining a database 1-2 Formulating rehabilitation and development plan of irrigation systems 1-3 Implementation of rehabilitation work of the irrigation system, re-construction of canal network and re-arrangement of irrigation land through land consolidation 2. Establishing pilot area of irrigation development 2-1 Selection of pilot area of irrigation development 2-2 Establishing pilot area of irrigation development 2-3 Preferential implementation of rehabilitation/construction work, improvement of users' capability of operation and maintenance, improvement of irrigation technology of farmers 2-4 Utilizing pilot areas for extension activities through demonstrating good practice of irrigation development																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts. Priority for rehabilitation of irrigation systems assigned to Zone II, Zone III, Zone I and Lichinga of Zone V. Priority for establishing pilot area for irrigation development is tentatively given to Malema of Zone III, and afterward, pilot areas will be established in each district of the above priority zones of rehabilitation.																
Implementing Agency/ Related Organization	DPA in Nampula, Niassa and Zambezia, SDAEs, MINAG and INIR																
Relevant Plan/ Projects	Provincial Strategic Plan Nampula '2010-2020,' Niassa '2017,' Zambezia '2011-2020'																
Remarks																	

## 10. Project for Enhancement of Water Users' Organizations

Project Title	Project for Enhancement of Water Users' Organizations																
Background	Water users and users' groups have the responsibility of operation and maintenance of the irrigation system. Most water users and members of groups are small-scale farmers, and the activities of the group are insufficient due to lack of members' skills, knowledge and experience in managing irrigation facilities as well as a weak financial background. In order to maintain the function of the system over the long term and expect positive effects of irrigation development, it is essential to improve the capability of water users and users' groups for operation and maintenance of the system.																
Objectives	To realize sustainable irrigation development over the long term through appropriate operation and maintenance of irrigation facilities through enhancing water users' organizations.																
Project Goals	Irrigation users obtain capability of appropriate operation and maintenance and the systems are used sustainably.																
Expected Output	1. The organizational operation of irrigation users is enhanced in managing irrigation systems, managing water fees, and managing members' labor/material contributions for O/M work. 2. The skill and technology of members of water users' organizations are improved and appropriate operation and maintenance of the system is implemented by users.																
Main Activities	1. Enhancement of water users' organization 1-1 Organizing water users' groups into legalized farmers' associations, in order to strengthen financial status 1-2 Organizing water users associations which will be set up among associations in cases where the system covers multiple associations 1-3 Strengthening of farmers' associations on the function of operation and maintenance of irrigation systems as well as water, land and farmland management 1-4 Enhancing the activity of associations including collection of water/membership fees, account control and arrangement of members' participation in O/M 2. Improvement of techniques on operation and maintenance 2-1 Training of farmers' groups on construction and repair of simple structures 2-2 Enhancing technical guidance and inspection on operation and maintenance of the system of SDAE extension officers 3. Sensitization of community members 3-1 Sensitization of community members and users on necessity of appropriate operation and maintenance																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts. Priority for rehabilitation of irrigation system is assigned to Zone II, Zone III, Zone I and Lichinga of Zone V.																
Implementing Agency/ Related Organization	DPA in Nampula, Niassa and Zambezia, SDAEs																
Relevant Plan/ Projects	Provincial Strategic Plan Nampula '2010-2020,' Niassa '2017,' Zambezia '2011-2020'																
Remarks																	

## 11. Project for Improvement of Irrigation Technology and Construction Quality

Project Title	Project for Improvement of Irrigation Technology and Construction Quality																
Background	In order to fully take advantage of the effect of introducing irrigation, it is essential to adopt appropriate technology of irrigation farming such as irrigation management and crop management in the field as well as water management among users in the system. On the other hand, one of the major reasons for malfunctions of hydraulic structures is due to the lack of adequate skill and technology for construction and repair work at each level, i.e., administrative level, local construction company, and local community and famers. It is necessary to improve the skills and technology of the above actors at each level.																
Objectives	To strengthen the technical extension service of SDAE on irrigation farming in order to enable farmers appropriate irrigation farming with effective and efficient water use. To increase the capability of construction companies as well as enhance the technical management of DPA in order to improve the quality of irrigation facilities.																
Project Goals	Farmers' skills and technology on irrigation farming and water management are improved. The quality of construction work of irrigation facilities is improved and the function of facilities can be maintained over the long term.																
Expected Output	1. Farmers implement appropriate water management and irrigation technology in the field and productivity increases. 2. Skills and technology of construction company are improved, as is the quality of construction work.																
Main Activities	1. Improvement of irrigation technology of famers 1-1 Enhancing technical extension to small-scale irrigation farmers on water management, irrigation and cultivation technology of irrigated crops. Technical extension will be implemented by SDAE extension officers through water users' organizations such as farmers' associations. 1-2 Sensitization of community and users on necessity of land and water management 2. Improvement of skill and technology of construction company 2-1 Introducing qualification system into procurement of construction of hydraulic structures 2-2 Enhancement of technical guidance and inspection of DPA 2-3 Enhancement of technical support of MINAG to DPA through developing technical guidelines and standard designs of hydraulic structures, preferential establishment of regional branches of INIR																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts.																
Implementing Agency/ Related Organization	DPA in Nampula, Niassa and Zambezia, SDAEs, MINAG and INIR																
Relevant Plan/ Projects	Provincial Strategic Plan Nampula '2010-2020,' Niassa '2017,' Zambezia '2011-2020'																
Remarks																	

## 12. Project for Improvement of Access Roads for Agricultural Activities

Project Title	Project for Improvement of Access Road for Agricultural Activities																
Background	Rural roads are not developed well in the Study Area. Therefore, many farms face difficulty regarding transportation in the rainy season because of the lack of bridges over seasonal rivers or the slippery, muddy conditions of steep roads. Moreover, rural roads are maintained by ANE and district governments supported by a road fund. However, the maintenance is carried out according to local demands and there is no strategy for its development. Therefore, for example, roads over districts or provinces are difficult to improve, and the paving of roads between vegetable production sites and markets to mitigate transportation loss is not given priority by the district. In order to improve the distribution and efficiency of production, it is necessary to prepare a strategic plan for road improvement based on the viewpoint of agriculture development and ensure its smooth implementation.																
Objectives	To rehabilitate or improve roads used for agricultural activities as distribution and connection between production areas and markets.																
Project Goals	To ensure agriculture roads are maintained to tie agricultural production places, markets, processing or storehouses in each district or over districts so some production areas can become accessible year around.																
Expected Output	1. Strategic road improvement plan for agriculture development is prepared. 2. Rural roads are improved.																
Main Activities	1. To formulate agricultural road improvement committee consisting of DPA, DPTC, ANE, SDAEs and SDPIs in each province. 2. To prepare a strategic plan for agricultural road development in committee based on ideas from each SDAE cooperating with SDPI. SDAE will examine its own plan from the viewpoint of agriculture promotion in the district and show it to the committee. 3: To improve rehabilitation works according to the plan.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts. Priority will be assigned by the committee.																
Implementing Agency/ Related Organization	DPA in Nampula, Niassa and Zambezia, ANE in Nampula, Niassa and Zambezia/ MPD, MTC, MPOH																
Relevant Plan/ Projects	Provincial Strategic Plan Nampula '2010-2020,' Niassa '2017,' Zambezia '2011-2020' PROMER – road component																
Remarks																	



### 4.3. Activities for Increased Agricultural Production

#### 13. Project for Establishment of Preferential Credit to Support Agricultural Mechanization Service Providers

Project Title	Project for Establishment of Preferential Credit to Support Agricultural Mechanization Service Providers																
Background	<p>Most of the farmers cultivate farmland with simple manual tools. This is one of the limiting factors keeping farmers at small-scale with low productivity. In order to improve their land preparation practice, so that they can plant crops in well-prepared land at the right time, it is necessary to popularize agricultural mechanization, especially mechanized plowing, because animal traction is not common in this region by tradition. The Project Area is, unfortunately, not blessed with high potential for cattle breeding.</p> <p>In order to promote mechanized agriculture among small-scale farmers, it is necessary to vitalize agricultural mechanization services with tractors. Because of rainfall patterns, the optimum cultivation period is short and not flexible in the area. This condition doesn't allow the mechanization service providers to use their tractors to their maximum potential. Due to such inefficient operation of tractors, most providers cannot expect enough profit from the service at the present service fee. It is desirable that public supportive measures to promote agricultural mechanization services be taken during the period when the service is still in its infancy.</p>																
Objectives	To increase farmers or agricultural entities using tractor service provided by agricultural mechanization service providers.																
Project Goals	To increase number of agricultural mechanization service providers in order to create an environment in which farmers can use the mechanization service at an affordable cost.																
Expected Output	<ol style="list-style-type: none"> <li>1. Tractor price are reduced.</li> <li>2. Tractors can be purchased under favorable conditions.</li> <li>3. Potential farmers or entities can get ideas on agricultural mechanization services through extension workers or tractor dealers.</li> <li>4. The number of capable operators of tractors is increased.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To take measures to reduce the price of agricultural machines, like tractors such as the revision of tariff &amp; VAT, simplifying logistic procedures, etc.</li> <li>2. To establish preferential credit system to purchase tractors (the government provides subsidies to exempt interest on credit used to purchase tractors) to give incentives to potential farmers to purchase them.</li> <li>3. To train extension workers so that they can introduce the business model of agricultural mechanization services to potential farmers, showing calculation of income and expenditure and explaining the after sale services. The workers can also introduce customers.</li> <li>4. To provide training to tractor operators free of charge by the government.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts.																
Implementing Agency/ Related Organization	MINAG, DPAs, SDEAs, Credit institutions																
Relevant Plan/ Projects	PNISA - Mechanisation Support Program Plano Estratégico de Mecanização Agrária (PEMA)																
Remarks																	

## 14. Project for Capacity Building of Seed Growers

Project Title	Project for Capacity Building of Seed Growers																
Background	<p>Only a few farmers use quality seeds in Mozambique and the Project Area. They usually use their own produced seeds or exchanged/purchased seeds from neighbors. The quality of the seeds is inferior compared to the standard in general due to the lack of proper management during crop growing and post-harvest treatments. Since quality seeds are fundamental inputs to increase the productivity of crops, the accessibility for farmers should be improved in order to promote an intensive farming system.</p> <p>Basic seeds of major crops produced by USEBA (Basic Seed Production Unit) of IIAM are multiplied to certified seeds by seed growers (companies). There are, however, only 18 companies producing the seeds out of 35 registered seed companies in Mozambique, according to a World Bank report in 2012. In the Project Area, there are several small-scale seed companies who have newly started their business at province/district levels in recent years. While most of them get financial and/or technical assistance from NGOs or donor agencies, they don't receive systematic support to address the following constraints in a blanket manner.</p> <p>(1) Lack of reliable basic seeds  (2) Lack of technical staff to manage quality seeds production  (3) Lack of funds (capital &amp; operation)</p> <p>In order to improve the accessibility of quality seeds to farmers, the government should foster the small-scale local seed companies with necessary assistance, so that the companies will be able to produce and distribute quality seeds of major crops with an affordable price for farmers.</p>																
Objectives	To increase farmers who use quality seed																
Project Goals	To improve accessibility of quality seeds to farmers with an affordable price at the district level.																
Expected Output	1. The number of able seed growers is increased in the Project Area 2. Production of quality seeds of major crops is increased in the Project Area																
Main Activities	1. To train technical staff of seed companies and agricultural extension agents how to produce quality seeds (by IIAM). While the target crops in the initial stage shall be maize and beans/pulses, other crops, such as potato and vegetables shall be covered from the mid-stage of the project 2. To give priority to the seed companies who send their technical staff to the training for receiving breeders seeds (by IIAM) 3. To introduce a capable farmer group to the seed companies as a candidate of out-growers at the request of the companies. Agricultural extension agents shall provide intensive technical support to the farmer group, if necessary (by SDAE/DPA) 4. To introduce an appropriate financial system to the seed companies at the request of the companies (by SDAE/DPA)																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts																
Implementing Agency/ Related Organization	IIAM (North East Centre & North West Centre), SDAE in 14 districts, DPA in Nampula, Niassa and Zambezia																
Relevant Plan/ Projects	<ul style="list-style-type: none"> <li>Provincial Strategic Plan Nampula 2010-2020</li> </ul>																
Remarks																	

## 15. Project for Improvement of Accessibility to Fertilizer

Project Title	Project for Improvement of Accessibility to Fertilizer																
Background	<p>Most farmers depend on an extensive farming practice and rarely use agricultural inputs, i.e. quality seeds, chemical fertilizers, pesticides and farm mechanization at present. The low use of inputs is the main reason of low productivity of major crops. While reasons for the low use are complicated, high prices are a major subject to be addressed to stimulate farmers' demand for the inputs.</p> <p>While chemical fertilizers are indispensable and the most effective inputs for increasing crop productivity, the present market price is too high to use them for major crops in Mozambique, especially for maize. Maize is a major staple of the people and is grown by most farmers in Mozambique. The country, however, imports a substantial amount of maize every year. According to a simulation in the Study, farmers can archive economic feasibility for using chemical fertilizers for maize only after the prices are reduced to almost half of the present level, even though they can get double the present production. It seems that only market-principle oriented measures to address the high prices cannot generate a high demand for chemical fertilizers at present. Thus, the measures to vitalize the market-chain should be taken by the government in order to reduce the prices.</p> <p>The present situation may provide the government with a good reason to establish a pump-priming subsidy system for chemical fertilizers for a certain limited period as many neighboring countries do, considering the economic impact of the inputs on the national economy and equity. If the farmers' demand is stimulated and established by the subsidy, the increased demand would pave the way for reducing the costs of the supply chain in the future.</p>																
Objectives	To increase farmers who use chemical fertilizer																
Project Goals	To improve accessibility of chemical fertilizers for general farmers																
Expected Output	<ol style="list-style-type: none"> <li>Price of chemical fertilizers is reduced to an economically feasible level for use in maize production</li> <li>Farmers' demand for chemical fertilizers is stimulated and established</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>To grant a subsidy to cover 50% of FOB price of imported chemical fertilizers for 5 years to fertilizer traders. Then, the subsidy percentage shall be gradually reduced by 10%/year for the next 4 years (the upper limit FOB price shall be set and periodically reviewed based on the international market price)</li> <li>To allocate a fund (budget) of US\$10 million for the subsidy every year. This amount is the upper limit of the annual subsidy</li> <li>To grant the subsidy for only urea and NPK (12-24-12). They are relatively popular fertilizers among general farmers for use in major crops. The subsidized fertilizers must be prohibited for re-export, even after blending by traders/blending companies.</li> <li>To introduce a registration system of fertilizer traders, so that only registered traders can be granted the subsidy. However, corporate farms who produce crops by themselves or using out-growers, for crops such as tobacco, sugar-cane, cotton, banana, rice etc. or their affiliated companies are not allowed to be registered traders.</li> <li>To establish an independent monitoring system in the government.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	The whole country																
Implementing Agency/ Related Organization	MINAG, MIC																
Relevant Plan/ Projects																	
Remarks																	

### 16. Model Villages Project

Project Title	Model Villages Project																
Background	<p>Transformation from the prevailing shifting cultivation to settled farming with intensive agricultural technology is crucial to attain increased agricultural production and sustainable use of natural resources in the Project Area. However, many farmers do not have a concrete image of the new farming system after the abandonment of the shifting cultivation.</p> <p>According to the long history of colonization, people in the country used to coexist with only a limited number of large-scaled plantation farms under corporate management and a large number of subsistence farmers in shifting cultivation.</p> <p>Considering farmers' behavior in general, they will not transfer to a new farming system before they will be able to recognize the actual benefit of the new system by themselves. "A picture is worth a thousand words" is very true to convince farmers of the benefit of new things. The existing demonstration plots of MINAG's SUE (the United Extension System), however, don't fulfill this positive purpose due to improper management.</p> <p>Through demonstrating a model of intensive farming in an area of settled farmland by emerging farmers, it is expected that many farmers in the Project Area will be motivated to convert their farming system. A model village shall lead to explosive diffusion of new settled farming among the farmers aiming at the increase of crop production with intensive agricultural technology.</p>																
Objectives	To disseminate the cultivation technology of intensive farming and its effect and to motivate farmers in the area for introducing intensive farming																
Project Goals	To demonstrate practical intensive farming at a settled farmland area and a management system of farmer organization at the field level																
Expected Output	<ol style="list-style-type: none"> <li>1. Settled farmers in the model villages increase agricultural production by intensive farming technology</li> <li>2. Settled farmers in the model villages increase their agricultural income through joint activities.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To develop new settlement areas for the model villages (1,000 ha: 5ha x 200 farmers per village), with necessary farming infrastructure and life-lines including houses for the settlers</li> <li>2. To select capable young farmers from surrounding communities for settlement. Graduates from ProSAVANA Agricultural Academy should be included up to a certain percentage of the settlers</li> <li>3. To provide a soft-loan to cover initial capital costs to start farming</li> <li>4. To provide intensive agricultural extension services, including grouping of farmers and matching with private companies who are looking for good partners.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Candidate Places for Model Villages: Meconta, Mogovolos, Mutuali (Malema), Alto Molocue and Lichinga																
Implementing Agency/ Related Organization	DPA in Nampula, Niassa and Zambezia, SDAE in 14 districts,																
Relevant Plan/ Projects	<ul style="list-style-type: none"> <li>• Provincial Strategic Plan Nampula 2010-2020, Millennium Village</li> </ul>																
Remarks																	

## 17. Pilot Project for Improvement of Small-Scale Farmers

Project Title	Pilot Project for Improvement of Small-Scale Farmers																
Background	More than 90% of the farmers in the Project Area are small-scale farmers. Their improvement in production and livelihood is essential for agricultural development in the area. Comprehensive measures are required to overcome complicated constraints that small-scale farmers experience at present, so that the farmers can transfer their farming practice from the present shifting cultivation to more an intensive one without difficulty.																
Objectives	To establish a development model to proceed the Master Plan from the result of a pilot project.																
Project Goals	Through implementation of a pilot project consisting of several technical and social measures, production increase and income generation of small-scale farmers are achieved.																
Expected Output	<ol style="list-style-type: none"> <li>1. Individual DUAT is registered in pilot communities.</li> <li>2. Income of participating farmers is generated.</li> <li>3. Capacity of SDEA and extension workers is developed.</li> <li>4. Development model of small-scale farmers for application in the Project Area is formulated.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To select pilot project communities based on voluntary initiatives under transparent process. <ol style="list-style-type: none"> <li>1) Socialization of pilot projects, explanation to representatives of communities.</li> <li>2) Selection of pilot community and farmers taking part in the project</li> </ol> </li> <li>2. To survey all farmland of individual farmers in the pilot community and register their DUAT.</li> <li>3. To prepare farming program for participating farmers. <ol style="list-style-type: none"> <li>1) Studying present farming methods of each farmer, to identify details of growing crops, varieties, management practice, marketing method, household income etc.</li> <li>2) Preparation of draft farming program: The farming program aiming at income generation based on settled cultivation is drafted with the farmers and the project.</li> <li>3) Revision of the draft program: The draft is evaluated with technical advisors from IIAM and extension service of DPA from aspects of technical and economic feasibility. The program should be based on detailed consideration of operation such as arrangement of agricultural inputs or credit support, if necessary. Benefit analysis is calculated at the end. The farmers must be included in this process in order to develop their capacity.</li> <li>4) Public announcement of the farming program in the community</li> </ol> </li> <li>4. Preparation: Farmer starts preparation of farming. Procurement of inputs is basically carried out using the existing distribution and procurement methods of farmers. The project support farmers and local stores to connect to an existing distribution channel. If there is no choice for the farmers themselves to procure inputs, the project provides them directly. However, farmer will repay the full amount of the cost.</li> <li>5. Monitoring: Activities are monitored throughout the farming period, and evaluated after the farmers themselves and the project sell the major crops. The following year's program is prepared based on the evaluation.</li> <li>6. Capacity Development: The activities and experience of the pilot project will be shared with local government staff such as extension workers and SDAE.</li> <li>7. Development model for small-scale farmers is formulated based on the lessons learnt in the last stage of the pilot project, including compiling a project operation manual for extension workers and SDAE staff.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Monapo, Rapale (Nampula), Grue and Cuamba. (high population area highly require transition to settled cultivation)																
Implementing Agency/ Related Organization	Extension Service in MINAG, IIAM, SDAEs, NGOs,																
Relevant Plan/ Projects	<ul style="list-style-type: none"> <li>• PRONEA</li> </ul>																
Remarks	<ul style="list-style-type: none"> <li>• The pilot project is carried out by experienced NGOs or specialists on a contract basis.</li> <li>• In the future, graduates from ProSAVANA academy, ideally originated to form pilot communities, can be assigned as core leading farmers.</li> </ul>																

## 18. Project for Vegetable Production Model

Project Title	Project for Vegetable Production Model
Background	<p>The demand for vegetables is expected to increase due to the increased number of laborers working in urban areas such as Nampula and SEZ of Nacala as well as in the planned fertilizer factory in Monapo. Vegetables are considered to be a promising product both for vitalization of special local products in the areas that have good access to the market and for generating cash income for small and medium-scale farmers.</p> <p>Vegetables are produced by small farmers along rivers, streams and reservoirs through manual carrying and application of irrigation water. The huge manpower required for this irrigation practice is a limiting factor for farmers to carry out and expand irrigation plots. Thus, the introduction of small pumps or simple irrigation systems is anticipated to help expand irrigation of vegetables.</p> <p>Because irrigation farming of vegetable crops requires initial and running costs for pump equipment, fuel, seeds, fertilizers, etc. as well as appropriate technology, it is necessary to develop proper a support system for expansion.</p>
Objectives	To promote vegetable production by small pumps and simple irrigation systems to provide cash income for small and medium-scale farmers
Project Goals	<p>To increase the irrigation area and production of vegetable crops</p> <p>To increase farmers income through producing vegetable crops by irrigation in consideration of market demand.</p> <p>To organize small-scale vegetable farmers into associations and to implement procurement and development of irrigation equipment, improvement of irrigation and cultivation techniques and development of market and sales channels by the association.</p> <p>To bring up leading farmers in small and medium-scale farms in the area through production of vegetable crops.</p>
Expected Output	<ol style="list-style-type: none"> <li>1. Farmers who intend to use irrigation farming can obtain necessary pump equipment and/or simple irrigation systems.</li> <li>2. Farmers who intend to use irrigating farming are organized into associations and start procurement of equipment, construction of facilities as well as developing marketing by the association.</li> <li>3. Cultivation and irrigation techniques of vegetable farmers are improved by receiving adequate technical extension service.</li> <li>4. Farmer's group/associations will develop market and sales channels by receiving necessary support of marketing activity.</li> </ol>
Main Activities	<ol style="list-style-type: none"> <li>1. Establishment of a support system for introducing small pump and developing simple irrigation systems by farmers and/or farmers' group <ol style="list-style-type: none"> <li>1-1 Support for introducing small pumps <ul style="list-style-type: none"> <li>• Providing loans for individual farmers to procure pump equipment</li> <li>• Lending pump equipment through farmers' associations</li> <li>• Training of core farmers on operation and maintenance of pump equipment</li> </ul> </li> <li>1-2 Support for developing of simple irrigation system <ul style="list-style-type: none"> <li>• Providing loans for farmer's associations to construct simple hydraulic structures, canal systems and farm ponds as well as to procure pump equipment and storage tanks</li> <li>• Technical support for planning and designing and training of members of associations on construction of simple hydraulic structure</li> </ul> </li> <li>1-3 Preparing preferential budget in FDA of SDAE and FDD of district for procurement of pump equipment and development of simple irrigation systems</li> </ol> </li> <li>2. Enhancement of farmers' groups <ol style="list-style-type: none"> <li>2-1 Organizing small-scale irrigation farmers into groups and promoting the formulation of farmers' associations as well as legalization</li> <li>2-2 Application of loan for irrigation equipment and facility development by the associations</li> <li>2-3 Operation and management of irrigation equipment and facilities by the associations</li> <li>2-4 Enhancement of activity of associations on irrigation management including collection of water/membership fees, account control and arrangement of members' participation in O/M</li> </ol> </li> <li>3. Establishing a technical extension system of vegetable cultivation with irrigation <ol style="list-style-type: none"> <li>3-1 Preferential implementation of technical extension by SDAE extension officers and NGOs on water management, irrigation practices and cultivation of vegetable crops</li> </ol> </li> </ol>

	<p>3-2 Steady supply of seed, which shall be linked with the Capacity Building of Seed Grower Project of the Master Plan</p> <p>4. Development of market and sales channels for vegetables</p> <p>4-1 Support to develop collection and handling facilities for vegetables, which will be operated by associations or forum of associations</p> <p>4-2 Support of farmers' associations and medium-scale farmers to connect to sales channels with large-scale consumers</p>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	<p>Priority for vegetable production with small pump irrigation is given to Zone I and Zone II, and the priority for developing simple irrigation systems is given to Zone III and Zone V.</p>																
Implementing Agency/ Related Organization	<p>DPA in Nampula, Niassa and Zambezia, SDAE, District Governor's Office</p>																
Relevant Plan/ Projects	<p>Provincial Strategic Plan Nampula '2010-2020,' Niassa '2017,' Zambezia '2011-2020'</p>																
Remarks																	

## 19. Project for Renewal of Cashew Trees and Improvement of Inter-cropping System

Project Title	Project for Renewal of Cashew Trees and Improvement of Inter-cropping System																
Background	<p>Mozambique was one of leading producers and exporters of cashew nuts before its independence. Its climatic conditions are suitable for growing cashew. The Nacalaa Corridor is the center of production. According to INCAJU (the Institute of Promotion of Cashew), about 40% of national cashew nut production occurs in Nampula province. The cashew industry is concentrated in the province, especially in the eastern part. While the production reached about 200,000 tons at peak, recent production remains at 1/3 of this level. One of the major reasons for the reduced production is the disease-infested cashew trees. In order to revive the production, INCAJU has been making the following efforts.</p> <p>(1) To provide spraying service targeting disease- infested trees.  (2) To multiply and distribute new seedlings to replace old trees hosting the disease</p> <p>Even though INCAJU has made significant efforts, they have not had the intended effect on disease control. Farmers are generally reluctant to replace the disease-infested trees due to the following reasons:</p> <p>(1) Limited access to new trees (poor transport infrastructure and high transportation costs).  (2) They are afraid of reduced income before the new cashew trees reach full production.</p> <p>It is recommended to support the INCAJU's efforts to revitalize cashew production in selected Nampula districts with the following measures.</p> <p>(1) To provide appropriate financial support covering the necessary costs for the replacement of old trees (transportation of seedlings, cutting of old trees, land clearance, etc.).  (2) To introduce an inter-cropping system with cashew trees, so that farmers can expect an adequate income from the field for 6-7 years before the new cashew trees achieve full production</p>																
Objectives	To revitalize cashew production as a special local products																
Project Goals	To increase cashew production through replacement of old disease-infested trees.																
Expected Output	<p>1. The number of new vital cashew trees replacing old and unproductive cashew trees infested with disease is increase</p> <p>2. Farmers who replant new cashew trees are able to expect a certain level of income between the replacement and full-production stage of the trees</p>																
Main Activities	<p>1. To provide a proper loan to farmers who are going to replace cashew trees.</p> <p>2. To develop and demonstrate a profitable inter-cropping system applicable when the trees are before the full production (may be combined with sesame and pulses/beans).</p> <p>3. To provide intensive support to the farmers through the agricultural extension agents</p> <p>4. To organize the farmers, so that they can have bargaining power against traders through improving their products in terms of quality and quantity. The organization may have processing facilities for cashew and other products, if necessary.</p>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Zone I (Monapo and Muecate), Zone II (Meconta, Mogovolas, Nampula, Murrupula)																
Implementing Agency/ Related Organization	INCAJU, IIAM (North East Centre), DPA Nampula , SDAE of concerned districts,																
Relevant Plan/ Projects	• Provincial Strategic Plan Nampula '2010-2020'																
Remarks																	



## 20. Tea Industry Revitalization Project

Project Title	Tea Industry Revitalization Project																
Background	Tea was a major export commodity in Mozambique before the civil war. Production and processing of tea still account for an important portion of economic activities in the highlands of Zambézia, amounting to 7,000 tons per year for the whole province and creating 4,000 job opportunities in Gurue district alone. There are over 8,000 ha of potential area for tea gardens in Gurue district, but only 65% of these are operational due to destruction during the civil war, insufficient replanting of over-70-year-old trees, and decreasing support by the government after privatization of state plantations.																
Objectives	To increase the income of small-scale farmers as well as the profitability of tea companies, thus contributing to the improvement of the regional economy.																
Project Goals	The tea industry around Gurue district is gaining higher competitiveness in national and international markets, without accelerating environmental degradation or enlarging socio-economic disparity.																
Expected Output	<ol style="list-style-type: none"> <li>1. Accessible financing mechanism is established.</li> <li>2. Aged tea trees are replaced by quality seedlings.</li> <li>3. Tea out-grower scheme is operational and expanding.</li> <li>4. Research results and extension services are available for out-growers.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1) Establishment of an accessible financing mechanism for tea companies <ul style="list-style-type: none"> <li>- Application of "ProSAVANA Development Initiative Fund"</li> <li>- Provision of fiscal incentives for investment in processing facilities</li> </ul> </li> <li>2) Support for tea replanting <ul style="list-style-type: none"> <li>- Introduction of improved foreign varieties (as seeds, seedlings or clones) through collective purchase</li> <li>- Financial support for replanting costs (either subsidy or loan)</li> </ul> </li> <li>3) Promotion of tea out-grower scheme <ul style="list-style-type: none"> <li>- Initial trial using part of the abandoned tea gardens of companies</li> <li>- Development of contract farming supported by technical assistance and provision of seedling and inputs by companies</li> </ul> </li> <li>4) Support for research and extension of good farming practices <ul style="list-style-type: none"> <li>- Assistance for tea research program by the tea companies and associations, supported by IIAM (hopefully Gurue branch)</li> <li>- Introduction of FFS to small-scale tea out-growers</li> </ul> </li> </ol>																
Implementation Period	Initial intensive intervention : 2014 – 2019																
	Development and continuation: from 2020																
	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Gurue district																
Implementing Agency/ Related Organization	Association of Tea Industries in Zambézia (consisting of 5 tea companies), Zambézia Provincial Government, IIAM																
Relevant Plan/ Projects	<i>Strategic Plan for Provincial Development of Zambézia 2011-2020</i> (The revitalization of tea industry is one of the priority projects)																
Remarks	Zone IV, to which the tea-producing mountainous part of Gurue district belongs, will require particular attention regarding environmental vulnerability.																

## 21. Modern Agriculture Cooperatives Formulation and Development Project

Project Title	Modern Agriculture Cooperatives Formulation and Development Project																
Background	Promoting the establishment of agricultural cooperatives based on the General Law of Modern Cooperatives (Law 23/2009). Although it is an important policy of MINAG / DNSA, the new law is not well known in the rural areas, and the number of cooperatives registered under the new legislation is still very limited. Therefore, in the Nacala Corridor area, for organizations of small-scale farmers, establishment of the modern agricultural cooperatives and an efficient and effective system of business-like management and operation based on the new cooperative law is required to achieve competitiveness and sustainability of farmers' organizations.																
Objectives	Bargaining powers of farmers' groups will be strengthened by sustainable management of modern agricultural cooperatives, Small-scale farmers' income would be increased and their living standards would be improved.																
Project Goals	To support establishment and development of the modern agricultural cooperatives having business-like based on the new cooperatives law.																
Expected Output	1. New agricultural cooperatives will be established as a model projects. 2. Existing farmers' associations will be transformed to new agricultural cooperatives.																
Main Activities	1. To disseminate knowledge of the new law and operation methods to relevant organizations and stakeholders of provinces and districts involved in the organization of farmers and establishment of agricultural cooperatives. 2. To support the establishment of new agricultural cooperatives as a model project for farmers' groups who wish to organize. 3. To support the transformation to new agricultural cooperatives from existing farmers' associations. 4. To support the operation of the new cooperatives with soft loans through the financing system. 5. To conduct trainings for human capacity development of cooperative members.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts.																
Implementing Agency/ Related Organization	DNEA, DPAs, AMPCM, NGOs																
Relevant Plan/ Projects	In Nampula and Niassa provinces the cooperative development is actively supported by CLUSA.																
Remarks	AMPCM is taking a lead role in implementing the new law through promoting and developing modern cooperatives as a sustainable form of wealth generation to target the multiple sectors.																

#### 4.4. Activities for Development of Agribusiness

##### 22. Establishment of a Support Organization for Investment and Value Chain Development

Project Title	Establishment of a Support Organization for the Investment and Value Chain Development																
Background	<p>Information on agriculture/agribusiness investment, as well as the export and import of agriculture products, has been separately dealt with by different organizations established under each of the ministries concerned, such as CEPAGRI (the Ministry of Agriculture), CPI and GAZEDA (the Ministry of Planning and Development), and IPEX (the Ministry of Commerce and Industry). As a result, investors have faced difficulties in acquiring necessary information on investment promotion and market opportunities in a timely manner.</p> <p>In addition to this, the agricultural value chain remains underdeveloped in the Nacala Corridor due to limited information sharing mechanisms between large consumers and producers, which has resulted in mismatching in the agriculture product market. In order to improve these issues, it is essential to establish a consolidated platform for providing necessary information on investment and marketing in the agriculture sector through a collaborative effort by all of the different agencies. The established support organization will also provide advisory and consulting services to potential investors and local entrepreneurs for business planning and marketing.</p>																
Objectives	1) To establish a support organization for promoting agriculture/agribusiness investment and value chain development in the Nacala Corridor																
Project Goals	The business environment for promoting agriculture/agribusiness investments and agriculture value chain development is improved through the establishment of a comprehensive platform for providing investment and marketing information.																
Expected Output	<p>1: A support organization for investment and value chain development is established and functional.</p> <p>2: Business and investment opportunities in the agriculture sector are expanded as a result of enhanced information provision service.</p>																
Main Activities	<ol style="list-style-type: none"> <li>1. Form a consultative committee comprised of CEPAGRI/DPA, CPI, GAZEDA, IPEX, Chambers of Commerce, and other related agencies and donors in order to develop a plan for establishing the support organization for investment and value chain development.</li> <li>2. Set up a support organization based on the plan.</li> <li>3. Provide information on investment promotion and consulting services to potential investors.</li> <li>4. Accumulate information on potential demand by major consumers and product volumes of producer groups in order to facilitate matching services.</li> <li>5. Provide advisory services (support in preparing business plans, introduction of available financial schemes for agriculture investment, etc.) to small and medium enterprises for business start-ups.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts and surrounding areas along the Nacala Corridor. The main office will be located in Nampula, while also establishing branch offices in core areas (e.g. Cuamba, Lichinga, etc.).																
Implementing Agency/ Related Organization	CEPAGRI, CPI, GAZEDA, IPEX, IPEME, MINAG/DPA, ProSAVANA Coordination Office, Donors																
Relevant Plan/ Projects																	
Remarks	<p>From viewpoints of both efficiency of business operation in this organization and easy accessibility to advisory service for customers, quality and quantity of advisory service staff, who will intermediate between this organization and customers are quite important for smooth implementation of investment projects. They are required to have sufficient knowledge on their operation schemes, to support business start-up, and to advise operation management to their customers, through knowledge and experience of business administration.</p> <p>Since donors and NGOs already have developed capacity of business development service providers in this area, refreshment and utilization of these human resources should be</p>																

	considered for establishment of a quality advisory service. IPEME (Institute of Promotion of Small and Medium Enterprises) as a trainer of training is suitable for providing technical service on capacity building of business development service. IPEME plans to establish their branch office in this year.
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### 23. Project for Land Reserve for Investment and Territorial Planning

Project Title	Project for Land Reserve for Investment and Territorial Planning																
Background	<p>The difficulties in the search of available land and after this obtaining DUAT (Right of Land Use and Reclamation) by investors are the main constraints for implementation of agro forestry projects in the country, since it requires a long time (searching and conducting) for a process that is quite complex to understand. In the last five years (2008-2012) only 20 projects were approved by CEPAGRI and are under implementation. These five projects total 740,700 hectares, and 60.2% of this area is used for reforestation projects, mainly in Niassa.</p> <p>In this context, the provinces, to attract large-scale investments for development, could adopt practical measures to facilitate access to available land, as well as provide information about the potential of these areas through agronomic and socio-environmental zonings. Through the formation of a bank / stock of land, managed by the respective provinces according to their public policies, and the provision of those areas to investors with basic plans of subdivision already prepared, the provincial governments can become the main protagonists of the development process.</p> <p>This protagonist role in inducing the development and targeting of investments in accordance with provincial policies should be exercised with CEPAGRI through joint work on the formulation of productive projects.</p>																
Objectives	Making the provinces the main protagonists in the process of investment for agricultural development																
Project Goals	Creating government offices in each province for the promotion of investment by management of available lands, formation of a database to support the interested investors and direction of investments in accordance with provincial public policies.																
Expected Output	<ol style="list-style-type: none"> <li>1. Government offices are created in each province.</li> <li>2. Available lands for agricultural projects are found in each district.</li> <li>3. Government office have a database of available land</li> <li>4. Basic plan on subdivision of available lands is prepared.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Creation of government offices to promote large-scale investment in each province</li> <li>2. Survey of available lands for agricultural projects.</li> <li>3. Formation of land bank and its database.</li> <li>4. Preparation of basic plan of subdivision and land management based on agronomic and socio-environmental zoning in the provinces.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Nacala Corridor (available lands in the three provinces)																
Implementing Agency/ Related Organization	Provincial government, DPA/SPGC's, CEPAGRI																
Relevant Plan/ Projects	PNDA - Agribusiness National Development Plan																
Remarks																	

## 24. Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement

Project Title	Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement																																																
Background	Despite the many well-structured legal instruments to supervise private investment projects in Mozambique, weak law enforcement is resulting in environmental degradation as well as threatened livelihood of the communities in many cases. The serious lack of budget, equipment and trained staff is the underlying problem.																																																
Objectives	To harmonize the agribusiness investment and the development of local communities as well as promote environmental conservation through compliance with the RAI principles, a large part of which can be achieved by proper enforcement of the existing supervision mechanism.																																																
Project Goals	All the agribusiness investment projects entering the Nacala Corridor are properly supervised, thus contributing to avoiding conflict with local communities and guaranteeing the enforcement of corrective measures and penalty on any infractions.																																																
Expected Output	<ol style="list-style-type: none"> <li>1. Government officials are trained to provide improved supervision service.</li> <li>2. Supervisions by the government are complemented by the private sector.</li> <li>3. Base of the supervision is reinforced in terms of budget and equipment.</li> <li>4. Documented information is transparent and accessible by the public.</li> </ol>																																																
Main Activities	<ol style="list-style-type: none"> <li>1. Training of the government officials <ul style="list-style-type: none"> <li>- Effective supervision methods for agriculture / agro-industry projects</li> <li>- Exchange of experience among different regions and projects</li> </ul> </li> <li>2. Partial outsourcing of the supervision service <ul style="list-style-type: none"> <li>- Promotion of certified private environmental auditors</li> <li>- Contracted consulting service to support the government officials</li> </ul> </li> <li>3. Strengthening of the base of supervision <ul style="list-style-type: none"> <li>- Provision of vehicles and ICT equipment for the exclusive use by inspectors and auditors</li> <li>- Budget support either through direct funding by donors or fund canalization from FUNAB</li> </ul> </li> <li>4. Improvement of information disclosure system <ul style="list-style-type: none"> <li>- Upgrading of the documentation standards</li> <li>- Creation of website or public access point for investment proposals, EIA reports, environmental licenses and supervision reports</li> </ul> </li> </ol>																																																
Implementation Period	Initial Intensive Intervention: 2014 – 2019 Continuation: 2020 – <table border="1" style="width: 100%; text-align: center;"> <tr> <td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td><td>21</td><td>22</td><td>23</td><td>24</td><td>25</td><td>26</td><td>27</td><td>28</td><td>29</td><td>30</td> </tr> <tr style="background-color: #cccccc;"> <td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td> </tr> </table>															14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																	
14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30																																	
Prioritized Area (candidate)	The entire Nacala Corridor will be covered; however, priority will be given to the areas identified in the Project No.22 “Land Reserve for Investment and Territorial Planning.”																																																
Implementing Agency/ Related Organization	MICOA (General Inspection, DNAIA), DPCA MINAG (DNTEF), CEPAGRI, Cadastre Services																																																
Relevant Plan/ Projects																																																	
Remarks																																																	

## 25. ProSAVANA Agriculture Special Economic Zone Project

Project Title	ProSAVANA Agriculture Special Economic Zone Project																
Background	<p>In order to develop agricultural clusters, the private sector should be invited using several incentives, for example, a preferential tax system for investment. In addition, social infrastructure like electricity, water supply, telecommunication, etc. are needed. The establishment of SEZ or IFZ confined to the agribusiness sector is one method for development within a limited budget, because it allows the application of favorable treatment in a limited area and concentration on works for infrastructure.</p> <p>The Government of Mozambique has mechanisms (GAZEDA) to establish SEZ (Special Economic Zones) and IFZ (Industrial Free Zones) in specific places and thus create a preferable environment including efficient value chain operation for each crop and increased productivity. For industries related to production, processing, storage, and distribution center can be organized into a single complex and attract investment.</p>																
Objectives	<p>To create special areas of economic activity, geographically delimited and regulated by a special customs regime. As the basis of which, all commodities entering there, meeting, circulating, becoming industrially related or leaving the country are totally exempted from any customs charges, tax and a free exchange rate regime and operations "off-shore" (ZEE); To create an area, unit or series of units of industrial activity, geographically delimited and regulated by a specific customs regime on the basis of which the goods contained therein or circulated, for the production of export items are exempt from all customs charges, tax, to tax-benefit schemes of exchange, fiscal and labor specially set (ZFI).</p>																
Project Goals	To create special economic zones for the agroindustry with incentives (tax, financing, technical assistance, etc.).																
Expected Output	<ol style="list-style-type: none"> <li>1. Competitive agricultural products, both for exports and imports substitution, are produced.</li> <li>2. Formal wholesale market for agribusiness development is created.</li> <li>3. New employment is generated.</li> <li>4. Consumption of agricultural products for agro-industrial services is increased.</li> <li>5. The industry is consuming local raw materials and promoting national development.</li> <li>6. Linkage of agriculture-commerce-industry is well coordinated.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To conduct zoning of areas (special economic zone) for each "cluster" of agricultural products.</li> <li>2. To inform and start negotiation with the government (GAZEDA) on the need to establish special areas of agriculture.</li> <li>3. To prepare the Draft Constitution for the ZEE and ZFI in the Council of Ministers.</li> <li>4. To make offers for investment from the private sector related to the supply of agricultural inputs, production, processing and distribution.</li> <li>5. To prepare basic infrastructure with the provision of electricity, water supply, roads and communication by government institutions (including railway access).</li> <li>6. To conduct monitoring services for private companies.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Areas zoned by the ProSAVANA and infrastructure potential (Cuamba or Ribaué)																
Implementing Agency/ Related Organization	The Ministry of Planning and Development. GAZEDA (Office for Accelerated Development Economic Zones) Nacala Corridor Development Agency																
Relevant Plan/ Projects	PNDA - National Plan for Development of Agribusiness.																
Remarks																	

## 26. Project for Rehabilitation of Agriculture Storage Facilities

Project Title	Project for Rehabilitation of Agriculture Storage Facilities																
Background	<p>In the Study Area, there are some public warehouses, which were built during the Portuguese colonial era in each district. These warehouses are currently managed by ICM (Institute of Cereal Mozambique) and the storage volumes vary from 200 to 5000 tons. Of these, almost all are rented out to the private sector for logistics for agriculture products. Since it has been more than 50 years since their construction, these warehouses are very old and need rehabilitation.</p> <p>In order to improve the efficiency of the supply chain and quality control of agricultural produce, the present public storage network should be rehabilitated. As is done currently, these public storage facilities will be utilized by the private sector in PPP. Among them, priority is given to small to medium-volume customers, especially farmers' groups, who cannot afford to invest in their own commercial scale warehouse, in order to improve their access to commercial scale storage facilities. One storage facility should consist of small capacity warehouses, about 100 tons of volume each, so that many small groups, individuals, and companies can utilize it. Meanwhile, medium to large-scale storage facilities including grain silos will be invested in by the private sector.</p> <p>Post-harvest technology, especially appropriate storage techniques for quality control of products has to be taught to stakeholders involved in the supply chain of agricultural products.</p>																
Objectives	To improve efficiency of the supply chain, quality control of agriculture produce, and the present public storage network																
Project Goals	Private sector can access public storage facilities to manage the timing for selling their products and reduce storage loss under controlled conditions.																
Expected Output	<ol style="list-style-type: none"> <li>1. Strategic storage rehabilitation plan in the Nacala Corridor for agriculture development is prepared.</li> <li>2. Public storage facilities are rehabilitated.</li> <li>3. Storage facilities are properly utilized, and storage loss is reduced.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To study the present condition of all public storage facilities owned by ICM.</li> <li>2. To prepare rehabilitation plans based on agriculture production forecasts, conditions of storage, and logistic network.</li> <li>3. To implement rehabilitation works according to the plan.</li> <li>4. To train ICM staff on O&amp;M of facilities.</li> <li>5. To train stakeholders on storage technology.</li> <li>6. To apply agriculture product standard cooperating with stakeholders.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts, Priority will be assigned depending on current condition and logistic importance of location.																
Implementing Agency/ Related Organization	MIC, Institute of Cereal Mozambique, MINAG, DPA (Nampula, Niassa and Zambezia), IIAM																
Relevant Plan/ Projects	Installation of grain silos in central and northern regions, Portuguese government																
Remarks																	

## 27. Project for Standardization of Agriculture Products

Project Title	Project for Standardization of Agriculture Products																
Background	No clear standard of agriculture products are used for trade or contract of products in Mozambique. Capacity, called "tin," is dominant for measuring units of product volume in rural areas, but units of capacity vary from place to place. Measuring units are changed to weight (kg) at assembling points when putting products in a sack. Regarding quality, for instance, moisture content of grain is not a condition for price determination. This results in quality deterioration during the storage process led by the mixture of high moisture content in grain. Traders determine a buying price of product regardless of the level of moisture content considering the risk of losses. If price is determined based on an agriculture product standard, the risk of losses for traders can be minimized. In addition, it can motivate farmers to produce quality products. Both sellers and buyers will be satisfied with pricing. Thus, agriculture product standards are necessary for transparent transaction, reduction of transaction costs and an increase of quality product.																
Objectives	To strengthen price competitiveness of Mozambican agricultural products by decreasing transaction cost and increasing quality of product.																
Project Goals	Trade price and contract price of products are fairly decided by the standard.																
Expected Output	1. Standards for agriculture products are officially issued. 2. The standards are used nationwide.																
Main Activities	1. To monitor and evaluate a trial activity of standardization in ProSAVANA. 2. To consider suitable standards countrywide. 3. To promote the use of agriculture product standards.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Whole country																
Implementing Agency/ Related Organization	MINAG, MIC, representatives of stakeholder group involved in agriculture product production, trading, processing, and retailing, research institutes including universities																
Relevant Plan/ Projects																	
Remarks																	



## 28. Market Information Access Improvement Project

Project Title	Market Information Access Improvement Project																
Background	It is important to collect and disseminate market information nationwide for actors in the value chain to access market opportunities. SIMA (Agriculture Market Information System) of MINAG plays a significant role regarding this issue. Nationwide market information is collected and updated every week on their website. But, small-scale farmers can hardly access the information through Internet services. Meanwhile, a new challenge, the provision of demand market information through an SMS system was launched in Mozambique. Not only farmers, but also other actors in the private sector can make a decision on investment in facilities and equipment of storage, processing and transportation using market information. Suitable information sources should be verified and taken into consideration for stakeholders under various living and working conditions.																
Objectives	To create a fairly competitive environment of agriculture product trade and improve market efficiency.																
Project Goals	Producers and agribusiness operators have better access to market information																
Expected Output	1. To collect lessons learnt from present or past efforts on market information systems. 2. To improve access to market information for farmers and agribusiness operators. 3. To utilize market information for business management.																
Main Activities	1. To collect lessons learnt from present or past efforts on market information systems. 2. To select and support possible information dissemination system. 3. To instruct farmers' groups and small-scale business operators on how to use information in business management.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts. Priority will be assigned through the basic design study.																
Implementing Agency/ Related Organization	MINAG, SIMA, DPA (Nampula, Niassa and Zambezia), DPIC (Provincial Department of Industry and Commerce)																
Relevant Plan/ Projects	Information texting service for farmers and small business, IFC																
Remarks																	

### 29. Soybean Cluster Development Project

Project Title	Soybean Cluster Development Project																
Background	<p>In the current value chain of agriculture product, the lack of linkage between stakeholders vertically and horizontally along with poor infrastructure causes low bargaining power, low quality of product, information gaps, and high transaction cost. This leads farmers to remain at the subsistence level.</p> <p>By promoting these stakeholders to create linkages vertically and horizontally in the cluster, it is expected to achieve higher productivity, access to market information and market opportunity, and enhance market-oriented or higher value-added production. Soybean has a value chain, in which many stakeholders from various agribusiness fields can participate. The soybean-based cluster is a rural development model of cluster development.</p>																
Objectives	Roles of public and private sectors are clarified to materialize socioeconomic development in rural areas through agribusiness cluster development.																
Project Goals	A cluster development model is demonstrated through strong linkage of production, industry and service actors in the supply chain.																
Expected Output	<ol style="list-style-type: none"> <li>1. The linkage between participants of the soybean cluster is well facilitated.</li> <li>2. Economic infrastructure for cluster development is prepared.</li> <li>3. Necessary support on production techniques, business services, and financial services are provided.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To select suitable location for soybean clusters in terms of proximity to production and consumption areas and availability of logistics.</li> <li>2. To invite the private sector (farmers' groups, input dealers, machinery service providers, oil processors<sup>1)</sup>, poultry farms, storage and transportation service providers), through use of special credit lines or preferential tax systems for investment in the cluster.</li> <li>3. To improve necessary infrastructure, such as roads, electricity, water supply and telecommunication network.</li> <li>4. To facilitate the strengthening of the linkage between participating farmers' groups<sup>2)</sup>, private companies, and public institutions.</li> <li>5. To provide technical, financial and management support services to participants.</li> <li>6. To feedback lessons learnt to the ProSAVANA agriculture special economic zone project.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Cuamba district																
Implementing Agency/ Related Organization	Investment Promotion Service (temporary), CPI, CEPAGRI, MP, Gazeda, DPA, (ICM)																
Relevant Plan/ Projects																	
Remarks	<ol style="list-style-type: none"> <li>1) In case the private sector hesitates to invest in processing businesses, such as soybean oil extracting and soy cake production, sharing investment and operation by Public-Private Partnership (PPP) will be considered. For example, parastatal institution like ICM will invest in necessary facilities with public investment budget, and operation will be done by a private company, who is interested in this business.</li> <li>2) Contract farming between farmers' groups including model villages and participating processors or poultry farms can be mediated by the Investment Promotion Service (temporary).</li> </ol>																

## 4.5. Activities for Sustainable Use of Natural Resources

### 30. Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)

Project Title	Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)																
Background	MICOA has been promoting the elaboration of PDUT since 2008 in view of the current tendency of disordered land-use and unsustainable exploitation of natural resources that threaten the ecosystem and community's livelihood.																
Objectives	To provide the 14 districts with legal instruments for spatial planning to restrict indiscriminate development activities and maintain equilibrium with environmental conservation, in the earliest stages of M/P implementation.																
Project Goals	Activities of agricultural development are taking place in harmony with the natural environment, avoiding significant or irreversible negative impacts in environmentally vulnerable areas, in conformity with PDUTs.																
Expected Output	<ol style="list-style-type: none"> <li>1. 14 PDUTs are elaborated, ratified and properly revised in the 14 districts.</li> <li>2. DNAPOT, DPCA and SDPI are sufficiently equipped and trained for enforcement and revision of PDUT.</li> <li>3. PDUTs are accessible to the public and disseminated among relevant actors.</li> <li>4. Appropriate land management under PDUT is implemented.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. Assistance for accelerated elaboration of PDUT in 6 districts <ul style="list-style-type: none"> <li>- Provision of equipment and software such as GPS, motorbikes, cameras, computers and GIS along with technical training</li> <li>- Budget support for contracting engineers and field operation costs</li> </ul> </li> <li>2. Assistance for dissemination of ratified PDUT <ul style="list-style-type: none"> <li>- Disclosure of PDUTs on the websites of MICOA and provincial governments</li> <li>- Distribution of printed PDUTs (including synopsis version) along with explanation seminars for relevant actors (institutions, private sector, residents, NGOs)</li> <li>- Technical meetings to harmonize PDUTs with the protected zones and agro-ecological zoning, as well as inter-district planning with attendance of DPA (especially SPGC and SPFFB)</li> </ul> </li> <li>3. Assistance for enforcement of PDUT by district governments <ul style="list-style-type: none"> <li>- Provision of equipment and software such as GPS, motorbikes, cameras, and computers along with technical training</li> <li>- Budget support for contracting assistant inspectors and field operation costs</li> </ul> </li> <li>4. Assistance for revision of PDUS after the first 10 years</li> </ol>																
Implementation Period	Elaboration: 2014 – 2015, Revision: 2022 – 2025, Dissemination and Enforcement: all periods																
	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	1 <sup>st</sup> priority area (for Elaboration of PDUT): Malema, Gurue, Cuamba, Mandimba, Ngauma, Lichinga districts 2 <sup>nd</sup> priority area (for Dissemination and Enforcement): all districts																
Implementing Agency/ elated organization	MICOA (DNAPOT), DPCA, District Government (SDPI), DPA																
Relevant Plan/ Projects	PDUTs are elaborated and ratified in: Monapo, Mogovolas, Murrupula, Alto Molocue districts. PDUTs are elaborated but yet to be ratified in: Meconta, Muecate, Rapale, and Ribau districts. Nation-wide Agro-ecological Zoning on a scale of 1:250 000 is being done by MINAG, and the final report will be published in 2013.																
Remarks (Legal base of this project)	Territorial Arrangement Law (Law no.19/2007), Territorial Arrangement Law Regulations (Decree no.23/2008) Land Law (Law no.19/97), Land Law Regulations (Decree no.66/98) Forest and Wildlife Law (Law no.10/99), Forest and Wildlife Law Regulations (Decree no.12/2002)																

## 31. Basic Study for Water Resource Management

Project Title	Basic Study for Water Resource Management																
Background	Management of the water resources is essential for sustainable use of natural resources and water distribution in an appropriate and fair manner. At present, the development of water resources has remained at a far lower level than the potential, except for some rivers running through high population density areas. Thus, even though accurate water resource management is not applied, no serious conflicts or trouble have not occurred. Considering the future development of industry and agriculture as well as the population increase of the Nacala Corridor area, the establishment of appropriate water resources management is considered a primary task.																
Objectives	The project aims to contribute to manage natural resources for the regional economy and irrigation development through providing the basic condition of well-organized water resources development and use. Through the activity of the project, the accurate situation of water use and development potential will be grasped and shared among concerned actors.																
Project Goals	To arrange necessary information for development and management of water resources to be shared among concerned actors of development including private investors. To realize well-organized water use and development in the basins through appropriate water resources management.																
Expected Output	1. River observatory network is re-built and hydrological information will be accumulated. Data and assessment results will be written in a database and be shared among concerned actors of development including private investors. 2. Well-ordered development and sustainable use of water resources is implemented through enhancing the monitoring of water use and strengthening the water license system. 3. Water management plan is formulated and the order of water use is established in the development concentrated basins.																
Main Activities	1. Steady implementation of development and re-construction of the river observatory network planned by ARA-CN and ARA-N. 2. Creation of database of water resources development potential. 3. Selection of possible dam site. 4. Investigation and preparation of inventory of small and medium-scale water users and their water use such as users with irrigation systems of less than 500ha, who are not included in the current water license system. 5. Formulation of water management plan including water distribution plan of the rivers for which intensive development is expected such as the Monapo River.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	Rio Monapo, Rio Mecuburi, Rio Meluli/Namaita, Rio Ligonha, Rio LuRioio and tributaries, Rio Lugenda and tributaries, Rio Lucheringo, Lago Chiuta The Monapo River Basin of Zone I and Zone II shall be given the priority for establishing a water management and distribution plan.																
Implementing Agency/ Related Organization	ARA-CN and ARA-N in close cooperation with DPA in Nampula, Niassa and Zambezia																
Relevant Plan/ Projects																	
Remarks																	

## 4.6. Activities for Capacity Development of Human Resources

### 32. Project for Training of Distributors of Agricultural Inputs

Project Title	Project for Training of Distributors of Agricultural Inputs																
Background	<p>It is necessary to promote the transition of farming style from shifting cultivation to intensive cultivation. This requires expanding the use of fertilizers, certified seeds and agrochemicals. However, public extension services are weak due to the small number of extension workers. Therefore, many channels to transfer knowledge on the intensive agriculture to farmers are required. Thus, stores or distributors handling agricultural inputs will meet farmers frequently, acting as a consultation counter regarding the use of agricultural inputs.</p> <p>On the other hand, proper knowledge on agrochemicals like pesticides and herbicides should be understood by farmers for natural conservation and for their own and people's good health. The distributors or stores handling them should also be knowledgeable and be sure to transfer the knowledge to their customer farmers to avoid unexpected accidents. If agricultural inputs distributors are motivated to provide the consulting services, farmers will have easy access to basic farming technology at a grass-roots level. The weak public agricultural extension services can be compensated by these consultation services. Moreover, the inputs distributors can earn the trust of customers (farmers) if they can continue to provide appropriate information on farming technology. This trust will enable them to successfully run their business in competition with others.</p>																
Objectives	Farmers have good access to basic knowledge about intensive farming technology																
Project Goals	Qualified agricultural distributors provide agricultural consultation services on farming technology to farmers as well as supply input.																
Expected Output	<ol style="list-style-type: none"> <li>1. Training courses for agricultural inputs distributors or stores are organized regularly throughout the year.</li> <li>2. Number of qualified agricultural distributors is increased at district levels.</li> <li>3. Number of entities handling agricultural inputs is increased.</li> </ol>																
Main Activities	<ol style="list-style-type: none"> <li>1. To organize training courses regarding major crop management and proper use of agricultural inputs including safety standards of agrochemicals designed for voluntary agricultural inputs distributors or stores. A certificate is issued for trainees who finish the course.</li> <li>2. In order to motivate distributors to take the training, favorable treatment is given to certificate holders, such as priority in governmental procurement, tax incentives, priority for low-interest credit, honor system etc.</li> <li>3. SDEA and DPA announce the favorable treatment of agricultural inputs distributors or stores.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts.																
Implementing Agency/ Related Organization	DPAs, district governments, MINAG, Execution Agency for Agriculture Development in the Nacala Corridor, NGOs																
Relevant Plan/ Projects																	
Remarks																	

## 33. ProSAVANA Agricultural Academy (Agricultural Development Centre) Project

Project Title	ProSAVANA Agricultural Academy (Agricultural Development Centre) Project
Background	<p>The government of Mozambique has recognized that empowerment of human resources at a grass-roots level is a major driving force for agricultural development. PRONEA (National Extension Program), which is the operational program of the Agricultural Extension Master Plan in compliance with PEDSA, focuses on small-scale and emerging farmers in order to enhance their productivity and market access. PRONEA has 2 components of human development out of its 3 major components. One is the supply-side development of agricultural extension services (empowerment of extension agents) and the other is the demand-side development of agricultural extension services (empowerment of farmers).</p> <p>Even though the government recognizes the need for human resources, the small number of leading farmers in communities and able agricultural extension agents is a serious problem for the agricultural development in the Project Area. In order to accelerate the development, able human resources on both sides at the district level, the farmer side and the extension side, should be systematically secured with a long-term strategy. Although there is an existing formal education system in agriculture, i.e. Agricultural Universities, Agricultural Institutes and Agricultural Basic Schools in Mozambique, the system cannot fully respond to the demand for able leaders dedicated to agricultural development at a grass-roots level.</p> <p>It is recommended that the government pay serious attention to determining capable young personnel and to foster them to be grass-roots leaders to bear responsibility of agricultural development, as well as to empower public extension agents periodically.</p>
Objectives	To foster able personnel who play a leading role in agricultural development in the Project Area
Project Goals	Number of able and minded farmers and public agricultural extension agents for agricultural/rural development is increased in the Project area
Expected Output	<ol style="list-style-type: none"> <li>1. School system of Pro-SAVANA Agricultural Academy is established.</li> <li>2. Capable young personnel are trained and educated through intensive training centering on farm practice and necessary skills to be a community leader.</li> <li>3. Training course of community leaders and agricultural inputs suppliers as well as training of extension agents at each stage.</li> </ol>
Main Activities	<p>&lt;Training of Leading Farmers &amp; Public Agricultural Extension Agent&gt;</p> <ol style="list-style-type: none"> <li>1. To construct academies and practice field training.</li> <li>2. To train selected capable young personnel (high-school graduates) who have a strong will to bear responsibility for the development of regional agriculture. The selected 20 personnel/year shall be given 2-years of intensive training centering on farming practices.</li> <li>3. To focus on training subjects regarding farm management, group organization and management, etc. in addition to the practice, so that the trainees will be able to develop the qualities and skills needed to become a community leader in the future</li> <li>4. To provide the following 2 options for incentives to the qualified trainees after 2-years <ol style="list-style-type: none"> <li>(1) DUAT of farmland for about 5 ha and a soft-loan to cover initial capital costs to start farming</li> <li>(2) Employment as a public extension agent of the intended SDAE</li> </ol> </li> </ol> <p>&lt;Other training&gt;</p> <ol style="list-style-type: none"> <li>1. Rookie training of public extension agents (1-year training at the time of recruitment)</li> <li>2. Refreshment training of public extension agents (1-month training every 5-years during the career of the agents)</li> <li>3. Community leader training (Ad-hoc trainings sessions based on requests from the extension side)</li> <li>4. Agricultural Inputs Suppliers Training (2-week training, once a year)</li> </ol> <p>&lt;Trainers&gt;</p> <p>Professors/instructors of agricultural universities, IIAM researchers, Senior staff of DPA, NGOs &amp; private sector and foreign experts, such as those from Brazil and Japan</p>

Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts (candidate place for the Academy: Cuamba)																
Implementing Agency/ Related Organization	MINAG, DPA in Nampula, Niassa and Zambezia, SDAE in 14 districts, IIAM (North East Centre & North West Centre)																
Relevant Plan/ Projects	• PRONEA																
Remarks																	

#### 34. Project for Human Capacity Development for Farmers' Organization

Project Title	Project for Human Capacity Development for Farmers' Organization																
Background	In order to efficiently promote the various agricultural development projects in the Nacala Corridor area, it is necessary to realize the improvement of agricultural practices and the living standard of small-scale farmers who participate in the projects. It is also necessary to conduct training activities for human capacity development at the rural level. There is also a need to support the technical guidance and organization for a number of small-scale farmers who do not benefit from the out-growing projects.																
Objectives	Human capacity of small-scale farmers to participate in the agricultural development projects in the Nacala Corridor area will developed by improving agricultural practices and the living standard. In addition, the core people of the future farmers' organizations will be developed.																
Project Goals	To carry out the training programs for human capacity development of small-scale farmers involved in the agricultural development in the Nacala Corridor area.																
Expected Output	1: Agricultural practice level of small-scale farmers will be improved. 2: Core people of the future farmers' organizations will be developed.																
Main Activities	<ol style="list-style-type: none"> <li>1. To create the training plan for human capacity development by DPAs and SDAE</li> <li>2. To select training participants from community recommendations or representatives of the community youth group.</li> <li>3. To implement training for human capacity development at the Administrative Post level.</li> <li>4. To select talented individuals that could become the core people of the future farmers' organizations from among trainees and to implement leader training for the talented people who are candidates for organization leaders.</li> <li>5. To formulate farmers' organizations led by well-trained core parson.</li> <li>6. To support the new farmers' organizations by those that have been established with agricultural extension services.</li> </ol>																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	All 14 districts.																
Implementing Agency/ Related Organization	DNEA, DPAs, SDAE, NGOs																
Relevant Plan/ Projects																	
Remarks	Because the objectives and activities of the program are similar to that of PRONEA, the program will support and be carried out in conjunction with PRONEA.																

35. Project for Capacity Development of District Governments

Project Title	Project for Capacity Development of District Governments																
Background	The basic administrative unit of rural development is the district government. The district government has played an important role to realize agricultural development and they should be the core of planning and implementation. However, human resources to support the administrative organization at the district level are poor; and it has not been able to perform effective and efficient administration. In order to promote the agricultural development plan in the future, it is necessary to develop the human resource of the local administration in the district government.																
Objectives	To accrue the ability of the district government to execute projects for agricultural development in the Nacala Corridor area, and to implement capacity development training for the district staff.																
Project Goals	Staff in SDAE improve their capacity to implement projects and to revise the plan based on monitoring.																
Expected Output	1. Agricultural Development Master Plan in Nacala Corridor Area is understood at the district level 2. Staff in SDAE obtain the capacity for operation/management of the projects.																
Main Activities	1. To implement a multi-day training seminar for SDAEs in the Nacala Corridor area with the following contents. (1) Dissemination of Agricultural Development Master Plan in the Nacala Corridor Area. (2) Recognizing the role of district government/SDAE in the execution of the plan. (3) General management methods, monitoring and evaluation methods for project execution. (4) Preparing a monitoring plan concerning specific projects in the Master Plan. 2. To implement regular annual seminars, in order to present monitoring results and to share faced issues and their solutions by SDAEs. 3. To assign necessary personnel to SDAE for promoting the agricultural development plan, as well as to budget for them.																
Implementation Period	2014	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Prioritized Area (candidate)	SDAE of all 14 districts.																
Implementing Agency/ Related Organization	Execution Agency for Agriculture Development in the Nacala Corridor, DPAs, District governments, NGOs																
Relevant Plan/ Projects																	
Remarks																	



## 4.7. Staging of the Master Plan

The achievement of the agriculture development in the Nacala Corridor proposed in the Master Plan is targeted for 2030 with activities beginning from 2014. In consideration of the present state of agriculture practices in the area with most small-scale farmers relying on extensive shifting cultivation, the development stage has been divided into three phases that allow for the intensive use of resources by target sectors in order to achieve the effective implementation of proposed programs/projects in the Master Plan.

Figure 3.2.1 sets out the proposed phasing of the agriculture development in the Nacala Corridor with “Phase I - Transition to Settled Cultivation Phase (2014-2020),” “Phase II - Growth of Agriculture Production Phase (2021-2025),” and “Phase III - Expansion of Agribusiness Phase (2026-2030).” The basic development strategies for these phases are summarized below:

### Phase I - Transition to Settled Cultivation Phase (2014-2020)

In this phase, the project intervention will mainly concentrate on promoting the transition from the current cultivation system by small-scale farmers, specifically moving from the extensive shifting cultivation to intensive settled cultivation, through the implementation of several projects. Focus will be given to the capacity building of small and medium-scale farmers to improve agriculture productivity as well as the promotion of agribusiness enterprises as strategic partners to collaborate with small-scale farmers in order to establish an effective contract farming model. Accessible support mechanisms, such as agricultural credit and input subsidy schemes, will be introduced to accelerate these development initiatives. In addition, support will be provided to facilitate the registration of DUAT for small-scale farmers in order to confirm their agriculture land use rights.

### Phase II - Growth of Agriculture Production Phase (2021-2025)

For this phase, continuous support for the expansion of agriculture production will be conducted, focusing on organizing farmers’ groups or strengthening existing farmers’ associations to widely promote the transition from shifting to settled cultivation. One of the potential mechanisms would be the establishment of a model village where a practical model for intensive fixed production would be demonstrated through the involvement of farmers who settle in the model village. At the same time, support/projects for improving and strengthening agriculture value chains will be conducted through basic infrastructure development and the introduction of policy measures to promote agribusiness development. This would also promote proactive collaboration between small and medium-scale farmers and large corporate farms by attracting foreign direct investment.

### Phase III - Expansion of Agribusiness Phase (2026-2030)

In the Expansion of Agribusiness Phase, cluster development in selected production areas, specified in the Master Plan, will be promoted, and is expected to lead to comprehensive agriculture development in the Nacala Corridor. Potential policy measures to support this initiative include large farming plot development in which the government will strategically facilitate the establishment of a large-scale commercial agribusiness model, and the establishment of the Special Agriculture Economic Zones with support from CPI/GAZEDA forming the core for agriculture clusters in the area. Additionally, a continuous effort towards the transition of agriculture production to intensive settled cultivation will be critical to achieve of the development goals of the Master Plan.

## **4.8. Implementation Schedule of Agricultural Development Master Plan**

### **4.8.1. Task Allocation among Stakeholders**

The Master Plan will be implemented by not the only public sector, but also the private sector including farmers, NGOs, etc. The public sector means mainly government organizations including MINAG, its subordinate organizations, and other related ministries such as MPD, MOPH, MICOA, etc. Some public organizations like chambers of commerce, financial institutions, and donors are also categorized in this sector. The private sector consists of cooperate farm, SMEs in agribusiness, distributors, etc. and farmers under various levels of farmers' associations. The expected stakeholders are shown in Table 4.8.1.

The relation between each stakeholder and project/activities will be clarified and main actors for implementation as well as executing group/agencies and supporters will be identified in Table.

**Table 4.8.1 Expected Stakeholders related to Implementation of the Master Plan**

SECTOR	SUB CATEGORY	STAKEHOLDER
GOVERNMENT	GOVERNMENT ORGANIZATION	MINISTRY OF AGRICULTURE MINISTRY OF PLANNING AND DEVELOPMENT, MINISTRY OF INDUSTRY AND COMMERCE, MINISTRY OF PUBLIC WORKS AND HABITATION, MINISTRY OF ENVIRONMENT, CPI, CEPAGRI, GAZEDA, IPEX, IIAM, INCAJU, IAM, ARA, ANE, DPA, SDAE,
	PUBLIC ORGANIZATION/ INSTITUTION	CHAMBER OF COMMERCE, UNIVERSITY BANKS AND OTHER FINANCIAL INSTITUTIONS, MALONDA FOUNDATION,
	DONORS	INTERNATIONAL ORGANIZATIONS, DONOR COUNTRIES
PRIVATE	FARMER	UNAC FORUMS, FARMERS ASSOCIATIONS, COOPERATIVES
	PRODUCER	CORPORATE FARMS
	AGRIBUSINESS	LARGE AGRIBUSINESS ENTERPRISES, SMES FOR AGRIBUSINESS, SEED PRODUCERS/COMPANIES, AGRICULTURAL INPUTS DISTRIBUTORS, AGRICULTURAL MACHINE DISTRIBUTORS, MACHINERY SERVICE PROVIDERS
NGOS	-	CLUSA, AFRICARE, WORLD VISION, TECHNOSERVE, ORAM ETC.

Source: JICA Study Team

**Table 4.8.2 Stakeholders and Projects**

	Ministry of Agriculture	Other Ministries	CPI	CEPAGRI	GAZEDA	IPEME	IPEX	IIAM	INCAJU	IAM	ICM	ARA	INIR	ANE	DPA	SDAE	SDPI	Chamber of commerce	University	Banks and other financial institutions	Malonda Foundation	Farmer	Cooperative/ Farmers Association	Corporate Farm	Agribusiness Investor	SMEs in Agribusiness/ Production	Agriculture Input distributor	NGOs
1. Project for Strengthening of Agricultural Research	✓							✓	✓	✓																		
2. Project for Strengthening of Agricultural Extension Services	✓							✓	✓						✓	✓							✓					✓
3. Project for Land Registration of the Small and Medium-Scale Farmers	✓														✓	✓						✓						
4. Project for Establishment of Financial System for Agriculture	✓														✓	✓				✓								
5. Project for Financial Supporting System for Large Investors																				✓			✓	✓				
6. Project for Establishment of Financial Support System for Small and Medium-Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund)	✓			✓											✓					✓								
7. Project for Establishment of Financial Support System for Individual Farmers	✓														✓	✓				✓								
8. Project for Capacity Development of Business Development Service			✓	✓		✓	✓											✓		✓								
9. Irrigation System Rehabilitation Project	✓													✓	✓	✓						✓	✓					
10. Project for Enhancement of Water Users' Organizations															✓	✓												
11. Project for Improvement of Irrigation Technology and Construction Quality	✓													✓	✓	✓												

	Ministry of Agriculture	Other Ministries	CPI	CEPAGRI	GAZEDA	IPEME	IPEX	IIAM	INCAJU*	IAM	ICM	ARA	INIR	ANE	DPA	SDAE	SDPI	Chamber of commerce	University	Banks and other financial institutions	Malonda Fundation	Farmer	Cooperative/ Farmers Association	Corporate Farm	Agribusiness investor	SMEs in Agribusiness/ Production	Agriculture input distributor	NGOs
12. Project for Improvement of Access Roads for Agricultural Activities	✓	✓												✓	✓	✓	✓					✓						
13. Project for Establishment of Preferential Credit to Support Agricultural Mechanization Service Providers	✓														✓	✓			✓						✓			
14. Project for Capacity Building of Seed Growers								✓							✓							✓			✓	✓		
15. Project for Improvement of Accessibility to Fertilizer	✓	✓																								✓		
16. Model Villages Project	✓														✓							✓						
17. Pilot Project for Improvement of Small-Scale Farmers	✓							✓							✓	✓						✓						✓
18. Project for Vegetable Production Model															✓	✓						✓	✓					
19. Project for Renewal of Cashew Trees and Improvement of Inter-cropping System	✓								✓						✓	✓						✓						✓
20. Tea Industry Revitalization Project	✓														✓	✓			✓			✓						
21. Modern Agriculture Cooperatives Formulation and Development Project	✓														✓							✓	✓					✓
22. Establishment of a Support Organization for Investment and Value Chain Development	✓		✓	✓	✓	✓	✓								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
23. Project for Land Reserve for Investment and Territorial Planning	✓			✓											✓	✓					✓			✓				
24. Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement	✓	✓	✓	✓																								
25. ProSAVANA Agriculture Special Economic Zone Project	✓	✓	✓	✓	✓																				✓	✓		
26. Project for Rehabilitation of Agriculture Storage Facilities		✓						✓		✓					✓										✓	✓		
27. Project for Standardization of Agriculture Products	✓	✓		✓				✓										✓	✓			✓	✓	✓	✓	✓	✓	
28. Market Information Access Improvement Project	✓	✓														✓												
29. Soybean Cluster Development Project	✓	✓	✓	✓	✓					✓				✓	✓	✓				✓	✓				✓			
30. Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)		✓															✓											
31. Basic Study for Water Resource Management	✓											✓																
32. Project for Training of Distributors of Agricultural Inputs	✓	✓						✓							✓											✓	✓	
33. ProSAVANA Agricultural Academy (Agricultural Development Centre) Project	✓							✓							✓	✓						✓						
34. Project for Human Capacity Development for Rural Development	✓														✓	✓						✓	✓					✓
35. Project for Capacity Development of District Governments	✓														✓	✓												✓

## 4.8.2. Staging Implementation Plan

The main stakeholders to implement the Master Plan are the public sector, the private sector and NGOs.

As described in Chapter 4.4, the Master Plan will be targeted for the period between 2014 and 2030. The development stage of the Master Plan period is divided into three stages, as shown in Figure 5.8.1, “Phase I - Transition to Settled Cultivation (2014-2020),” “Phase II - Growth of Agriculture Production (2021-2025),” and “Phase III - Expansion of Agribusiness (2026-2030).”

## 4.8.3. Implementation Schedule

The projects/programs will be implemented considering effective implementation of the Master Plan and intensive use of resources of stakeholder for target sectors. Monitoring of the progress shall be continued up to the end of the programs/projects, and at the end of each stage, progress of the Master Plan should be evaluated.

The implementation schedule of the Master Plan is summarized in Table 4.8.3. The schedule will be considered in more detail based on the activities in the next phase.

**Table 4.8.3 Implementation Schedule of the Master Plan**

Project	Phase I - Transition to settled cultivation						Phase II - Growth of agriculture production					Phase III - Expansion of agribusiness					
	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30
1. Project for Strengthening of Agricultural Research																	
2. Project for Strengthening of Agricultural Extension Service																	
3. Project for Land Registration of the Small and Medium-Scale Farmers																	
4. Project for Establishment of Financial System for Agriculture																	
5. Project for Financial Supporting System for Large Investors																	
6. Project for Establishment of Financial Support System for Small and Medium-Scale Agribusiness Enterprises and Farmers' Organizations (ProSAVANA Development Initiative Fund)																	
7. Project for Establishment of Financial Support System for Individual Farmers																	
8. Project for Capacity Development of Business Development Service																	
9. Irrigation System Rehabilitation Project																	
10. Project for Enhancement of Water Users' Organizations																	
11. Project for Improvement of Irrigation Technology and Construction Quality																	
12. Project for Improvement of Access Roads for Agricultural Activities																	
13. Project for Establishment of Preferential Credit to Support Agricultural Mechanization Service Providers																	
14. Project for Capacity Building of Seed Growers																	
15. Project for Improvement of Accessibility to Fertilizer																	
16. Model Villages Project																	

Project	Phase I - Transition to settled cultivation							Phase II - Growth of agriculture production					Phase III - Expansion of agribusiness				
	'14	'15	'16	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	'30
17. Pilot Project for Improvement of Small-Scale Farmers																	
18. Project for Vegetable Production Model																	
19. Project for Renewal of Cashew Trees and Improvement of Inter-cropping System																	
20. Tea Industry Revitalization Project																	
21. Modern Agriculture Cooperatives Formulation and Development Project																	
22. Establishment of a Support Organization for Investment and Value Chain Development																	
23. Project for Land Reserve for Investment and Territorial Planning																	
24. Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement																	
25. ProSAVANA Agriculture Special Economic Zone Project																	
26. Project for Rehabilitation of Agriculture Storage Facility																	
27. Project for Standardization of Agriculture Products																	
28. Market Information Access Improvement Project																	
29. Soybean Cluster Development Project																	
30. Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)																	
31. Basic Study for Water Resource Management																	
32. Project for Training for Distributors of Agricultural Input																	
33. ProSAVANA Agricultural Academy (Agricultural Development Centre) Project																	
34. Project for Human Capacity Development for Farmer's Organization																	
35. Project for Capacity Development of District Governments																	

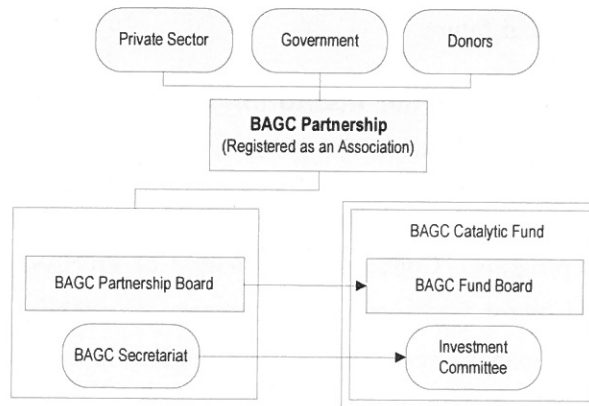
## 4.9. Institutional Frameworks for Master Plan Implementation

### 4.9.1. Experience in the Baira Agriculture Growth Corridor

The organizational structure of the Baira Agriculture Growth Corridor (BAGC), known as “BARC Partnership,” will be the basis for the ProSAVANA institutional platform. As illustrated in Figure 4.9.1, the role of the BAGC Partnership is to facilitate coordinated investment by public and private sectors in order to support commercially viable agribusinesses. There are two main functionaries under the BAGC Partnership: the BAGC board and BAGC secretariat. The BAGC board acts as a decision-making body represented by public and private sectors to work in their interest in promoting investments in commercial agriculture in the Beira Corridor. In contrast, the BAGC secretariat provides a platform for the coordination and facilitation of operational support in the work of the BAGC Partnership. The Catalytic Fund, which is registered as an investment company, invests in early-stage farming and agro-processing businesses, which incorporates small and medium scale farmers. Technical staff of the Catalytic Fund provide intensive support to the

clients of the fund in relation to production and business management as well as advisory services to small-medium enterprises who would initiate and expand commercial agriculture.

In summary, the roles of the BAGC Partnerships' secretariat are limited to coordination and public relations activities for the creation of a network among public and private partners, while the Catalytic Fund takes proactive and practical roles in promoting and expanding commercial agriculture and agribusiness in the area, providing extensive advisory and monitoring support.



Source: Beira Agriculture Growth Corridor

**Figure 4.9.1 Organizational Structure of the BAGC Partnership**

#### **4.9.2. Potential Options for the Institutional Structure in the Implementation of the Agriculture Master Plan in the Nacala Corridor**

##### **(1) Establishment of the Coordinating Body for the Implementation of the Master Plan**

The Agriculture Master Plan in the Nacala Corridor covers 14 districts in 3 provinces involving different sectors to address a variety of development issues such as the environment, land ownership, infrastructure, human resource development and agricultural and agribusiness development. Implementation of the Agriculture Master Plan in the Nacala Corridor (aka ProSAVANA) will institutionally come under the authority of the Ministry of Agriculture under collaboration with relevant ministries, such as the Ministry of Planning and Development (CPI, GAZEDA), the Ministry of Commerce, the Ministry of Public Works and Housing (DNA, ARAs), and the Ministry of Coordination of Environment Action at the central government level.

Being a multi-sector program, ProSAVANA will work with a number of different agencies in both the public and private sectors, and at national, provincial and district levels. In order to effectively implement and oversee the agricultural development projects and activities proposed in the Master Plan, a coordinating body must be formed to act as an inter-agency consultative board for information sharing and the coordinating of activities among different parties in three provinces: Nampula, Niassa and Zambezia. The coordinating body will play a facilitating role, helping to coordinate support from other development partners and

maintain linkages with private agribusiness partners during the implementation of the Master Plan. In addition, it will have a separate unit to monitor/audit the status of agricultural and agribusiness investments in terms of their environmental and social aspects in order to realize the concept of introducing responsible agricultural investment for the development of the Nacala Corridor.

This agricultural sector development institution will be one of the most important sectors under the development institution for the integrated economic development in the Nacala Corridor in the near future.

## **(2) Potential Options for the Institutional Structure in the Implementation of the Agriculture Master Plan in the Nacala Corridor**

There are different types of organizational structures for coordinating and implementing projects and programs. Concerning the nature of ProSAVANA, which will be carried out through multi-sector initiatives, it is necessary to establish a coordinating body structure, comprised of a management board and secretariat, in order to ensure collaborative decision making and information sharing. Reflecting the case of the BAGC Partnerships, two potential institutional structures, focused on the functions of the secretariat, are proposed below:

### **1) Option 1: ProSAVANA secretariat with coordination role**

The role of the secretariat herein is to facilitate coordination between the agricultural development projects, and activities and investments carried out by different entities, both public and private; while the management board, composed of representatives of three provinces, the Ministry of Agriculture, ABC and JICA, acts as a decision making body. Although the secretariat does not have a technical advisory role in supporting projects and activities carried out by the different actors as shown in Figure 4.9.2, it facilitates linkages with agricultural and agribusiness activities to create synergies for expansion of their initiatives. Though development projects and investments will be carried out independently by different parties, they are required to participate in quarterly meetings organized by the secretariat in order to report on the progress of their activities. A liaison office would be set up in Maputo with the task of collaborating closely with concerned ministries, donors and private businesses. Specific tasks for the management board and the secretariat are summarized below:

#### **The roles of the ProSAVANA Management Board**

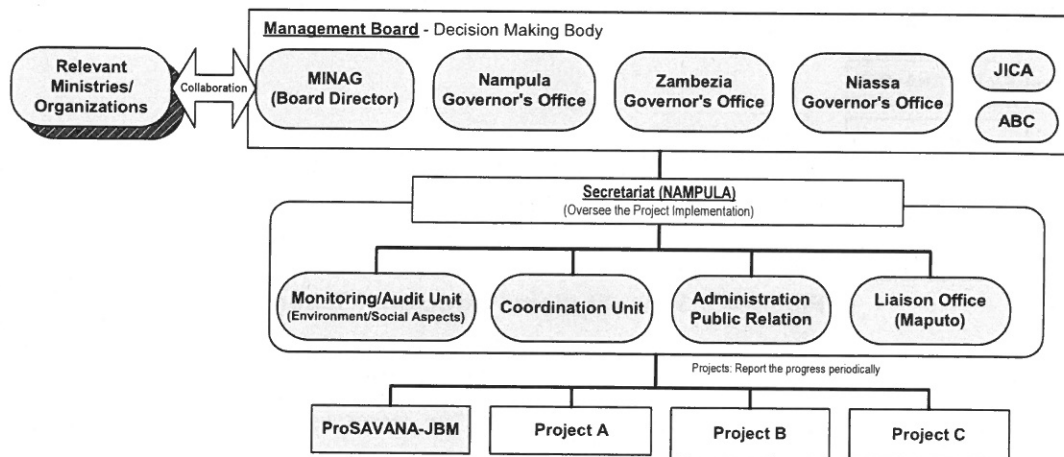
- Hold annual board meetings
- Monitor overall progress of projects and investments carried out in the Nacala Corridor
- Approve the annual plan and budget for the activities of the ProSAVANA secretariat
- Discuss issues of institutional or regulatory reform necessary for the agriculture/



agribusiness development in the Nacala Corridor.

**The roles of the ProSAVANA secretariat**

- Responsible for overall coordination of activities with concerned entities
- Hold quarterly coordination meetings, inviting institutions and offices engaged in agricultural and agribusiness development in the Nacala Corridor
- Support monitoring and evaluation of the implementation of the Master Plan
- Monitor/audit agricultural and agribusiness investments in terms of their environmental and social aspects, and admonish investors to induce them to take remedial action if serious offenses are observed
- Facilitate the development of a knowledge management platform, acting as an information center for ProSAVANA
- Conduct public relation activities to broadly disseminate information on agriculture and agribusiness development in the Nacala Corridor
- Facilitate policy discussions with concerned parties for institutional or regulatory reform in order to promote agricultural development and agribusiness investment
- Conduct donor coordination for the development of the Nacala Corridor.



**Figure 4.9.2 Institutional Structure (Option 1)**

**2) Option 2 : ProSAVANA secretariat with technical advisory and coordinating roles**

The second option, shown in Figure 4.9.3, proposes an extended secretariat role with technical advisory tasks. A project support unit will be established in the secretariat, staffed with technical experts assigned to providing monitoring and advisory support. The secretariat will be expected to play a more proactive role in leading the agricultural development projects, although there might be a potential risk of ineffective management due to the limited organizational capacity to carry out the extended tasks. In addition to the functions of the secretariat summarized in Option 1, there would be additional tasks under Option 2, which are listed below, while the role of the management board would remain the same as under Option 1.

### The roles of the Project Support Unit of the ProSAVANA secretariat

- Monitor the progress of each project and/or activity according to the implementation plan
- Provide necessary technical inputs and advisory services to ensure the smooth implementation of the project
- Draw technical lessons learned from the projects in order to provide feedback for the formulation of new agriculture projects
- Review a proposal and project document of new agriculture development projects and investments, and provide technical inputs and advices for the planning of projects.

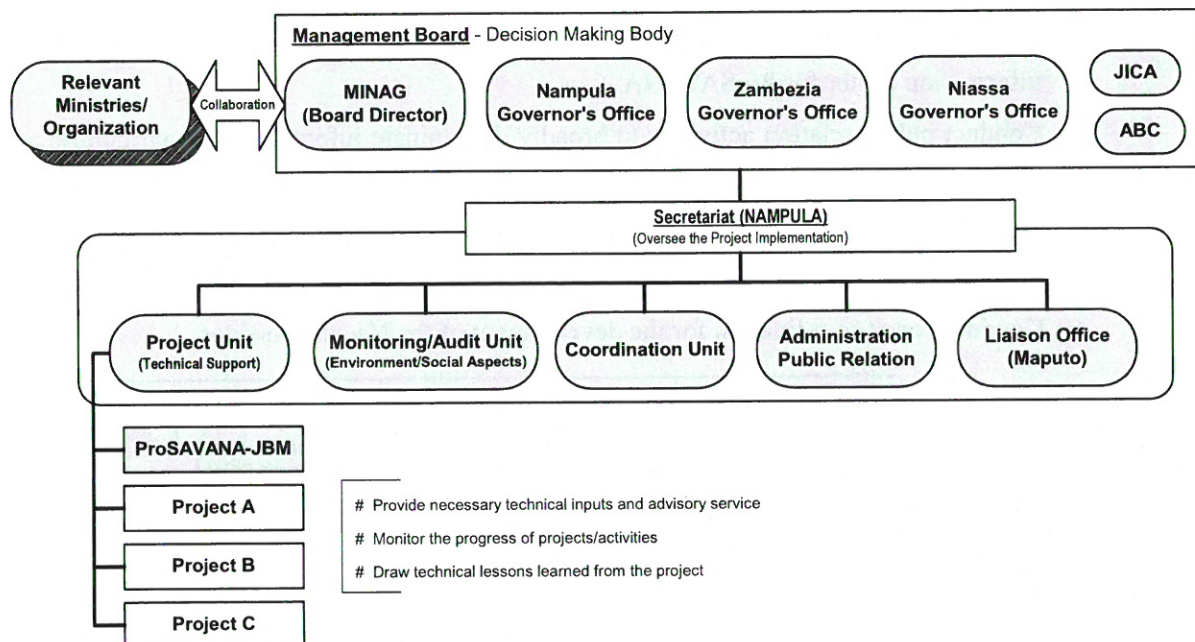


Figure 4.9.3 Institutional Structure (Option 2)

## 4.10. Strategic Environmental Assessment

Strategic environmental assessment (SEA) refers to “an assessment implemented at the policy, planning and program levels but not a project-level EIA” (JICA Guidelines for Environmental and Social Considerations, 2010) or “a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programs and evaluate the inter-linkages with economic and social considerations” (OECD/DAC, 2006). Application of SEA has been proven to be useful especially at the earliest stages of decision-making for development. In this regard, the Draft Master Plan of Agricultural Development in the Nacala Corridor is now subject to SEA following the steps shown below:

- (1) Identification of alternatives
- (2) Stakeholder analysis
- (3) Matrix design and comparison of alternatives
- (4) Identification of significant adverse impacts associated with the Draft Master Plan

In later stages of the study, each component of the Master Plan including priority projects and quick

impact projects will be subject to screening and scoping at the IEE level, and mitigation measures will be proposed.

Though Mozambique does not have specific legislation on SEA<sup>2</sup> apart from Decree No. 45/2004 “EIA Process Regulations,” there are a few cases where SEA has been applied (Table 4.8.1). Among donors, CIDA is applying SEA as a common tool for its operations in Mozambique such as budgetary support for poverty reduction, sector programs for health and agriculture, etc.

**Table 4.10.1 Examples of SEA in Mozambique**

Title	Location	Main Output
Transport Options for Corridor Sands Ltd. (MICOA/DANIDA, 2004)	Gaza province	➤ Recommendation for decision-making on different transport options.
National Agricultural Development Program-II (MINAG/IUCN, 2005)	Nation-wide	➤ Environmental strategy for program implementation; ➤ Environmental criteria for selection of proposals.
Strategic Environmental Assessment of Coastal Zone (MICOA, 2012)	48 coastal districts	➤ Mapping of current land occupancy and identification of permissible lands for tourism, mining, housing, etc.

Source: Study Team

#### 4.10.1. Identification of Alternatives

As described in Chapter 3.2, the goal of the Draft Master Plan is set as *“Improve the agricultural productivity of the small to medium-scale farms, and maximize the effects of increased agricultural products on the regional economy through the development of agricultural clusters through private investment and involving small and medium-scale farms.”* There are several plans, programs and strategies that can be regarded as alternatives (not competitive but complementary to each other) toward the same end, though geographical coverage does not exactly fit the Nacala Corridor in every case. Table 4.10.2 shows such alternatives to be analyzed in the present SEA. Some important action plans such as PAPA and PARPA are not included because these are scheduled to terminate before 2015, the year when the Master Plan is expected to become operational.

National policies underlying the above alternatives include: Agrarian Policy (1995), Environment Policy (1995), Land Policy (1995), Forest and Wildlife Policy (1997), Territorial Arrangement Policy (2007), Water Policy (2007), Bio-fuel Policy (2009) and Conservation Policy (2009). The “Pact for the Development of Agriculture Sector in Mozambique in the Context of CAADP” signed in 2011 among MINAG, AU, SADC and other stakeholders cites the Maputo Declaration in 2003 that requested allocation of at least 10% of the national budget for the agriculture sector in order to achieve sector growth of more than 6% per annum.

**Table 4.10.2 Alternatives to the Master Plan**

Title	Coverage	Period	Indicative Budget
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<sup>2</sup> It is defined that National Directorate of Environmental Impact Assessment (DNAIA) has the function to “proceed with strategic environmental assessment of policies, plans and programs” (Ministerial Orders no.259/2005 and no.265/2009).

PEDSA: Strategic Plan for the Development of the Agriculture Sector (MINAG)	Nation-wide	2011 – 2020	112 billion MT (as estimated by 1 <sup>st</sup> draft of PNISA)
Provincial Strategic Plan of Niassa (Niassa Provincial Government)	Niassa Province	2008 – 2017	680 million USD
Plan for Provincial Development of Nampula (Nampula Provincial Government)	Nampula Province	2010 – 2020	4,292 million USD
Strategic Plan for Provincial Development of Zambézia (Zambézia Provincial Government)	Zambézia Province	2011 – 2020	3,706 million USD*
Strategy of Green Revolution in Mozambique (Council of Ministers)	Nation-wide	2007 –	Not presented
EDR: Strategy of Rural Development (Council of Ministers)	Nation-wide	2007 – 2025	20 million USD (for 1st phase 2007 - 2009)
PASAN: Strategy and Action Plan for Food and Nutritional Security (SETSAN)	Nation-wide	2008 – 2015	232 million USD
Extension Master Plan (MINAG)	Nation-wide	2007 – 2016	51 million USD (for PRONEA 2007 - 2014)
Irrigation Strategy (MINAG)	Nation-wide	2010 – 2020	645 million USD
PROMER: Rural Market Promotion Program (MINAG/IFAD/AGRA)	15 districts of 4 northern provinces	2009 – 2016	41 million USD
Strategy for Reforestation (MINAG)	Nation-wide	2009 – 2030	1,360 million USD
Action Plan for Prevention and Control of Soil Erosion (MICOA)	Nation-wide	2008 – 2018	4.4 million USD
Action Plan for Prevention and Control of Forest Fires (MICOA)	Nation-wide	2008 – 2018	2 million USD

\* Ongoing projects are not included.

Source: Study Team

#### 4.10.2. Stakeholder Analysis

According to the “Minutes of Meeting on Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique (17<sup>th</sup> September 2009),” the stakeholders of ProSAVANA are determined as follows:

- Producers: Local farmers, Local population, Agricultural associations, Private enterprises (agricultural enterprises, agricultural product-processing enterprises), Other enterprises from the productive chain
- Public organizations: IIAM, DNSA, DNEA, DNSV, IAM, INCAJU, Others

However, it is evident that there exists a broader range of stakeholders, characterized by different levels of participation in the decision-making process, consultative influence and susceptibility to the positive/negative, direct/indirect impacts due to the implementation of the Master Plan. Table 4.10.3 is an attempt to describe the stakeholders in a wider sense for the Study Area.

**Table 4.10.3 Extended Stakeholders of ProSAVANA**

<p><b>Producers:</b></p> <ul style="list-style-type: none"> <li>- Associations (registered/non-registered)</li> <li>- Forums, Unions, Federations</li> <li>- Cooperatives (first-tier/second-tier)</li> <li>- National-level organization such as AMPCM, UNAC</li> <li>- Farmers can be classified in various ways by: crop, farm size, animals owned, DUAT holding, farming practice (settled/shifting, manual/mechanized), access to extension/finance/irrigation/market, health conditions such as</li> </ul>
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<ul style="list-style-type: none"> <li>HIV/AIDS, age, gender, ethnic group, language, literacy, religion, poverty level, etc.</li> <li>- Farm households (headed by male/female, etc.)</li> <li>- Official/Traditional representatives of locality, village and community</li> </ul>
<p><b>Private enterprises:</b></p> <ul style="list-style-type: none"> <li>- Traditional cash crop companies (cotton, tobacco, sugar cane, oilseed, coconut, etc.)</li> <li>- Agro-processing companies (maize, cassava, rice, cashew nut, chicken, beef, etc.)</li> <li>- Formal/Informal traders, transporters, middlemen</li> <li>- Wholesalers, retailers, supermarkets, restaurants</li> <li>- Public/Informal food markets at city, town or village level</li> <li>- Trade companies for import and export</li> <li>- Service providers (seed, fertilizer, agrochemical, machinery, equipment, technical assistance, finance, marketing, etc.)</li> <li>- Agribusiness investors (foreign/domestic)</li> <li>- Chamber of commerce</li> </ul>
<p><b>Public organizations:</b></p> <ul style="list-style-type: none"> <li>- MINAG (Cabinet of Minister, DNSA, DNEA, DNSV, DNTF, etc.)</li> <li>- MICOA (DNAPOT, DNAIA, etc.)</li> <li>- MOPH, ARA</li> <li>- ANE</li> <li>- CPI</li> <li>- GAPI</li> <li>- Institutions related to MINAG (IIAM, INCAJU, IAM, ICM, CEPAGRI, CENACARTA, INFATEC, FDA, etc.)</li> <li>- Provincial governments, especially DPA, DPOPH, DPIC, DPCA</li> <li>- District governments, especially SDAE and SDPI</li> </ul>
<p><b>NGOs and Donors:</b></p> <ul style="list-style-type: none"> <li>- NGOs (international/national)</li> <li>- Multilateral donors (WB, AfDB, IFAD, UNDP, etc.)</li> <li>- Bilateral donors (JICA, ABC, USAID, MCA, SIDA, SDC, FINNIDA, etc.)</li> </ul>

Source: Study Team

#### 4.10.3. Matrix Design and Comparison of Alternatives

Adverse impacts on natural and social environments might occur in association with the plans, programs and strategies described above. Table 4.10.4 shows a matrix of potential adverse impacts and their principal causes.

**Table 4.10.4 Potential Adverse Impacts and their Principal Causes**

Adverse Impacts	Principal Causes
Air pollution	Emission from processing factories; Forest burning; Burning of crop residue
Water pollution & sediment contamination	Drainage and seepage from farms affected by fertilizers, agrochemicals or livestock excreta; Effluent from processing factories; Eutrophication of reservoirs and increased turbidity of discharged water
Improper waste disposal	Organic waste from processing factories; Deposit of removed earth by civil works (road, irrigation system, factory, etc.)
Soil contamination & sediment contamination	Residual agrochemicals and heavy metals; Discharged water from civil works
Noise and vibration	Operation of processing factories; Civil works (during construction); Increased traffic on rural roads
Ground subsidence	Excessive extraction of groundwater
Offensive odor	Intensive livestock farming; Some kinds of processing factories
Disturbance of protected areas	Inadequate site selection inside or around protected areas; Encroachment of buffer zones by increasing land pressure

Deterioration of ecosystem and biodiversity	Inadequate site selection near habitats of protected or threatened species; Burning or clearance of forest; Reclamation of wetlands; Massive extraction or diversion of surface water and groundwater; Discharge from reservoirs; Effluent from processing factories; Obstruction of fish migration by hydraulic structures; Obstruction of animal migration and fragmentation of habitat by increased road traffic; Invasion of exotic species or pests; Accelerated deforestation by improved road network; Overgrazing; Monoculture of tree crops; Eutrophication; Overfishing
Change in hydrologic regime	Massive extraction or diversion of surface water and groundwater; Hydraulic structures for irrigation; Road embankment in poorly drained areas; Discharge from reservoirs; Backwater effect by reservoir; Massive deforestation and reforestation
Soil erosion and siltation	Deforestation and expansion of inadequate farming practices in sloped areas; Accumulation of sediment in reservoirs; Earth cut-and-fill by civil works
Salt accumulation, other soil degradation	Inadequate irrigation practices in potential risk areas; Consecutive farming without fallow, mulching, fertilization or manure application; Accelerated compaction by mechanization
Substantial alteration of land-form, geology, landscape	<i>Unlikely</i>
Improper management of abandoned sites	<i>Unlikely</i>
Increased risk of forest fire	Expansion of agricultural frontier into forest; Expansion of tree plantation or tree crop farms near residential areas
Transboundary or global effect	Greenhouse gas emissions from processing factories; Hydrological alteration in international river basins
Influence on indigenous peoples or minorities	<i>Unlikely</i>
Detriment to cultural or historical heritage	Inadequate site selection over known or unknown heritage; Insufficient initial examination before commencement of activity
Involuntary resettlement	Enclosure of large terrain by DUAT; Land expropriation; Inundation by construction or rehabilitation of reservoirs; Conversion of forest into farmland; Excessive extraction of surface water or groundwater especially in upstream areas; Non-compliance with compensation flow from reservoirs to downstream; Expansion of bio-fuel plantations replacing farms, forests and community areas; Weak consensus building among investors, the community and the government; Non-compliance with resettlement action plans; Insufficient and/or delayed compensation; Non-compliance with investor-community partnership agreements; Resettlement in areas without proper infrastructure and social service delivery; Lack of livelihood reconstruction plans for affected people; Weak mechanism of grievance redress; Loss of traditional jobs due to improved transport, land-use and natural resource utilization; Capture of benefits by local elites; Lack of preferential employment opportunities for local people
Limitation of access to natural resources	
Loss or restriction of livelihood	
Serious change in lifestyle	
Marginalization of vulnerable groups	
Localization of benefits and damages	
Aggravation of conflict of interests	
Widening of gender inequity	
Working conditions and occupational safety	
Annoyances during construction	
Risk of accident and harm to human health	Intoxication by inadequate management of agrochemicals; Effluent from processing factories into rivers and lakes used as sources of drinking water; Traffic change due to road works and increased traffic accidents; Propagation of pests around reservoir; Lack of alert system for emergency discharge from reservoir; Increased interaction between outside laborers and local residents; Non-compliance with the relevant legislation for civil works and factory operations; Lack of training and awareness creation campaign on safety and public health; Lack of contingency plan for emergency
Spread of infectious disease, HIV/AIDS	
Offense against children's rights	

Source: Study Team

Table 4.10.5 shows the results of the comparison between the Draft Master Plan and its alternatives, in terms of probable occurrence of adverse impacts without exact quantification. Although it is desirable to classify the impacts through rating the probability, magnitude, extent and duration, the comparison was carried out in a qualitative manner since most alternatives did not fully describe concrete activities or numerical indicators. Also, it should be noted that Table 4.10.5 does not mean that checked (X) adverse impacts are going to happen surely, as most impacts could be avoided by applying appropriate measures. On the other hand, it is also true that the absence of a check (X) does not guarantee that that impact would never happen.

All the likely adverse impacts of the Draft Master Plan also appear in other alternatives. In terms of the natural environment, the principal factors of these impacts are: (i) construction or rehabilitation of rural infrastructure such as roads, irrigation facilities, processing factories, etc. and, (ii) expanded use of fertilizers and agrochemicals. As for the social environment, the background of negative impacts is more complicated and different in each case, but are commonly attributable to: (i) enclosure or expropriation of land already in use by local people (including fallow and forest); (ii) extraction or diversion of water; and, (iii) non-transparent targeting or unfair selection of beneficiaries.

**Table 4.10.5 Qualitative Comparison of Likely Adverse Impacts between Draft Master Plan and its Alternatives**

	Draft M/P	Alternatives														
		1	2	3	4	5	6	7	8	9	10	11	12	13		
Air pollution																
Water pollution (& sediment contamination)	X	X	X	X	X		X		X							
Improper waste disposal	X	X	X	X	X		X		X							
Soil contamination (& sediment contamination)	X	X	X	X	X		X		X							
Noise and vibration	X	X	X	X	X		X		X							
Ground subsidence																
Offensive odor	X	X		X	X											
Disturbance of protected areas																
Deterioration of ecosystem and biodiversity	X	X	X	X	X		X		X							
Change in hydrologic regime	X	X	X	X	X		X		X							
Soil erosion and siltation	X	X	X	X	X		X		X							
Salt accumulation, other soil degradation	X	X	X	X	X		X		X							
Increased risk of forest fire	X	X														
Transboundary or global effect																
Detriment to cultural or historical heritage	X	X	X	X	X		X		X							
Involuntary resettlement																
Limitation of access to natural resources																
Loss or restriction of livelihood																
Serious change in lifestyle																
Marginalization of vulnerable groups	X	X	X	X	X				X							
Localization of benefits and damages																
Aggravation of conflict of interests																
Widening of gender inequity																
Working conditions and occupational safety																
Annoyances during construction																
Risk of accident and harm to human health	X	X	X	X	X				X							
Spread of infectious disease, HIV/AIDS																
Offense against children's rights																

Alternatives = 1:PEDSA, 2:PEP Niassa, 3: PEP Nampula, 4:PEP Zambézia, 5:Green revolution strategy, 6:EDR, 7:PASAN, 8:Extension MP, 9:Irrigation strategy, 10:PROMER, 11:Reforestation strategy, 12:Soil erosion control plan, 13:Forest fire control plan

Source: Study Team

The opinions and findings comprised in these documents were for study purposes and are not binding or reflecting the position of the coordinating institutions, nor the implementation of the strategies described therein.



The similarity in the likely adverse impacts between the Draft Master Plan and other alternatives reflects the fact that these plans and programs share the same direction of agricultural development. However, it is difficult to say with certainty to what extent the “alternative” plans, programs and strategies would be really put into implementation under the “Without Master Plan” scenario. Moreover, activities by the private sector are rapidly expanding in the Nacala Corridor which makes it even harder to predict the exact situation in 2030. *In spite of these uncertainties, we may conclude, as a general remark, that the Draft Master Plan does not contain elements that are significantly more worrying than other alternatives, in terms of the impacts on natural and social environments.* Additionally, it should be pointed out that the following concerns still need a clear-cut solution at policy level:

- ✧ Inharmonious grand design of land-use at the national level among Agrarian Policy, Forest and Wildlife Policy (especially on artificial plantations), Bio-fuel Policy and Conservation Policy.
- ✧ Lack of national policy on chemical fertilizers.

#### 4.10.4. Identification of Significant Adverse Impacts Associated with the Draft Master Plan

The exact location, dimension, targets and procedures of the proposed projects are still unknown at the present stage of the study. Therefore, an approximation was attempted in Table 4.10.6 to group them by the significance (judged by foreseen irreversibility and duration) of the likely adverse impacts. Detailed screening and scoping of each project will be done in Interim Report 3, along with proposal of the mitigation measures and the monitoring and evaluation methods. Also, it is important to recognize that some of the proposed projects (for instance, Nos. 3, 23, 24, 30) are designed to work as measures of avoidance or mitigation of the adverse impacts derived from other projects.

**Table 4.10.6 Significance of Likely Adverse Impacts of the Draft Master Plan**

Group	Proposed Project
Alarming	16. Model Villages Project
	25. ProSAVANA Agriculture Special Economic Zone Project
	29. Soybean Cluster Development Project
Notable (mainly natural impact)	9. Irrigation System Rehabilitation Project
	12. Project for Improvement of Access Roads for Agricultural Activities
	19. Project for Renewal of Cashew Trees and Improvement of Inter-cropping System
Notable (mainly social impact)	18. Project for Vegetable Production Model
	23. Project for Land Reserve for Investment and Territorial Planning
	30. Program of Assistance for Elaboration, Dissemination and Enforcement of PDUT (District Land-Use Planning)
Slight	3. Project for Land Registration of the Small and Medium Scale Farmers
	17. Pilot Project for Improvement of Small-Scale Farmers
	20. Tea Industry Revitalization Project
Negligible	26. Project for Rehabilitation of Agriculture Storage Facilities
	Other projects

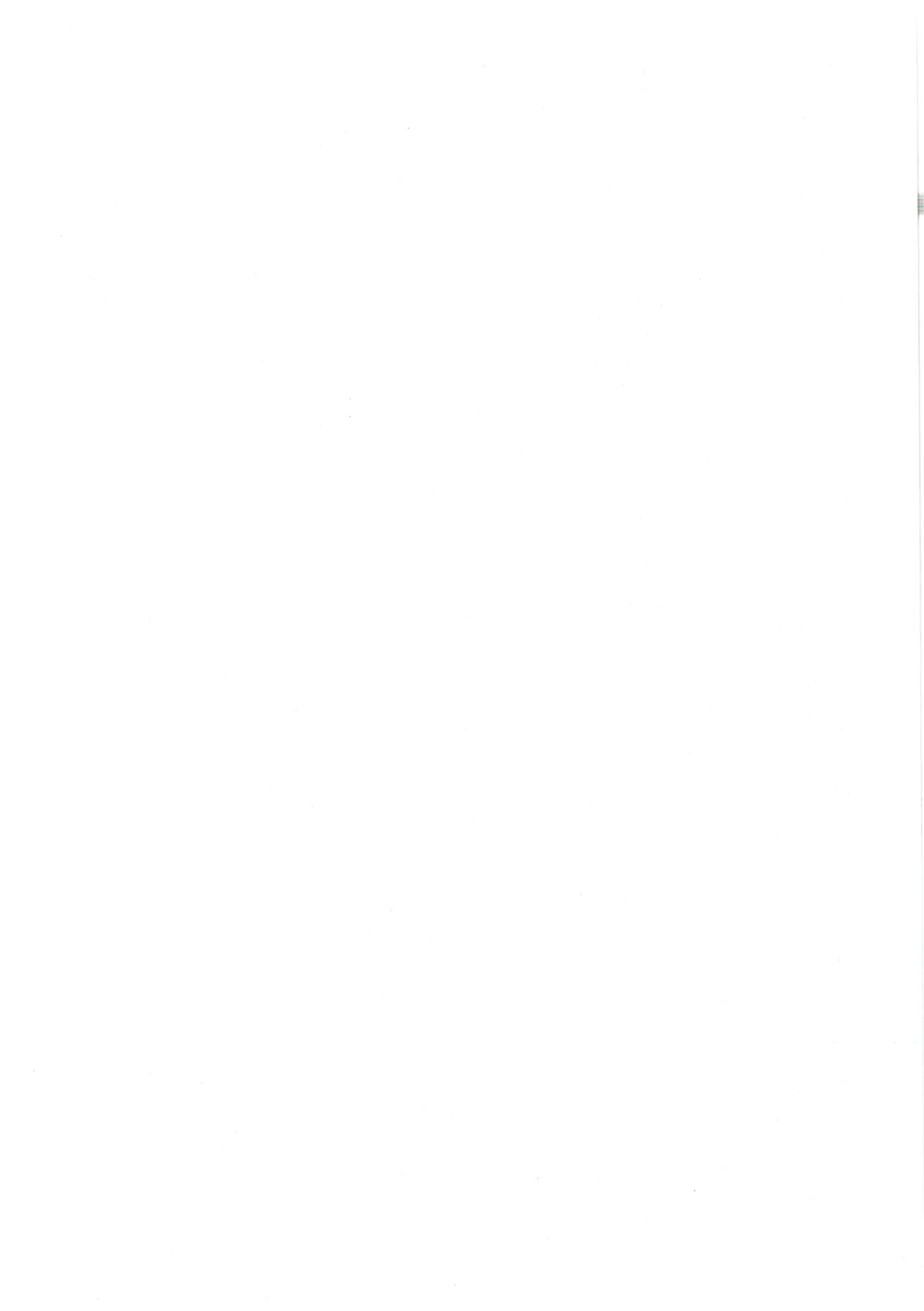
Source: Study Team

- Alarming group is characterized by the possibility of large-scale land acquisition and infrastructure development that imply significant adverse impacts on both natural and social environments including involuntary resettlement.
- Notable group (mainly natural impact) refers to rural infrastructure development by rehabilitation or new construction, such as roads, irrigation and processing factories. Expanded use of agrochemicals also falls under this group.
- Notable group (mainly social impact) and Slight group will require attention to social equity, transparency and good mechanisms for consensus building among different stakeholder, in addition to some slight impacts on the natural environment.

Analyzing the Draft Master Plan as a whole, one of the worrying issues of environmental and social concern is the “existence of 300,000 to 600,000 ha of available land for new farm development.” This argument will need a careful technical review and thorough discussion, since most private investors (corporate farms) will be attracted to these areas, potentially provoking friction with local people. On the contrary, aggravation of the threat to food security due to the Draft Master Plan will be negligible: even soybean, the most rapidly expanding non-traditional cash crop, is allocated only 10% of the foreseen total cultivated land in 2030, reserving enough space for other major crops. Another concern of the Draft Master Plan lies in its vague vision on how to distribute the benefits of growth between individual farmers and corporate farms, as well as among different classes of farmers, in a socially fair and acceptable manner.

The study for “Nacala Corridor Economic Development Strategy (PEDEC)” undertaken by JICA and MPD will also conduct an SEA for larger areas and broader sectors including agriculture, forestry, transport, water resources, electricity, communication, tourism, mining and other industries. It is expected that the present SEA of ProSAVANA-PD could be integrated into that of PEDEC.





## **CHAPTER 5 Further Study**

### **5.1. Detailed Study of Overall Picture (Draft Master Plan)**

(November 2012 to February 2013)

#### **(1) Detailed Study on Each Master Plan Component Project**

Based on the formulated projects under the draft Master Plan, more detailed study shall be continued on the following items:

- 1) determination of proposed project sites based on the zonal agricultural development plan;
- 2) implementation plan of project activities;
- 3) investment costs of project based on the standard prices in Mozambique;
- 4) estimate expectable benefits of projects;
- 5) confirmation/nomination of the financial sources of projects through the hearing with donor agencies;
- 6) Others required for the finalization of Master Plan component projects

#### **(2) Grouping of Proposed Activities for the Smooth Implementation**

The identified activities in each zone will be categorized according to the main actors and beneficiaries. The combinations of proposed activities will be studied to generate a direct effect conducive to achieving the development goal by zone. As the result of this study, the project could be formulated focusing on its implementation. The project should be formulated to ensure increasing the value of agricultural products through a combined activities and establishment of a system to promote cooperation between private investment and small-scale farmers, as aforementioned in the technical approach section.

The formulated projects are also classified into short-term, middle-term and long-term projects according to their target year. For each project, activities, operation plan, budget, implementation structure and expected financing source, etc. will be determined. By gathering the projects, the agricultural development plan by

zone will be prepared. In addition, the development plan by zone will consist of projects crossing over the administration boundary, which may have several relations with Central Ministries in Mozambique, institutions in provincial or district governments, private companies and NGOs, etc. Therefore, establishing a new organization to monitor project implementation shall be considered.

#### **(3) Evaluation of the Project and Formulation of Master Plan**

After these confirmations, the project evaluation of formulated projects in each zone and

cross-zone projects will be conducted and some revisions will be made, if necessary. The projects will be evaluated with DAC 5 evaluation criteria (relevance, effectiveness, impacts, efficiency and sustainability). If the project is economically self-sustaining, an economic analysis will be estimated. Based on the respective evaluation of the projects, the draft Master Plan will be evaluated totally. The necessary revisions will be done on the projects, if required, and implementation plans of the projects (activities, schedule, budget, implementation structure, expected financing source) will be confirmed. Also, the final screenings by the strategic environmental Assessment will be conducted. Finally, the draft of the Master Plan of Agriculture Development in the Nacala Corridor will be formulated.

## 5.2. Output 3: Quick Impact Projects (QIPs) Planning (November 2012 to February 2013)

### 5.2.1. Formulation of Quick Impact Projects for Target Areas

#### (1) Selection of Priority Projects

Based on the proposals in the previous Chapter, 35 potential projects for each component of the Master Plan have been summarized under Table 4.1.1 (Section 4.1) based on the basic approach. Taking into consideration the development strategy for Phase I - Transition to Fixed Cultivation Phase, as explained in Section 4.7.1, as well as the development strategy of the 6 district zones<sup>1</sup> specified under District Group Zoning and set out in Table 3.3.4(Section 3.3.2), potential candidates for the priority projects will be selected for implementation in the early stage of the Master Plan. The proposed 35 projects will also be reviewed using other specific criteria in order to evaluate them in terms of development impacts from various perspectives. Table 5.2.1 illustrates the potential evaluation criteria for selecting the priority projects.

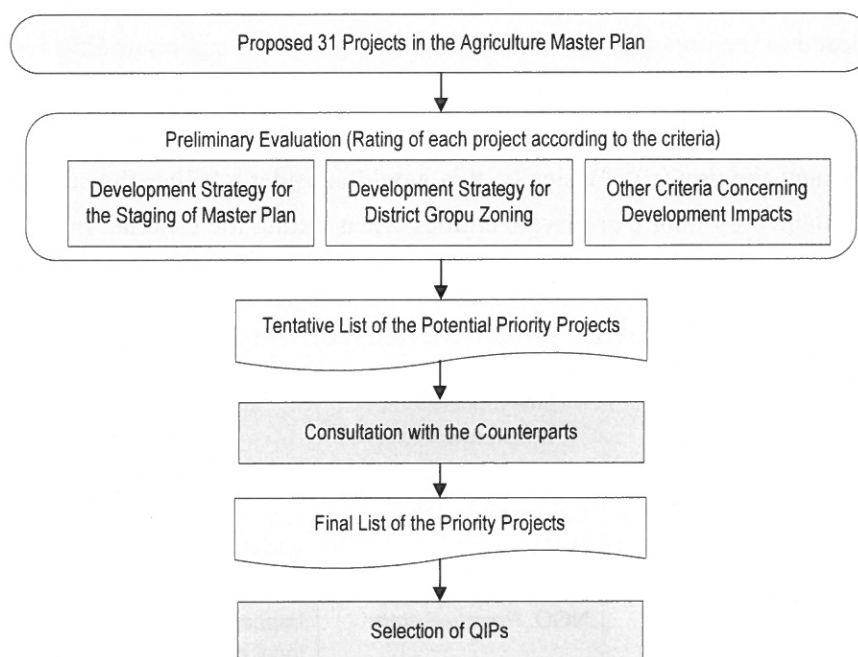
**Table 5.2.1 Tentative Evaluation Criteria for Selection of Priority Projects**

No.	Evaluation Criteria
1	Conformity with the development strategy of Phase I of the Master Plan
2	Conformity with the development strategy of the District Group Zoning
3	Level of impact on local economy in the Nacala Corridor
4	Knock-on effects for small-scale farmers or stimulation of agricultural/agribusiness investments
5	Organizational capacity of concerned institutions for project implementation
6	Needs of potential private sectors/investors identified through stakeholder consultation

Based on a preliminary evaluation using the above criteria, a tentative list of priority projects will be prepared for further discussion with the concerned government offices in order to obtain the approval of the priority projects. Among the priority projects, Quick Impact Projects (QIPs) that could be expected to produce effects/outcomes in the short-term will be

<sup>1</sup> Target areas for implementing 31 projects will be determined through further studies applying SWOT analysis and other evaluation methods.

identified. Figure 5.8.2 illustrates the overall procedure for the selection of the priority projects.



**Figure 5.2.1 Procedures for the Selection of the Priority Projects**

## (2) Criteria for selecting Quick Impact Projects (QIPs)

Even though QIPs will be selected from the list of priority projects, there may be priority projects that would seek to achieve institutional reforms or agricultural infrastructural development, from which a visible direct impact would not be produced in the short-term. Based on the nature of QIP, those projects would not be regarded as QIPs. Taking into consideration these points, the principle criteria for selecting QIPs are set out below:

- Produce visible outcomes in the short-term (during Phase I);
  - ✧ Outcomes may include technological development, improved production, strengthened agricultural value chains, improved input delivery and logistics systems, and expansion of agribusinesses; and
  - ✧ Impacts from the implementing of QIPs should spread widely to other areas in the Nacala Corridor during Stage II and Stage III.
- Contribute to the achievement of the development objectives of Phase I, specifically “promoting the transitioning of the production system from shifting to fixed cultivation”; and
- Should not require preparatory work such as institutional and/or policy reforms or infrastructural development.

### (3) Prioritization of potential QIPs

Identified potential QIPs will be further examined in order to prioritize them according to their investment impacts. Potential QIPs will be summarized, based on the basic approach proposed in the previous section, in order to develop evaluation criteria for the prioritization of QIPs. It is important to note that the measurement criteria for investment impacts will be developed in consideration of the source of financing for the project (i.e. who would implement the project)<sup>2</sup>. Basically, this would consider whether the selected QIPs would be implemented by public or private entities when setting the criteria. Table 5.8.2 proposes the tentative evaluation criteria based on the source of financing for the potential QIP.

**Table 5.2.2 Tentative Evaluation Criteria for QIPs**

Basic Approach	Financial Source (Implementation Body)	Evaluation Criteria
1. Improvement of basic production and infrastructural conditions	Government, Donor, NGO	Number of beneficiaries, knock-on effects, social impacts on local communities
2. Increase in agricultural production	Government, Donor, NGO, Private Sector	Number of beneficiaries, knock-on effects, impacts on local economy, social impacts on local communities
3. Development of agribusiness	Government, Private Sector	Investment risks, cost-benefit, initial investment costs, profitability
4. Sustainable use of natural resources	Government	Social impacts on local communities
5. Capacity development for human resources	Government, Donor, NGO	Number of beneficiaries, knock-on effects, social impacts on local communities

### (4) Identification of additional potential QIPs from on-going and planned private initiatives in the Nacala Corridor

Although potential QIPs will be chosen from the priority projects proposed in the Master Plan, on-going or planned private initiatives for commercial agriculture/ agribusiness investments will be identified as additional QIP candidates. Those projects would be expected to generate impacts on the local economy in the short-term since the foundation for their business operations would have already been established through the ongoing private initiative. Potential private initiatives applicable to QIPs are the agro-processing industry, poultry industry, corporate farms for crop production, and other agribusiness investments operated or planned in the Nacala Corridor.

<sup>2</sup> Private investments would prefer low implementation risks and high profitability, while the investment effect of the project to be carried out by the public sector will need to be evaluated by the number of beneficiaries, synergetic effects, and impacts on local economy and communities.



## **(5) Formulation of Implementation Plan of QIPs**

Implementation plans for the selected QIPs will be formulated upon reviewing activities, budget, implementation structure, expected financial resources for priority project, which are canalized above. The enticement plan will be recommended for the private investment projects based on discussion with the private companies. Operable enticement plans should only be recommended after careful discussion with the related institutions of the Government of Mozambique.

### **5.2.2. Prioritization of Quick Impact Projects**

#### **(1) Business Model Analysis and Evaluation of Priority Projects Including QIPs**

A business model analysis and evaluation will be applied for the QIPs selected. In the analysis and evaluation, profitability of the business model and balance in farming will be calculated. In addition, surrounding conditions of the business as legal framework, access to labor force and access to input material, etc. will be clarified. In total, the effectiveness of the business model will be verified. Examining the characteristics, QIPs can be categorized into 1) agricultural development project aimed at small farmers, 2) middle-large scale investment, and 3) agricultural development investment cooperating with small-scale farmers.

The analysis method and evaluation criteria for the business plan of QIPs will be decided based on the above and results of analyses in the field survey. In addition, the intentions or requests of private companies, which will be obtained through consultation with Japanese private companies or Brazilian companies operating in Mozambique, will be considered. The above analysis and results of evaluation are to be fed back to the QIPs and their implementation plans

#### **(2) Preparation and Discussion of Report on Output 3**

The priority projects and QIPs will be submitted as Interim Report III (English). The report will be translated into Portuguese tentatively for discussion with related institutes in Mozambique. The progress of the project shall be shared among them and the discussion will be reported in the minutes of the meeting.

#### **(3) Environmental Impact Assessment (Environmental and Social Considerations) for the Development Projects**

Environment impact assessment (EIA) shall be carried out two times, first after the Master Plan is prepared when all activities have been clarified and second during preparation of the QIPs when details of the projects including location are being discussed.

**(4) Supporting the Formulation of Resettlement Plan in the Case of the QIPs Require the Resettlement or Land Acquisition**

Large-scale resettlement and change of land-use rights from current land users are not expected during implementation of QIPs. However, if some resettlement or land acquisition will be required, it will be supported by preparation of a simple resettlement plan in accordance with JICA's Guideline for Environmental and Social Considerations (April, 2010) (hereinafter JICA Consideration Guideline).

In the JICA Consideration Guideline, it is stated that a resettlement plan should be submitted by the Government of Mozambique side to JICA, and concurred by JICA. Therefore, if submission of a resettlement plan is required in the Study, it should be prepared and submitted by the Government of Mozambique. However, if this is difficult for the Government of Mozambique due to technical or financial reasons, then it may be necessary for the Japan side to support implementation of the required survey and prepare the resettlement plan.

Presently, the scale of resettlement or land acquisition required for implementation of QIPs cannot be predicted. Therefore, the required workload cannot be estimated. Thus, if the survey is required, it must be immediately discussed with authorities and the work contents and methods including additional subcontracting will be decided.

**(5) Supporting the Third Stakeholder Meeting (expected to be held in March 2013)**

The third stakeholder meeting will be organized by the MINAG supported by the Study Team. The QIPs and their implementation plans will be explained in the meeting. Any opinions on the plans by the attendees will be gathered. The presentation might be conducted by the Mozambique Counterpart as part of OJT for technical transfer with support of the Study Team. The attendance and location of the meeting are expected to be same as the 2nd meeting, but details will be discussed with JICA and finalized with the Ministry of Agriculture.

**(6) Proposal for Capacity Building Plan of Mozambican Authorities to Implement the QIPs by Themselves**

The recommendation for strengthening of project implementation is issued through review and analysis of challenges in implementation structure in Mozambique, which are identified during the preparation of QIPs.

In this recommendation for strengthening of the implementation structure, in addition to the recommendations found during preparation of the Master Plan, items newly recognized through examination of QIPs will also be incorporated. Moreover, it is recommended that the Mozambique Government ensure that the agricultural investment is carried out in accordance with the RAI.

### **5.3. Output 4: Preparation of Investment Data Book for Agricultural Sector of Nacala Corridor Area and Holding Investment Seminars**

(March to June 2013)

#### **5.3.1. Elaboration and Presentation of Data Book to Private Investors**

##### **(1) Preparation of Investment Data Book for Agriculture Sector of Nacala Corridor Area**

The Data Book includes not only information related to the QIPs but also all required information for investment. It will be published in Portuguese, English and Japanese. The preparation of the Data Book shall be work together with CPI and the counterpart of the MINAG.

The Data Book will contain the whole picture of the Master Plan on agriculture development in the Nacala Corridor, QIPs and required process for agricultural investment in accordance to the laws of Mozambique. In addition, the “Agricultural Investment Blue Print in Beira Corridor,” which has been published to promote investment in the Beira Corridor, will be consulted upon issuing of the Data Book in this Study. The contents Data Book will be decided after discussions with CPI, counterparts and concerned institutes of Mozambique.

#### **5.3.2. Holding Seminars and Workshops to Stakeholders**

##### **(1) Investment Seminars and Presentation of Master Plan**

An Investment Seminar shall be held with private companies. In the seminar, the Master Plan and the investment Data Book for agricultural development in the Nacala Corridor will be explained, and the Investment Data Book shall be distributed. The seminar will be held on 1 day in Mozambique and Japan respectively. The seminar in Mozambique will be held at the same time as the explanation of Draft Final Report. On the other hand, the seminar in Japan will be held after the explanation of the Draft Final Report is completed during waiting for the comments on the Draft Final Report from MINAG. The number of attendees is expected to be about 50 people in both seminars. At present, it is expected that a few administration officials in Mozambique will be invited to the seminar in Japan.

##### **(2) Finalization of Agricultural Development Master Plan in Nacala Corridor Area**

The Master Plan is finalized by feedback of newly found items through examination of priority agricultural development plans and QIPs. In particular, in order to maintain consistency between the Master Plan and QIPs, details of QIPs will be reflected in the Master Plan such as detailed activities plan, implementation schedule, result of business

model analysis, recommendation for strengthening the implementation structure, etc., which will be examined during the preparation of implementation plans for selected QIPs.

### **(3) Preparation and Discussion of Draft Final Report**

All the results of the Study, from the beginning of the Study to finalization of the Master Plan, are described in the Draft Final Report. (English and Portuguese tentatively) The report will be explained in detail with related institutes in Mozambique, other donors, the private sector and NGOs. The comments stated in the explanation meeting will be recorded in the minutes of meetings and agreed on by the MINAG. Moreover, it is noted in the minutes that additional comments should be submitted in written form by the required date.

## **5.4. Final Report** (August 2013)

The comments on the Draft Final Report of the MINAG, JICA, ABC and output of investment seminars will be reflected in the Final Report. The Final Report will be submitted through official channel of JICA