Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique

SUPPORT AGRICULTURE DEVELOPMENT MASTER PLAN IN THE NACALA CORRIDOR IN MOZAMBIQUE

(PROSAVANA-PD)

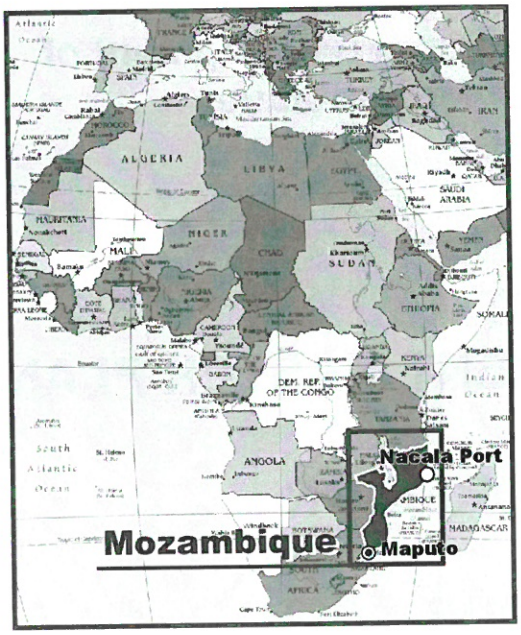
INTERIM REPORT (1)

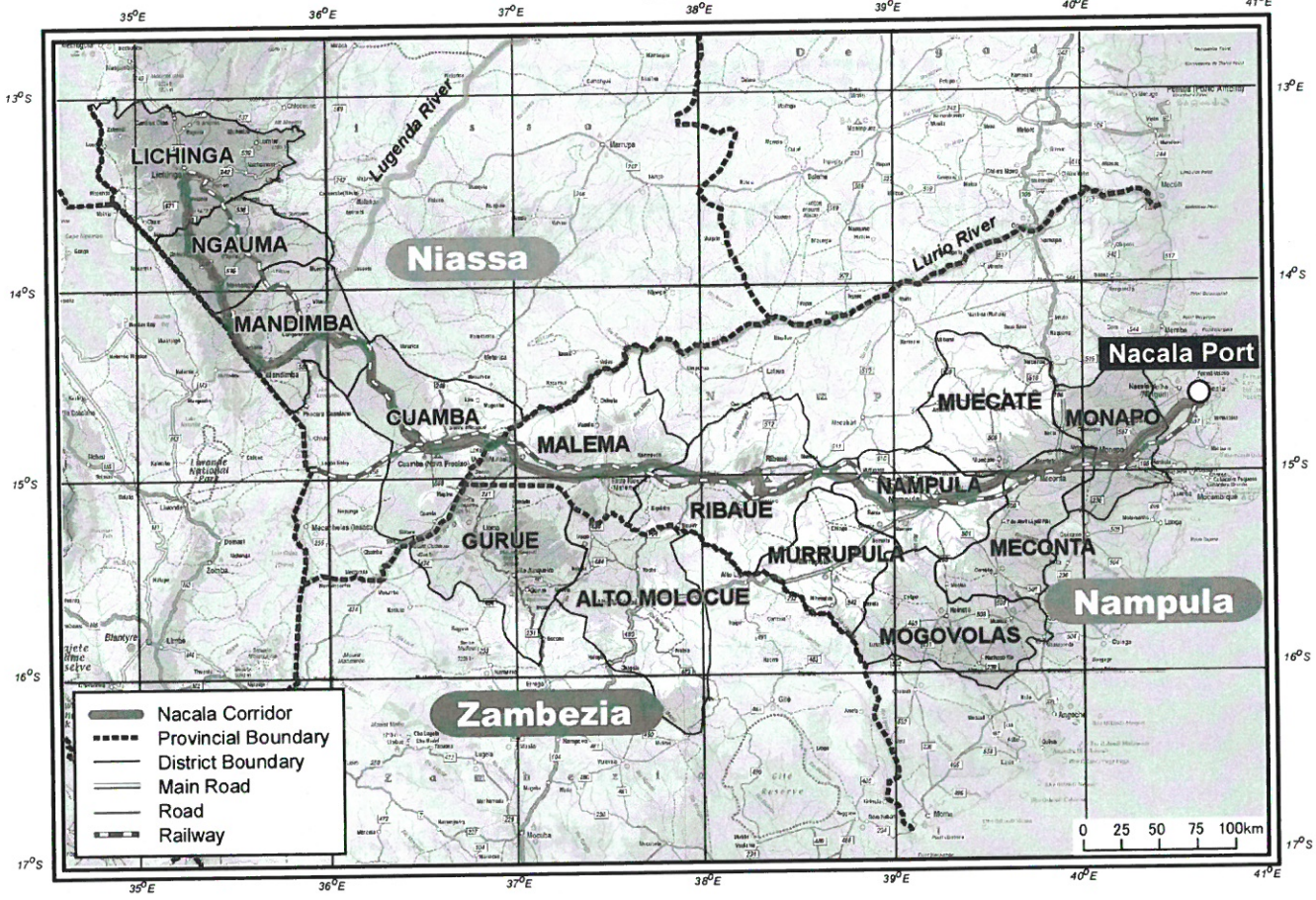
Data Collection and Analysis of Agriculture in Nacala Corridor

August 2012

For Mozambique: MINAG, DPAs

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





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Abbreviation

	English / Inglês	Portuguese / Português
ABC	Brazilian Cooperation Agency	Agência Brasileira de Cooperação
AIDS	Acquired Immune Deficiency Syndrome	Sindrome de Imuno Deficiência Adquirida
AIFM	Integrated Assessment of Forest in Mozambique	Avaliação Integrada das Florestas de Moçambique
ANE	National Agency of Roads	Administralção Nacional de Estradas
ARA	Basin Water Management Agency	Administração Regional de Águas
AU	African Union	União Africana
BAD	African Bank of Development	Banco Africano de Desenvolvimento
CAMPO	The company of Agricultural Promotion	Companhia de Promoção Agricola
CPAC	Cerrado Agricultural Research Center	Centro de Pesquisa Agropecuária dos Cerrados (EMBRAPA Cerrados)
CENACARTA	National Center of Cartography and Remote Sensing	Centro Nacional de Cartografia e Teledetecção
CEPAGRI	Center for the Promotion of Agriculture	Centro de Promoção da Agricultura
C/P	Counterpart	Contraparte
CPI	Investment Promotion Centre	Centro de Promoção de Investimentos
CSR	Company's Social Responsibility	Responsabilidade Social da Empresa
DAF	Directorate of Administration and Finance	Direcção de Administração e Finanças
DE	Economics Directorate	Direcção de Economia
DNA	National Directorate of Water	Direcção Nacional de Águas
DNEA	National Directorate of Agrarian Extension	Direcção Nacional de Extensão Agrária
DNTF	National Directorate of Land and Forestry	Direcção Nacional de Terras e Florestas
DPA	Provincial Directorate of Agriculture	Direcção Provincial da Agricultura
DPCA	Provincial Directorate for the Co-ordination of Enviromental Action	Direcção Provincial para Coordenação da Acção Ambiental
DPEC	Provincial Directorate of Education and Culture	Direcção Provincial de Educação e Cultura
DUAT	Land Use Rights	Direto de Uso e Aproveitamento da Terra
EIA	Environment Impact Assessment	Estudo de Impacto Ambiental
EMBRAPA	Brazilian Agricultural Research Corporation	Empresa Brasileira de Pesquisa Agropecuária
EPDA	Environmental Pre-viability Report and Scope Definition	Estudo de Pré-Viabilidade Ambiental e Definição do Âmbito
FAO	Food and Agriculture Organization	Organização para Agricultura e Alimento
FDD	Fund of District Development	Fundo de Desenvolvimento Distrital
FGV	Getulio Vargas Foundation	Fundacao Getulio Vargas
F/S	Feasibility Study	Estudo de Viabilidade
GAP	Good Agricultural Practice	Boas Práticas Agrícolas
GAPI	Office to Support Small Scale Industries	Gabinete de Consultoria e Apoio à Pequena Indústria
GDP	Gross Domestic Product	Produto Interno Bruto
GIS	Geographic Information System	Sistema de Informação Geográfica
GOM	Government of Mozambique	Governo de Moçambique
ICM	Cereals Insitute of Mozambique	Instituto de Cereais de Moçambique
IDA	International Development Association	Associação Internacional para o Desenvolvimento
IFAD	International Fund for Agricultural Development	Fundo Internacional para o Desenvolvimento Agrícola
IAM	Cotton Institute of Mozambique	Instituto do Algodão de Moçambique
IIAM	Agriculture Research Institute of Mozambique	Instituto de Investigação Agrária de Moçambique
IIED	International Institute for Environment and Development	Institute Internacional para o Meio Ambiente e Desenvolvimento
INAM	National Institute of Meteorology of Mozambique	Instituto National de Meteorologia de Moçqmbique
INCAJU	Institute of Promotion of Caju	Instituto de Fomento do Caju
INE	National Statistic Institute	Instituto National de Estatistica
INIA	National Institute of Agriculture Research	Instituto Nacional de Investigação Agronómica
ISRIC	International Soil Reference and Information Centre	Referência Internacional de Solo e Centro de Informação

IUCN	International Union for Conservation of Nature	União Internacional para a Conservação da Natureza
JCC	Joint Coordinating Committee	Comitê de Coordenação Conjunta
JICA	Japan International Cooperation Agency	Agência de Cooperação Internacional do Japao
JIRCAS	Japan International Research Centre for Agricultural Sciences	Centro de Pesquisa Internacional do Japão para as Ciências Agrárias
MAE	Ministry of the State Administration	Ministério da Administração Estatal
MEC	Ministry of Education and Culture	Ministério da Educação e Cultura
MF	Ministry of Finance	Ministério das Finanças
MICOA	Ministry for Coordination of Environment Action	Ministério para Coordenação da Acção Ambiental
MINAG	Ministry of Agriculture	Ministério da Agricultura
MITUR	Ministry of Tourism	Ministério de Turismo
MOPH	Ministry of Public Works and Housing	Ministério das Obras Públicas e Habitação
NGO (ONG)	Non Government Organisation	Organização Não Governamental
PAPA	Action Plan for Food Production	Plano de Acão para a Producão de Alimentos
PARPA	The Action Program for Reduction of Absolute Poverty	Programa de Ação para Redução de Pobreza Absoluta
PCM	Project Cycle Management	Gestão de Ciclo de Projeto
PD	Master Plan	Plano Director
PEDSA	The Strategic Plan for the Agricultural Sector Development	Plano Estratégico para o Desenvolvimento do Sector Agrário
PROAGRI	National Program for the Agrarian Development	Programa Nacional de Desenvolvimento Agrário
PRONEA	National Program for Agrarian Extension	Programa Nacional de Extensão Agrária
ProSAVANA-JBM	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
QIP	Quick Impact Project	Projetos de Rápido Impacto
RAI	Responsible Agricultural Investment	Investimento Agrícola Responsável
RAP	Resettlement Action Plan	Plano de Ação de Reassentamento
RAS	Simplified Environment Report	Relatório Ambiental Simplificado
R/D	Record of Discussion	Registro da Discussão
SADC	Southern African Development Community	Comunidade de Desenvolvimento da África Austra
SDAE	District Services of Economic Activities	Serviços Distritais de Actividades Económicas
SEACAM	Secretariat for Eastern Africa Coastal Area Management	Agência de Gestão Costeira e Marina da África Oriental
SER	Simplified Environmental Report	Estudo Ambiental Simplificado
SOTER	Soil and Terrain Database	Banco de Dados de Terras e Solo
TAC	Technical Assessment Commission	Comissão Técnica de Avaliação
TICAD	Tokyo International Conference on African Development	Conferência Internacional de Tokyo para o Desenvolvimento Africano
TOR	Term of Reference	Termo de Referência
UN	United Nations	Nações Unidas
UNCTAD	United Nations Conference on Trade and Development	Conferência das Nações Unidas sobre Comércio e Desenvolvimento
UNCDF	United Nations Capital Development Fund	Fundo de Desenvolvimento de Capital das Nações Unidas
UNEP	United Nations Environment Programme	Programa das Nações Unidas para o meio Ambiente
WB-OP	World Bank Operational Policy	Política Operacional do Banco Mundial
WRB	World Reference Base	Base de Referência Mundial

CHAPTER 1 INTRODUCTION

1.1. Background and Objectives of the Study

1.1.1. Background of the Study

The tropical savannah area in northern Mozambique is considered to have large potential for agricultural production due to adequate rainfall and vast arable land. However, in this area, many agricultural lands are not yet developed and small-scale farmers apply traditional and extensive agricultural techniques so the productivities of self-consuming crops and commercial crops are low. Even for middle or large-scale farmers, the applied agricultural technologies are limited and their productivity is not very high. Therefore, enhancement of the agricultural areas by introducing proper agricultural techniques and investment will significantly increase productivity and the produced amount.

Based on the background mentioned above, 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, Japanese Government), Brazilian Cooperation Agency (ABC of Brazilian Government) and the Ministry of Agriculture (MINAG of the Mozambican Government) in September 2009 and targeted poverty mitigation among small-scale farmers, food security, and agricultural development in the tropical savannah through the effective application of private investment.

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 Study Area of the second program of "Support of Agriculture Development Master Plan in 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) 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 the 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^2 and the population is 2,562,413 (Population Census 2007).

1.2.2. Recent Development of the Nacala Corridor

The Southern African Development Community (SADC) has adopted a Spatial Development Initiative (SDI) program to provide an impetus to economic integration among member states. The backbone of an SDI is usually a regional development corridor such as the Nacala Development Corridor (NDC) linking Zambia, Malawi and the northern provinces of Mozambique. In February 2003, the Investors' Conference Nacala was held with participants from Mozambique, Malawi and Zambia.

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) is completed and waiting for early implementation
- Construction of Nacala Airport expected to be completed in 2013

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) 1-2 Review of socioeconomic census, existing overall economic development plans and agricultural development plans for Nacala Corridor • Supporting the stakeholder meeting 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 1-7 Survey on current situation of land use in Nacala Corridor	Middle of August 2012 Interim Report (1)
【Output 2】 Drawing of an Overall Picture	2-1 Drawing an overall plan (blueprint) of agricultural development in Nacala Corridor • Supporting the 2nd stakeholder meeting	End of November 2012
【Output 3】 Quick Impact Projects (QIPs) planning	3-1 Characterization of selected areas which have agricultural development potential based on basic survey 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	Middle of February 2013
【Output 4】 Engagement stimulation of stakeholders focusing on investment promotion	• Environmental impact assessment for the development projects. Supporting the formulation of resettlement plan if required for QIPs • Supporting the 3rd stakeholder meeting 4-1 Elaboration and presentation of Data Book to private investors 4-2 Holding seminars and workshops for stakeholders	Middle of June 2013
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	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 Japan (JICA), Brazil (FGV), and Mozambican counterparts of the Ministry of Agriculture (MINAG), Provincial Directorate of Agriculture of Nampula, Niassa and Zambezia

CHAPTER 2 AGRICULTURE AND AGRICULTURAL DEVELOPMENT IN MOZAMBIQUE

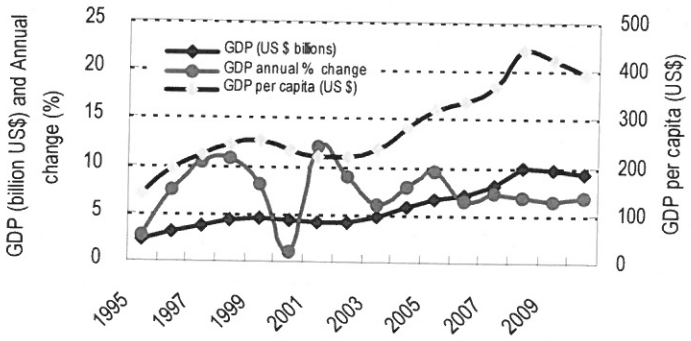
2.1. Mozambique in Brief

2.1.1. Natural Conditions

Mozambique is located in southeastern Africa, facing the Indian Ocean, with 799,380 km^2 of total territorial area, 786,380 km^2 of which is land area. The topography consists of coastal lowlands, uplands in the center, high plateaus in the northwest and mountains in the west. Major rivers such as the Rovuma, Zambezi, Save and Limpopo flow into the Indian Ocean. The climate is mostly tropical to subtropical with a rainy season extending from October to April. Annual rainfall varies from below 400 mm to over 2,000 mm, and the mean annual temperature is in the range of below 18ºC to over 26ºC. Mozambique's land cover includes 51% forest and 19% other woody cover. The most common vegetation type is savanna woodland called 'miombo' and 'mopane.' Protected areas occupy 19% of the national territory. The number of flora and fauna species reported is 5,500 (of which 4,800 are higher plants) and 4,271 (insects, birds, mammals, reptiles and amphibians), respectively. Mozambique is endowed with mineral resources such as coal, titanium, natural gas, tantalum and graphite. Soils of relatively low fertility such as arenosols and lixisols are widely distributed in the country, followed by acrisols, ferralsols, fluvisols and luvisols. As natural phenomena, and partly due to climate change, Mozambique is prone to cyclones, floods and droughts.

2.1.2. Social and Economic Conditions

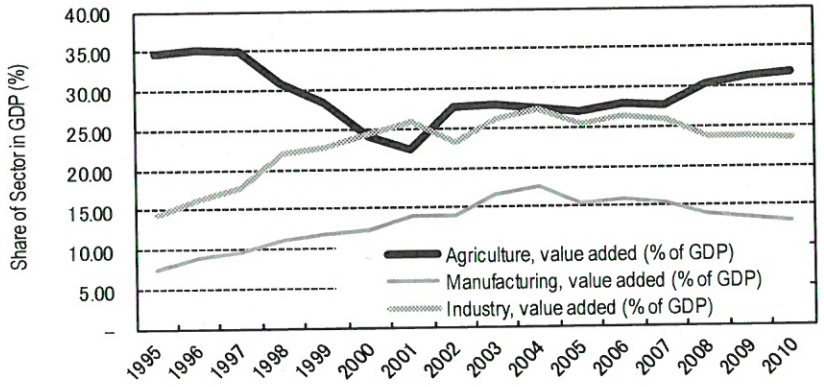
Mozambique started its full-fledged democratization process in 1995 following the first presidential election held in 1994 after the end of the civil war. Starting in 1995, its real gross domestic product (GDP) growth rate continued to post a rate higher than 8% until the mid-2000s, and during the past five years (2006 through 2010), it maintained a high growth rate of 6.7% per annum. Also the GDP per capita increased to 444 US$ in 2008 fron



Source: World Bank Database

Figure 2.1.1 Growing GDP after 1995

Of the GDP, share of the agriculture sector is the highest at more than 30%, followed by the industry and manufacturing sectors as shown Figure 2.1.2..



Source: World Bank Database

Figure 2.1.2 Change of GDP Share by Sub-Sector

The population of 15.9 million in 1995 increased to 23.4 million in 2010 (average annual growth at 2.6%). The share of the rural population decreased from 74.8% in 1995 to 62.4% in 2010 however, the average annual population growth of rural areas increased by 1.4% in same period. The urban population increased 5.2% annually.

Major social indicators are shown in Table 2.1.1.

Table 2.1.1 Social Indicators

Literacy rate (%)	50.4
Life expectancy at birth (years)	52.1
Birth rate (per 1000)	41.6
Death rate (per 1000)	13.7
Infant mortality rate (per 1000)	88.0

Source: INE Statistic Yearbook 2010

2.1.3. Law and Regulation System

Issues that affect the country's agrarian development, such as water, energy, forestry and wildlife, oil, mining, archaeological heritage, and tourism zones, are covered by specific laws. There are also legal instruments to implement necessary actions for development, establishing needed structures and definitions, such as functions and competencies of the Ministry of Agriculture and the organic statute of provincial and district governments.

The legal framework on the access and use of land is **Law 19/97** of October 1997, which reviews the first Land Law issued after the country's independence, Law 6/79 of July 3rd, and is based on the National Land Policy and Agrarian Policy, both adopted in 1995. The regulation of Land Law 19/97 occurred in 1998 and necessary amendments have been made since then. The last one occurred in June 15th, through the Ministerial Diploma no. 158/2011, which presents rules regarding local communities' public consultation in obtaining a Land Use Right title (DUAT).

The following table presents the legal framework that guides land use in Mozambique.

Table 2.1.2 Legal Framework on Land Use

Main Legal Instruments	Approved by
Land Law 1. Law no. 19/97 of October 1 (Land Law)	Assembly of the Republic and Presidency of the Republic
Policies under the Land Law 2. Resolution no. 10/9 of October 17 (Approves the National Land Policy) 3. Resolution no. 11/95 of October 31 (Approves Agrarian Policy) 4. Resolution no. 4/2010 of April 13 (Approves the Government Five Year Plan for 2010 - 2014)	Council of Ministers and Ministry of Agriculture - MINAG
First Legislation on Lands - Post-Independence 5. Law no. 6/79 of July 3rd (1st Law of Land) 6. Decree no. 16/87 of July 15 (Regulation of the first Land Law)	Popular Assembly and Presidency of the Republic
Complementary Legislation 7. Decree no. 66/98 of December 8 (Approves the Regulation of Land Law) 8. Decree no. 1/2003 of February 18 (Changes Articles 20º and 30º of the Regulation of Land Law) 9. Decree no. 60/2006 of December 26 (Regulates the regime in areas of cities and villages) 10. Decree no. 5/2007 of October 16 (Changes Article 35º of the Regulation of Land Law) 11. Decree no. 43/2010 of October 29 (Changes no. 2 of Article 27 of the Regulation of Land Law) 12. Ministerial Diploma no. 29 - A/2000 of March 17 (Technical Annex to the Regulation of Land Law)	Presidency of the Republic and Council of Ministers
Competent Governing Institutions 13. Presidential Decree no. 24/2005 of April 27 (Define the roles and competencies of the Ministry of Agriculture) 14. Resolution.no. 17/2009 of July 8 (Publishes the Organic Statute of the Ministry of Agriculture) 15. Law no. 2/97 of February 18 (Approves the legal framework for the implementation of Government Agencies) 16. Law no. 8/2003 of May 19 (Establishes the principles and rules of organization of local state institutions at the levels of province, district, administrative post and locality) 17. Decree no. 11/2005 of June 10 (Approves the Regulation of the Law on Local State Institutions) 18. Decree no. 6/2006 of 12 April (Approves the Structure and the Organic Statute of the District Government)	Presidency of the Republic and Council of Ministers
Community Authorities 19. Decree no. 15/2000 of June 20 (Approves the forms of articulation between local state authorities and community authorities) 20. Ministerial Diploma no. 107 - A/2000 of August 25 (Approves the Regulation of Decree no. 15/2000) 21. Ministerial Diploma no. 80/2004 of May 14 (Approves the Regulation of Articulation of Local Authorities and Agencies with Community Authorities)	Council of Ministers and Ministry of State Administration - MAE
Territorial Planning 22. Law no. 19/2007 of June 18 (Territorial Planning Law) 23. Decree no. 23/2008 of July 1 (Approves the Regulation of the Territorial Planning Law) 24. Ministerial Diploma no. 181/2010 of November 3 (Approves the Guidelines on the Expropriation Process for the purpose of Territorial Planning	Council of Ministers, Ministry for Coordination of Environmental Action - MICOA and Ministry of Finance and Justice
Public Participation 25. Decree no. 42/2010 of October 22 (Creates the National Land Forum) 26. Joint Order of the Ministry of State Administration and Planning and Finance of October 13 (Approves the Guidelines for Community Participation and	Council of Ministers, Ministry of Agriculture - MINAG, Ministry of State Administration – MAE and

Consultation on the District Planning) 27. Ministerial Diploma no. 158/2011 of June 15 (Rules for consults with local communities on the issuance of titles of land use rights)	Ministry of Finance - MF
Taxes 28. Ministerial Diploma no. 76/99 of June 16 (Regarding taxes) 29. Decree no. 77/99 of October 15 (Relating to taxes) 30. Ministerial Order no. 144/2010 of August 24 (Updates the value of taxes approved by Decree no. 77/99, June 16)	Ministry of Agriculture - MINAG, and Ministry of Finance - MF.
Co-participation in the Forest and Wildlife Taxes 31. Ministerial Diploma no. 93/2005 of May 4 (Approves the mechanisms of channeling and use of twenty per cent of forest and wildlife taxes) 32. Ministerial Diploma no. 66/2010 of March 31 (Creates mechanisms of channeling the revenue collected in the National Parks of the Tourism Sector) 33. Ministerial Diploma no. 63/2003 of June 18 (Regarding revenues in areas under the jurisdiction of Tchuma Tchato Program, including the percentage to be allocated to local communities)	Ministry of Agriculture – MINAG, Ministry of Tourism, Ministry of Finance and Justice.
Investments 34. Law no. 3/93 of July 24 (Investment Law) 35. Decree no. 14/93 of July 21 (Approves the Regulation of the Investment Law) 36. Decree no. 43/2009 of August 21 (Approves the adjustment Regulation of the Investment Law) 37. Resolution no. 70/2008 of December 30 (Defines additional criteria to guide the process of evaluating investments, when the implementation requires large areas of land)	Assembly of the Republic, Presidency of the Republic and Council of Ministers
Tourism 38. Law no. 4/2004, of June 17 (Law of Tourism). 39. Decree no 88/2009, of December 31 (Approves the Regulation of Ecotourism).	Assembly of the Republic, Presidency of the Republic and Council of Ministers
Protection Zones 40. Law no. 16/91, of August 3 (Law of Waters) 41. Law no. 21/97, of October 1 (Law of Electric Power) 42. Law no. 10/99, of July 7 (Law of Forestry and Wildlife) 43. Law no. 3/2001, of February 21 (Law of Petroleum) 44. Law no. 14/2002, of June 6 (Law of Mines) 45. Decree no. 27/94, of July 20 (Approves the Regulation for the Protection of Archaeological Heritage) 46. Decree no. 77/2009, of December 15 (Approves the Regulation of Tourism Interest Zones).	Assembly of the Republic, Presidency of the Republic and Council of Ministers

Source: Collection of Land Laws - 4th Edition – 2011 - Carlos Manuel Serra - Center for Legal and Judicial Training - Ministry of Justice

2.1.4. Socio-economic Development Policy of the Government

After the acceptance of the Structural Adjustment of IMF, national economic and social development under the market economization progressed. But 60% of the populations is under the poverty line (1.25 US$/day) and the GNI (gross national income) per capita remains at 440 US$. The Government of Mozambique set poverty reduction as the first priority through promoting the various economic and social programs. The "Action Plan for Poverty Reduction (PARP)(2011 to 2014)" was approved by the government, and in order to achieve "poverty reduction and improvement of labor forces through the integrated economic development." the poverty ratio is targeted to be reduced to 42% by 2014.

Economic and social development policies of the Government of Mozambique are compiled as the National Development Plan (Programa de Governo or Government

Five-Year Plan) as the top rank, and the Action Program for Reduction of Absolute Poverty (Programa de Ação para Redução de Pobreza Absoluta: PARPA) and sectorial development plans continue under this plan.

2.1.5. Decentralization of Government Administration

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

The Action Plan for the Reduction of Absolute Poverty II (PARAPA II) has been promoting decentralization by focusing on district-based development. One of the three pillars of PARAPA II is the governance pillar, in which public sector reform on decentralization and district-based development is to be promoted. Districts are key units as district development plans are formulated. It is expected that districts will become the centers of planning and implementation. However, the provincial directorates of sector ministries are currently in control of funds allocated from the central ministries.

In order to mitigate this situation, in 2006, the government launched a scheme of directly providing districts with annual discretionary development funds (District Development Fund - FDD). This scheme is called "7 million" because the amount of fund made available to each district is about 7 million MT. The money is lent to individuals or groups with viable projects that will create jobs and boost food production. The borrowers are required to repay the loan so that FDD can become a revolving fund, lending out money to new applicants without the need for replenishment over and over again from the state budget. But in reality the majority of people across the country who have received money from the fund have yet to repay any of it.

2.2. Agricultural Sector in National Economy and Development Direction

2.2.1. Trend of Agricultural Production and its Socioeconomic Contribution

Agriculture is the largest economic sector in Mozambique, generating 29.4% of the GDP in 2009 (INE), while accounting for about one quarter in the mid 2000s. It is estimated that the sector absorbs about 80% of the total labor force.

According to the Agriculture Census in 2009-2010 carried out by INE, the number of total farm-households (agriculture & livestock) in Mozambique is 3,827,797, while their total cultivated area is only 5,633,850 ha. The farm-households are predominated by small-scale farmers, and their average cultivated area is only 1.47 ha as shown in Table 2.2.1. The percentage of medium-scale and large-scale farmers are relatively high in Tete, Gaza and Maputo provinces, while the percentage is very limited in the northern provinces, which is the production centre in the country.

Table 2.2.1 Number of Farm-households and their Cultivated Area in Mozambique

	Small	Medium	Large	Total
Farm-households	3,801,259	25,654	884	3,827,797
(%)	(99.3)	(0.7)	(0.0)	(100.0)
Cultivated area (ha)	5,428,571	130,651	74,628	5,633,850
(%)	(96.4)	(2.3)	(1.3)	(100.0)
Average cultivated area (ha/household)	1.43	5.09	84.4	1.47

Source: Agriculture Census in 2009-2010, INE

There are a substantial number of women-headed farm-households, accounting for 27.5% of the total (small and medium-scale) as shown in Table 2.2.2.

Table 2.2.2 Number of Farm-households (Small & Medium) Heads by Sex

	Women	Men	Total
Farm-households	1,051,679	2,775,234	3,826,913*
(%)	(27.5)	(72,5)	(100.0)

Source: Agriculture Census in 2009-2010, INE
Note: * Only small and medium farm-households were counted.

Comparing the cultivated area of farm-households, the women-headed households manage relatively smaller land as shown in Table 2.2.3.

Table 2.2.3 Distribution of Farm-households (Small & Medium) by Farming Sizes

Unit: %

	< 0.5ha	0.5 – < 1.0ha	1.0 - < 5.0ha	5.0 - < 10.0ha	Over 10.0ha	Not specified
Woman-headed	14.59	30.75	51.95	2.28	0.03	0.40
Man-headed	8.77	21.49	62.67	6.65	0.17	0.24
Total	10.37	24.03	59.73	5.45	0.14	0.28

Source: Agriculture Census in 2009-2010, INE

2.2.2. Food Security

(1) General View

Food security conditions in Mozambique have been stable in recent years, even though some areas are affected by dry spells and localized flooding. The poor and urban households, especially in the southern region, a constant food deficit area, are vulnerable. However, the deficit has been complemented by the surplus provinces in the central and northern regions, as well as imported foods including supply through international food aid.

Table 2.2.4 shows FAO food supply (kcal/capita/day) data of the country from 1998 to 2007. It implies that the food supply, even at a minimal level, was stable and has shown a positive trend in recent years. In August 2009, the Technical Secretariat for Food Security and Nutrition (SETSAN) stated that the food security situation in Mozambique showed signs of improvement, as seen by a decrease in the number of people facing famine. According to the SETSAN National Coordinator, this trend is due to the government's investments in agriculture, particularly in food production.

Table 2.2.4 Food Supply (kcal/capita/day) of Mozambique in 1998 to 2007

Food item	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Maize	444.35	499.68	506.97	503.43	486.00	464.85	443.96	428.34	414.70	404.33
Cassava	708.64	685.78	671.71	679.74	694.49	682.11	659.38	678.61	668.28	627.64
Rice	93.04	75.38	90.88	86.71	91.28	113.66	127.46	137.53	172.08	197.84
Wheat	55.19	78.17	93.25	91.78	95.66	121.18	147.09	166.27	178.29	187.98
Sorghum	109.32	105.99	79.63	64.11	60.77	68.35	66.53	61.93	76.54	57.95
Millet	18.57	17.21	13.36	8.23	6.68	8.21	6.82	7.04	7.86	9.17
Pulses	71.01	42.98	44.07	44.97	44.04	46.19	41.77	37.81	55.46	56.10
Peanuts	23.80	24.04	19.70	16.53	15.30	11.32	11.71	12.64	10.10	12.15
Vegetable Oils	170.89	171.78	164.18	159.14	174.97	170.47	191.04	194.12	194.74	190.26
Vegetables	5.52	5.52	3.63	3.56	3.89	3.71	3.57	3.20	3.61	3.51
Fruits	23.19	22.79	17.76	17.89	19.98	20.65	19.78	18.75	17.76	17.35
Meat	89.18	87.41	86.48	81.66	79.21	66.01	70.34	74.98	56.18	62.15
Fish, Seafood	2.79	2.48	3.32	2.32	2.93	3.88	3.53	4.29	4.18	4.08
Others	113.99	159.63	163.63	179.19	175.99	217.57	225.66	229.40	231.03	236.08
Total	**1,929.48**	**1,978.84**	**1,958.57**	**1,939.26**	**1,951.19**	**1,998.16**	**2,018.64**	**2,054.91**	**2,090.81**	**2,066.59**

Source: FAOSTAT

Table 2.2.4 also implies that people are still in need of increased calorie intake rather than considering a balanced diet. At the national level, it is estimated that 34% of the population is still facing chronic hunger (WFP, 2010). It may take some time before the Mozambican people start actual diversification in food consumption.

Table 2.2.5 shows production and trade of major food crops in Mozambique. It indicates that Mozambique has nearly achieved self-sufficiency of major food crops except for wheat and rice. Domestic consumption for both crops has been increasing, despite the decreasing consumption of traditional food crops, i.e. maize, sorghum and millet (see Table 2.2.4). Considering the potential for increased food production

in the country, rice development might be a considerable subject to be addressed to improve national food security.

Table 2.2.5 Production and Trade of Major Food Crops (Ave. 2005 to 07)

(Unit: 1,000 ton)

Food Crop	Production (a)	Import (b)	Export (c)	a+b-c
Maize	1,170.7	148.7	41.3	1,278.0
Cassava	6,066.0	0.0	0.0	6,066.0
Wheat	2.3	486.3	1.0	487.7
Rice (milled equivalent)	59.7	365.0	0.0	424.7
Sorghum	163.3	8.7	1.0	171.0

Source: FAOSTAT

At the meeting of the Council of Ministers in June 2011, it was decided that the Mozambican Cereal Institute (ICM) should take up the role of "buyer of last resort" of all grain produced in Mozambique, which private traders fail to buy. ICM has already started its procurement at the district level.

(2) Supply and Consumption of Major Food Crops

1) Maize

Maize is the most important staple food along with cassava in Mozambique. The production has been almost equal to the domestic food consumption, though it does not fulfill the total domestic demand (consumption + seed + reserve stock). Per capita consumption of maize has been decreasing since 2000 probably due to the increased consumption of wheat and rice. The decrease contributes to stabilization of the total amount of consumption despite the increased population.

2) Cassava

Cassava is a popular food item and a safe crop (low risks cum less inputs) for many farmers in Mozambique. Cassava production has constantly been higher than the total domestic food consumption. The per capita consumption is stable in spite of the decreased consumption of traditional cereals.

3) Wheat

Almost all of the wheat demand is fulfilled by imports since domestic production is minimal in Mozambique. Due to the rapid increase of per capita consumption since the early 2000s, the total domestic consumption is simultaneously increasing.

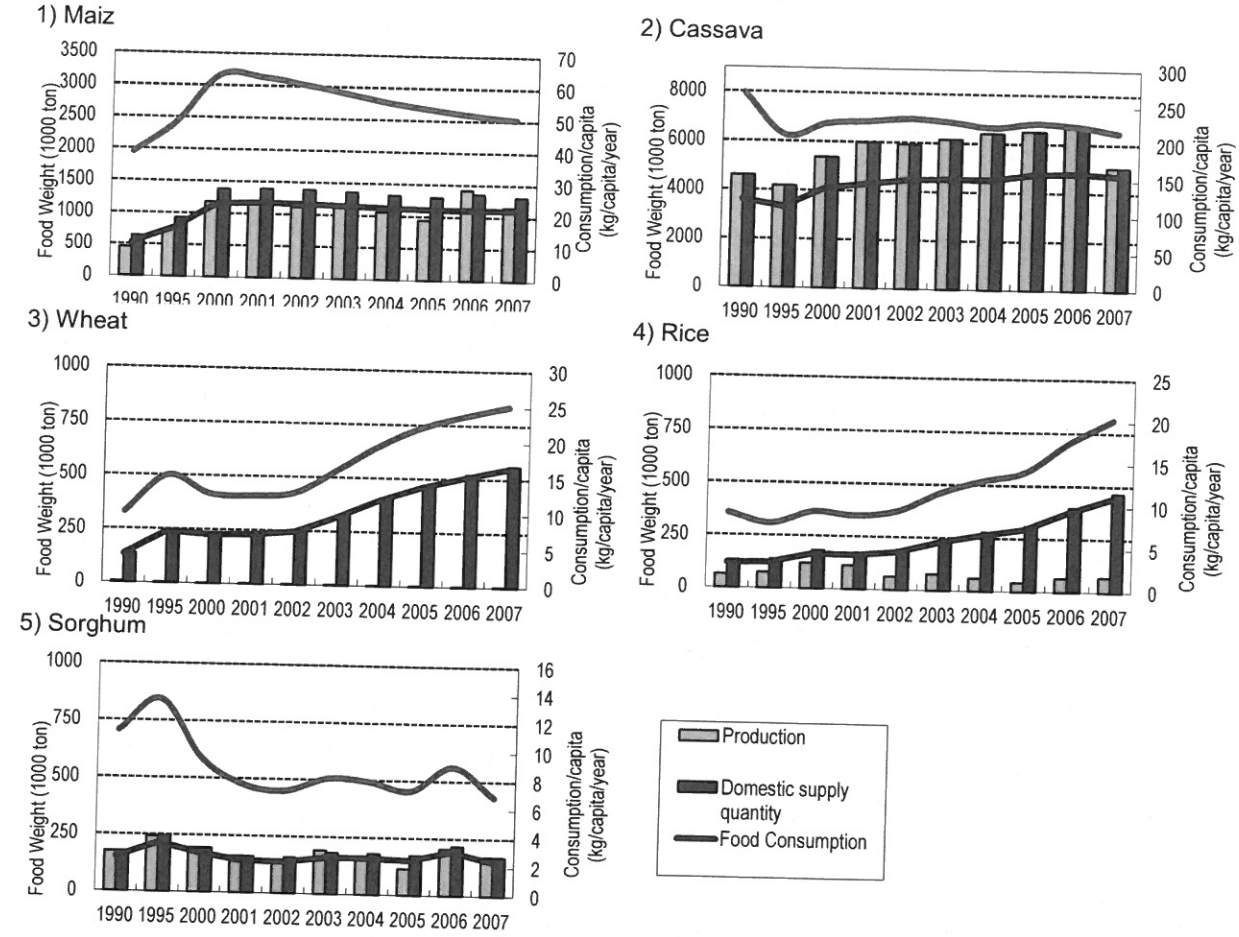
4) Rice

Like wheat, per capita consumption of rice and total consumption are increasing in Mozambique. Though there is some domestic production of rice, the amount

produced does not meet the increased demand. Furthermore, the production has decreased since the early 2000s.

5) Sorghum

Sorghum was a traditionally important food crop after maize and cassava. However, the per capita consumption has been less than wheat and rice in recent years. The production has been almost equal to the total domestic demand. Like maize, the decreased per capita consumption contributes to stabilization of the total amount of consumption despite the increased population.



Source: FAOSTAT

Figure 2.2.1 Supply and Consumption of Food Crops

2.2.3. Strategic Plan of Agriculture Development (PEDSA)

Agro-agriculture production is practiced by about 3.6 million small and medium-sized explorations, of which 99% are smallholders, many of whom have farms smaller than two hectares (CAP, 2010). Small explorations do not use modern technology (they use hoes and small modern inputs such as certified seeds, and fertilizers among

others). As a consequence, the agriculture sector faces challenges to increase agriculture productivity and competitiveness. The Government of Mozambique, in collaboration with partners has been designing and implementing policies, strategies, programs and projects aimed at improving the performance of the agriculture sector. For instance, in the past 10 years, the government has implemented the National Program for Agriculture Development (PROAGRI I and II) that resulted in the creation of tools for planning and management and coordination mechanisms of activities.

The government approved the Strategic Plan for Development of Agriculture Sector (PEDSA, 2011 - 2019) on 3 May 2011. PEDSA emerges as a guiding framework, synergies driver and harmonizing tool to promote agriculture development with a target of achieving an average annual agriculture growth of 7%. PEDSA is consistent with Comprehensive African Agriculture Development Program (CAADP) pillars and principles.

In PEDSA, the agricultural development vision is set as "**an integrated, prosperous, and sustainable agriculture sector**" and the mission is to "**contribute towards the food security and income of agricultural producers in a competitive and sustainable way, guaranteeing social and gender equity.**" The strategic objectives (pillars) are as follows:

- Increase productivity and production, competitiveness and its contribution to food security and nutrition
- Improve guiding framework and services for more market access
- Sustainable use of resources land, water, forests and fauna
- Strengthen institutions and organizations for agriculture development

The expected results of each pillar are shown in Table 2.2.6

PEDSA will be operationalized in five-year and annual plans :

- The Five-Year Program 2010 to 2014 harmonizes sectoral activities to introduce significant improvements in land, water and forest use, with the objective of achieving the Millennium Development Goals. The Food Production Action Plan (PAPA) for 2008 to 2011 forms part of PEDSA during the first five years.
- The Five-Year Program 2015 to 2019 consolidates food security and widens access to domestic, regional and global markets. The operational basis for this period will be established in the light of lessons learned during implementation in the first five years.

Table 2.2.6 Summary of PEDSA

Vision	A prosperous, competitive and sustainable agriculture sector, capable of providing sustainable responses to food security and nutrition challenges and targets agriculture markets globally
Mission	Contribute to food security and income of agriculture producers in a sustainable and competitive manner ensuring social and gender equity

Pillar 1 Increase productivity and production, competitiveness and its contribution to food security and nutrition	**Pillar 2 Improve guiding framework and services for more market access**	**Pillar 3 Sustainable use of resources land, water, forests and fauna**	**Pillar 4 Strengthen institutions and organizations for agriculture development**
1.1 Adopt improved technologies by farmers for increased agricultural productivity and animal production	2.1 Improve rural infrastructure (network of roads, storage facilities, markets)	3.1 Improve usage practices and techniques of natural resources – land, water, forests and fauna	4.1 Strengthening farmers ' organizations
1.2 Increase the capacity of extension services to provide advanced technologies and practices effectively and to draw appropriate programs for food security	2.2 Improve regulatory capacity and compliance with standards and quality assurance of agricultural products and animals	3.2 Improve capacity to formulate policies and programs related to land, water, forests and climate change	4.2 Develop Human Capital
1.3 Strengthen the system of research to develop or adapt and provide technologies and advanced agricultural practices	2.3 Added value to agricultural products, livestock and forestry	3.3 Improve administration and management of the land	4.3 Strengthen coordination of agricultural institutions and food safety
1.4 Improve the availability and management of water for agricultural production	2.4 Improve post-harvest management and strategic food reserve	3.4 Forest resources are used sustainably	
1.5 Improve soil fertility	2.5 Improve the ability of players throughout the value chain (farmers, processors of agricultural products, merchants) to participate in domestic and international markets	3.5 Increase the capacity of rural communities to prevent and control forest fires	
1.6 Improve control of pests and diseases of crops and livestock	2.6 Strengthen the capacity of the private sector to provide agricultural inputs (seeds, fertilizers, agrochemicals, drugs and medicinal products for veterinary use, tools and equipment)	3.6 Improve the ability of rural communities and wildlife professionals for sustainable management of these resources and reduction of human-wildlife conflict	
1.7 Increas the agrarian mechanization and the use of efficient technologies	2.7 Policies consistent with the objectives of the sector	3.7 Improve responsiveness to the effects of climate change	
1.8 Encourage the participation of enterprises in market-oriented crop production in food production	2.8 Strengthen land information system		
	2.9 Strengthen policies to support markets for inputs		

2.2.4. Relevant Institutes and Organization of the Agriculture

Among the institutions concerned with agricultural activities in Mozambique, the Ministry of Agriculture (MINAG) centralizes and coordinates actions at the national level, having the function to formulate, plan and implement its policies and strategies for agricultural development of the country. Among its duties are the administration, and regulation of the use, management, protection and conservation of essential resources to farming activities, such as land, water, forests and native wildlife. MINAG promotes activities to foster the production, agro-industrial processing and marketing of inputs and agricultural products, as well as agricultural research and technical assistance and rural extension. Among other roles and duties, MINAG also highlights the following:

- To ensure the animal and plant sanitary protection
- To implement programs of agricultural research and dissemination of results
- To promote basic infrastructure and services to the activities of economic agents in the agricultural sector
- To register land use right and manage cadastral.

In research and development activities, MINAG has three subordinate institutes, namely:

- IIAM - Mozambican Agricultural Research Institute - IIAM function is to generate knowledge and technological solutions for sustainable development of agribusiness and the food and nutritional security.
- IAM - Mozambican Cotton Institute - The institution aims to promote the activity in cotton, with the function to supervise, guide and regulate the production, marketing and export of the product, as well as cooperate with IIAM for research.
- INCAJU - Cashew Promotion Institute - The institution aims to promote programs that foster the planting and production of cashew and industrial processing.

MINAG has another subordinate institution, the Center for Agricultural Promotion (CEPAGRI), which aims to attract investment in agriculture.

The CEPAGRI acts in a coordinated manner with the Investment Promotion Center - CPI, which is responsible for promotion to attract national and foreign direct investment in all activities.

Concerning the land system, the National Land and Forests Directorate (DNTF) is established for land surveying, registration and demarcation of land as a subordinate to MINAG. The DNTF gathers information and enables government authorities to manage land appropriately.

In the provinces the implementation of strategic policies for agricultural development is the responsibility of the respective Provincial Directorates of Agriculture (DPAs),

which coordinates activities at the District Economic Activities Services (SDAE) at the district level.

Figure 2.2.2 shows the administrative structure of the agricultural activities of the three levels of government in Mozambique:

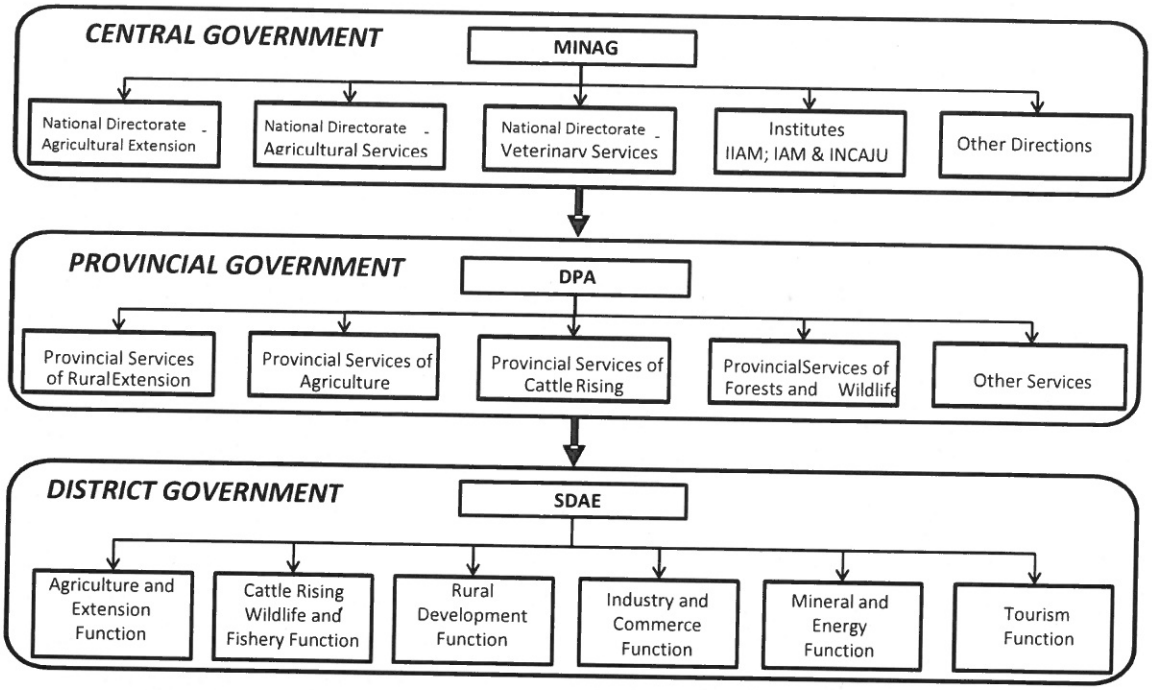


Figure 2.2.2 Administrative Structure of the Agricultural Activities of the Three Stairs of Government in Mozambique

2.3. Agriculture Production

2.3.1. Land Use and Cultivated Area

Out of the total land area of 79.9 million ha (FAOSTAT) in Mozambique, an agricultural land accounts for 15% or 12 million ha as shown in Table 2.3.1, while the cultivated area as calculated by the Agriculture Census in 2009 to 2010 is 5.6 million ha as shown in Table 2.3.2.

Table 2.3.1 Land Use (2005 to 2007) of Mozambique

Land Use	(%)	Calculated Area* (1000ha)
Forest	51	40,768
Other wood cover	19	15,188
Grass lands	12	9,593
Agricultural land	15	11,991
Other	3	2,398
Total	100	79,938

Source: Mozambique Biodiversity and Tropical Forests 118/119 Assessment, USAID, Sep. 2008
Note: *JICA Study Team's calculation based on the percentage

Table 2.3.2 Distribution of Cultivated Area and Farm-households by Districts

Province	Cultivated Area		Farm-households		Average Farming Size (ha)
	(ha)	(%)	(number)	(%)	
Niassa	409,473	7.3	225,151	5.9	1.82
Cabo Delgado	491,151	8.7	339,816	8.9	1.45
Nampula	1,037,748	18.4	829,642	21.7	1.25
Zambezia	1,071,170	19.0	828,801	21.7	1.29
Tete	623,014	11.1	376,150	9.8	1.66
Manica	555,900	9.9	265,486	6.9	2.09
Sofala	473,548	8.4	271,249	7.1	1.75
Inhambane	414,841	7.4	269,310	7.0	1.54
Gaza	364,367	6.5	216,771	5.7	1.60
Maputo	161,352	2.9	150,706	3.9	1.07
Cidade de Maputo	31,286	0.6	54,715	1.4	0.57
Mozambique	**5,633,850**	**100.0**	**3,827,797**	**100.0**	**1.47**

Source: Agriculture Census in 2009-2010, INE

The values shown in Table 2.3.1 may include a certain amount of fallow land for the agricultural land because extensive farming practices (slash and burning cum shifting cultivation) prevail in most of the country. It is assumed that a substantial part of other land use in the table could also be abandoned land for fallowing after cultivation. Though many relevant sources conclude that there is about 36 million ha of arable land in Mozambique, they report various data on farmland area. For example, the PEDSA says that only 10% of the arable land is in use at present, while the PROAGRI II (2004) estimated that about 9 million ha were under cultivation. Farmers actually need several times more fallow land than the present amount of cultivated area to continue extensive farming practices on a sustainable basis. Such farming practices make it difficult to assess the precise amount of farmland area in use, which should include the fallow land under shifting cultivation.

2.3.2. Major Crop Production

(1) Basic Food Crops

Maize, cassava, sorghum and millet are major traditional food crops cultivated by subsistence farmers, while paddy is grown by large-scale farms, and individual farmers. Wheat production is negligible though it is a major food crop.

Pulses and groundnut are also important food crops for the people besides cereals and cassava. Several kinds of pulses, i.e. haricot beans, cowpeas, mung beans and pigeon peas, are grown mainly by subsistence farmers in accordance with their cultivation conditions. The pulses are usually grown mixed with cereals and cassava in the same field.

Comparing cereals, cassava and pulses, the production of vegetables and fruits are limited but the production of vegetables has shown a positive trend in recent years.

Vegetables are usually grown by relatively wealthy farmers or farmers groups supported by the government in areas where water resources for irrigation are available.

The production of major crops has remarkably increased since 2009, perhaps due to government campaigns for increased food production, e.g. PAPA, etc. However, the production increase has mainly been achieved by an increase in planted area, not an increase in productivity (ton/ha).

Table 2.3.3 Basic Food Crops Production in Mozambique (2006 to 2010)

Crops	Element	2006	2007	2008	2009	2010
Maize	Area Harvested (ha)	1,664,000	1,350,000	1,400,000	1,612,000	1,573,000
	Production (ton)	1,417,800	1,152,050	1,284,930	1,932,000	1,878,000
	Yield (ton/ha)	0.85	0.85	0.92	1.20	1.19
Cassava	Area Harvested (ha)	857,000	650,000	525,000	940,000	950,000
	Production (ton)	6,658,710	5,038,620	4,054,590	5,672,370	5,700,000
	Yield (ton/ha)	7.77	7.75	7.72	6.03	6.00
Sorghum	Area Harvested (ha)	406,000	300,000	320,000	617,000	620,000
	Production (ton)	204,986	169,543	187,265	384,000	395,000
	Yield (ton/ha)	0.50	0.57	0.59	0.62	0.64
Paddy	Area Harvested (ha)	105,000	105,000	104,000	182,000	185,000
	Production (ton)	99,173	104,655	101,914	179,000	180,000
	Yield (ton/ha)	0.94	1.00	0.98	0.98	0.97
Millet	Area Harvested (ha)	57,000	58,000	60,000	109,000	110,000
	Production (ton)	22,721	25,213	23,967	49,000	50,000
	Yield (ton/ha)	0.40	0.43	0.40	0.45	0.45
Pulses/beans	Area Harvested (ha)	300,000	320,000	290,000	300,000	315,000
	Production (ton)	195,000	210,000	190,000	195,000	205,000
	Yield (ton/ha)	0.65	0.66	0.66	0.65	0.65
Groundnut, with shell	Area Harvested (ha)	295,000	295,000	295,000	295,000	295,000
	Production (ton)	85,977	102,932	94,454	68,000	70,000
	Yield (ton/ha)	0.29	0.35	0.32	0.23	0.24
Sweet potatoes	Area Harvested (ha)	128,000	120,000	80,000	126,000	130,000
	Production (ton)	929,896	875,216	566,050	900,000	920,000
	Yield (ton/ha)	7.26	7.29	7.08	7.14	7.08
Potatoes	Area Harvested (ha)	6,800	7,500	7,512	7,997	8,000
	Production (ton)	90,000	100,000	104,530	110,000	110,500
	Yield (ton/ha)	13.24	13.33	13.92	13.76	13.81
Vegetables	Area Harvested (ha)	39,662	36,657	42,214	48,737	50,150
	Production (ton)	164,841	180,925	194,969	206,504	215,700
	Yield (ton/ha)	4.16	4.94	4.62	4.24	4.30
Fruits	Area Harvested (ha)	64,069	61,527	62,423	65,670	66,990
	Production (ton)	358,094	354,791	356,624	358,749	368,810
	Yield (ton/ha)	5.59	5.77	5.71	5.46	5.51

Source: FAOSTAT

(2) Cash Crops (Oilseeds & Industrial Crops)

Most cash crops were developed during the colonial period, and cotton, tobacco, cashew nut and sugar are still important export commodities of Mozambique. The crops were grown on plantations before independence. While the government managed the plantations under its socialism policy for a certain period after independence, currently, management of the plantations has been transferred to the private sector. However, the government has maintained a certain share of some companies since privatization.

Many individual farmers have also started the production of cash crops. Cotton and tobacco are grown by out growers of private company that has a monopoly right from the government to contract farmers and buy their harvested crop within its concession area.

Table 2.3.4 Cash Crops Production in Mozambique (2006 to 2010)

Crops	Element	2006	2007	2008	2009	2010
Cotton (lint)	Area Harvested (ha)	390,000	360,000	398,000	365,000	370,000
	Production (ton)	59,000	55,000	62,000	57,500	58,000
	Yield (ton/ha)	0.15	0.15	0.16	0.16	0.16
Sugar cane	Area Harvested (ha)	160,000	160,000	180,000	165,000	215,000
	Production (ton)	2,060,320	2,060,670	2,451,170	2,207,000	2,800,000
	Yield (ton/ha)	12.88	12.88	13.62	13.38	13.02
Castor oil seed	Area Harvested (ha)	135,922	150,000	157,143	160,193	149,100
	Production (ton)	49,627	54,515	52,071	37,487	38,600
	Yield (ton/ha)	0.37	0.36	0.33	0.23	0.26
Coconuts	Area Harvested (ha)	70,000	70,662	73,604	89,758	82,900
	Production (ton)	290,000	306,494	265,000	270,000	277,900
	Yield (ton/ha)	4.14	4.34	3.60	3.01	3.35
Cashew nuts, with shell	Area Harvested (ha)	75,000	90,000	102,000	77,000	77,000
	Production (ton)	62,821	74,395	85,000	64,000	67,200
	Yield (ton/ha)	0.84	0.83	0.83	0.83	0.87
Sesame seed	Area Harvested (ha)	22,500	33,000	45,000	68,000	69,500
	Production (ton)	15,000	22,000	30,000	45,000	46,000
	Yield (ton/ha)	0.67	0.67	0.67	0.66	0.66
Tobacco	Area Harvested (ha)	58,000	70,000	62,000	60,000	59,200
	Production (ton)	59,041	73,000	64,342	63,000	86,000
	Yield (ton/ha)	1.02	1.04	1.04	1.05	1.45
Sunflower seed	Area Harvested (ha)	8,500	14,000	12,000	10,808	12,500
	Production (ton)	4,204	6,252	5,128	6,500	6,700
	Yield (ton/ha)	0.49	0.45	0.43	0.60	0.54

Source: FAOSTAT

(3) Regional Difference

Table 2.3.5 shows major crop production by provinces. It implies that Nampula, Zambezia and Tete are leading provinces in terms of crop production in the country. They are also population-dense provinces, and more than half of the total

farm-households are concentrated on there. Production in provinces in the southern region is sluggish due to inadequate rainfall conditions. The southern region always suffers food deficiency under this situation.

Table 2.3.5 Major Crop Production by Provinces (unit: 1000ton)

Crop	Northern Region			Central Region				Southern Region			Total
	Niassa	Cabo Delgado	Nam-pula	Zam-bezia	Tete	Manica	Safara	Inham-bane	Gaza	Maputo	
Maize	104	86	94	**229**	**212**	**212**	97	29	61	11	1,133
Cassava	88	45	**1,144**	**2,322**	24	171	123	442	156	42	4,557
Rice (milled)	3	12	10	**62**	3	2	11	2	2	0.1	103
Sorghum	8	18	21	14	22	**44**	**36**	3	1	-	169
Millet	0.9	0.2	1.5	3.4	**10.6**	2.4	**3.6**	0.5	1.8	-	25
Haricot beans	**16**	0.1	4	**15**	12	3	1	0.2	3	0.1	55
Cowpea	1	**12**	**20**	6	5	3	2	9	3	1	62
Ground nut	3	11	**50**	12	10	3.3	3	8.3	2	1	101
Sweet potato	20	8	9	**205**	**288**	**178**	74	7	56	15	861
Cotton	1	**24**	11	9	**16**	**17**	**15**	0.02	0.02	0	93
Cashew nuts	-	3.9	**14.8**	**13.4**	-	3.2	4.7	**9.8**	7.2	0.5	57
Sesame seed	0.3	**4**	**6**	1	2	2	**4**	-	0	-	19
Tobacco	**11**	0.3	1	5	**16**	1	0.1	0.1	-	0	36
Sunflower	0.1	0.02	0.01	**2**	0.2	**3**	0.04	0	0	-	6

Source: TIA 2007, MINAG
Note: The total (National) calculation is not correct for some crops

2.4. Supporting System for Agriculture

2.4.1. Agriculture Research

The Agricultural Research Institute of Mozambique (IIAM) is the country's main agricultural research and development (R&D) agency. After peace prevailed in 1992, the Mozambican government has made an effort to revive its agricultural R&D in cooperation with outside resources, such as IARCS, IITA, CIMMYT, ICRISAT, CIP, etc. Since then, Mozambique has made progress mainly in adaptive research that addresses a gap between the best practice at research level and actual practice at on-farm level. However, the R&D system has the following constraints.

1) Shortage of qualified management and scientific staff
2) Low and seasonally unavailable financial resources
3) Deficient research infrastructures
4) Weak research management
5) Inadequate research planning, priority setting and stakeholder participation

The R&D system is also highly dependent on donor funding, which fluctuate from year to year. Donor funding accounted for around 50 to 75% of IIAM's total budget in

2004 to 2008. Coupled with budget shortage, late and irregular disbursement of funds have negatively affected IIAM's performance.

2.4.2. Agricultural Technology Extension

(1) General Outline

The respective SDAE is responsible for agricultural extension service after the decentralization of the extension governance by PRONEA (National Agricultural Extension Program). While every SDAE organizes agricultural extension workers under an Extension Supervisor, the Provincial Extension Service of DPA and the National Directorate of Agricultural Extension of MINAG guide and supervise SDAE at provincial and national level, respectively.

According to the Mid-term Review Report of PRONEA in 2011, there were 2,238 extension workers in 2010. Of this 2,238, there were only 770 government extension workers, while 817 were from NGOs and 651 came from private service providers. The figure implies that the agricultural extension service in the country depends heavily on the private sector including NGOs. In any case, the total number of extension workers is too small to provide required technical services to all of the 3.8 million farm-households in the country.

MINAG's Agricultural Extension Master Plan (2007 to 2016) describes that there are two main pillars for the organization of agricultural extension in Mozambique. The pillars are the National Extension System (SISNE), in which different extension providers from public and private sector have a role, and the Unified Extension System (SUS), in which all agricultural services operate through a single extension officer contracting farmers in a particular area of operation.

(2) PRONEA (National Agricultural Extension Program)

The PRONEA has been implemented as the operationalization program of the Agricultural Extension Master Plan, which is compliant with the PEDSA (2011 to 2020). While PRONEA was originally planned for the years 2008 to 2015, a new five-year implementation plan (2012 to 2016) was made after the mid-term review in 2011. The Mid-term Review Report confirmed that the PRONEA support project focuses on small-scale and emerging farmers in order to enhance their productivity and market access.

PRONEA is organized in three components, each with two sub-components.

<Component 1: Supply-side Development of Agricultural Extension Services>

1) Public Sector Reorientation and Support, contributing to public sector reorganization in the approach of challenges, such as paradigm change for

participatory extension, de-concentration to the district and the use of the value chain approach.

2) Private Sector/NGO Promotion and Support in extension activities: mainly refers to strengthening of the NGO and private sector agricultural extension service providers at district and provincial levels

<Component 2: Demand-side Development for Agricultural Extension Services>

1) Farmer Organization and Empowerment, contributing to the strengthening of the role of farmers organizations in district participatory planning and provision of demand-oriented extension
2) Group, Association and Enterprise Development: contributing to the strengthening of farmers organizations in terms of value chain development and provision of agricultural services

<Component 3: Agricultural Extension Services Provision>

3) Provincial-level Services Provision: contributing towards a better provision of services after capacity development and strengthening of agricultural service provision program
4) District/Local-level Services Provision by both public and private extension service providers

The total budget for the new five year plan is 26.8 million US$ financed by the government, IFAD and EU.

2.4.3. Farmers Organization Support

The association movement in Mozambique started with support of the Law of Associations: Law 8/91; Lei das Associações: Lei 8/91, which provided free association and the forums of incorporation and registration of various forms of association (philanthropic associations which defend interests, unions, political parties, NGOs, sports clubs, etc.). Within this legal framework for association, a large number of farmers' associations were established in central and northern Mozambique, often with support from non-governmental development agencies (NGOs) such as World Vision, CARE and CLUSA. 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. Crops that were suitable for smallholder profit in the region, such as sesame and soybeans were also identified (CLUSA).

Later on, the legislation was improved by government approval of the Decree-Law 2/2006 that simplifies and decentralizes the process of registration of agricultural associations to the district level. Most of the associations were started through the support of this law. In order to encourage more economically-oriented organizations, supported by civil society and approved by the government, the General Law of

Modern Cooperatives (Law 23/2009), which emphasizes organization of people with an economic vision to overcome social issues in different areas not only the agricultural sector or branches of activity (agriculture, credit, health, consumer, construction, services, etc.) based on these three laws.

(1) Decree-Law 2/2006

The farmers' associations include registered and non-registered organizations. Regarding the regulation about incorporated organizations, presidential Decree - Law 2/2006 was prescribed. Registered organizations have advantages for fund-raising, however, application for registration requires various documents and red-tape formalities. This bureaucracy becomes a large obstacle when farmers apply for it. As a result, many farmers' organizations have not been registered.

Registered associations can establish a union with one or more other registered associations. If the union works beyond more than one district, the head of the province is responsible for the supervision. If the union works beyond more than one province, the head of concerned department of MINAG is responsible for the supervision. Following the establishment of a union, the member organizations can modify their constitution.

Farmers' associations are formed to fulfill one or more (multiple) functions of the following five areas: 1) to act as a recipient of agricultural extension services (information, technology, equipment, etc.) from MINAG and others, 2) to strengthen mutual assistance (community development, literacy education, empowerment of women, etc.) in the community, 3) to consolidate collection and shipment to collectively negotiate with traders and/or middle-men, 4) to access financial resources (microcredit), and 5) to operate and maintain the communal property (irrigation facilities, storage facilities, processing facilities, tractors, etc.).

(2) New Cooperative Law (Law 23/2009)

The new Cooperative Law (Law 23/2009) was approved in September 2009, and enacted in March 2010. A number of different organizations and projects (including ILO, CLUSA, Agrifuturo and others) were involved in the elaboration of the new law. Mozambican Association for the Promotion of Modern Cooperatives (AMPCM Associação Moçambicana de Promoção do Cooperativismo Moderno) was formally established in January 2010 to take a leading role in implementing the law through promoting and developing modern cooperatives in Mozambique as a sustainable form of wealth generation. The new law provides a well-defined legal framework for organizing farmers' cooperatives with a clearly defined purpose. At present commercialization of products may 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 in Mozambique.

Cooperatives are autonomous and independent, based on the voluntary association of its members, and under their democratic control. If cooperatives are organized as sales coops, there is ample space for separate farmers' associations which, according to Mozambican legislation, should have non-profit objectives and are not in a legal position to sign commercial contracts. In addition different types of farmers' organizations can be operative in the same localities, without being seen as competitive or mutually exclusive forms of rural organization.

Cooperatives do not, in contrast to associations, need previous authorization from the government be established. A producers' cooperative (a first-tier cooperative) must as a minimum have five members, while there is no upper limit regarding membership. Second-tier cooperatives are constituted with first-tier cooperatives as members, and they must as a minimum have two members. Article 82 of the new Cooperative Law provides for the transformation of existing producers associations into modern cooperatives if they comply with the requirements established in the law.

2.4.4. Agricultural Loan and Credits

In the last 10 years, the volume of lending to agriculture tripled despite the fact that the total lending to the Mozambican economy expanded by 9 times in local currency terms. The volume of credit to the agriculture sector accounted for only 6.5% of the total volume to the national economy in 2010. Lending to agricultural production still focuses on the traditional cash crops, i.e. tobacco, sugar, cotton, cashew, copra and tea.

Most small-scale farmers who dominate the rural economy of Mozambique are totally beyond the reach of any financial operators. As there is no subsidized formal finance system targeting small-scale farmers, commercial banks are the only formal financing channel for them. Though Banco Terra and ProCredit have set a micro-loan scheme appropriate for small-scale farmers, the scheme doesn't have no specific conditions for agricultural loans.

Nearly all of the districts have no formal banking facilities at all. In addition, many farmers have difficulties in accessing loans from commercial banks due to high interest rates commonly exceeding 25% and an inability of provide collateral for loans. Since it is state property, agricultural land cannot be used as collateral. The microfinance sector, complementing the weak commercial bank system, is small and has urban orientation, although a limited number of farmers associations have experiences with NGO in operating a micro financing. This situation makes it difficult for small-scale farmers to fulfill their increasing demands for rural financial services.

Table 2.4.1 shows that only 2.3% of farm-households could access credit at the national level, and there is a big gap between small, medium and large-scale farmers in accessibility to credit, except for Tete province.

Table 2.4.1 % of Farm-households that Accessed Credit

Province	Small	Medium	Large	Total
Niassa	0.7	11.1	-	0.7
Cabo Delgado	1.2	8.9	4.5	1.2
Nampula	1.2	6.3	11.4	1.2
Zambezia	0.4	8.1	13.0	0.4
Tete	13.9	9.9	15.6	13.8
Manica	0.6	6.3	20.0	0.7
Sofala	2.2	6.6	10.3	2.2
Inhambane	1.0	7.4	4.3	1.1
Gaza	2.4	5.3	20.7	2.4
Maputo	0.5	2.2	15.5	0.5
Maputo Cidade	0.9	3.0	24.1	0.9
National	**2.3**	**7.0**	**15.2**	**2.3**

Source: Agriculture Census in 2009-2010, INE

The Agribusiness Indicators, Mozambique (World Bank, April 2012) has determined that the majority of farmers who accessed credit in Tete province might be getting credit from MLTC (a tobacco company). As shown in Table2.4.2, a relatively large number of farmers had access to credit provided from inputs providers, maybe MLTC, in Tete province. The table implies that the government is the 2nd largest credit source after inputs providers, even the largest in some provinces.

Table 2.4.2 Number of Farm-households that Accessed Credit by Credit Sources

Province	Commer-cial Banks	Agri. Dev. Banks*	Credit Coops.	Inputs Providers	Self-help Group	Relatives & Friends	Govt.	Others	Total
Niassa	262	80	14	822	0	46	414	0	1,638
Cabo Delgado	100	244	1,044	0	47	334	1,458	792	4,019
Nampula	752	93	1,163	80	392	3,201	2,508	1,617	9,806
Zambezia	458	131	155	912	349	138	885	487	3,515
Tete	377	10	3,963	32,600	321	206	648	13,679	51,804
Manica	501	340	0	554	3	0	435	0	1,833
Sofala	4	1	11	1,031	576	24	3,850	431	5,928
Inhambane	90	46	74	339	472	0	1,821	6	2,848
Gaza	326	554	785	71	566	520	1,885	588	5,295
Maputo	296	117	187	2	56	0	77	46	781
Maputo Cidade	111	129	1	69	0	69	43	85	507
National	3,277	1,745	7,397	36,480	2,782	4,538	14,024	17,731	87,974

Source: Agriculture Census in 2009-2010, INE

Note: *The definition must be clarified since there are no banks exclusively for agricultural development in Mozambique.

The government source is probably the District Development Funds (FDD). FDD is a lump sum budget, 7 million MT, allocated from the central government to each district to implement district development projects subject to consultation with the

community and District Councils. While the first FDD plans were oriented to public investment projects, such as road and school constructions, the government later reserved FDD for loans to rural associations as well as for crop production aiming at improving food security.

2.5. Irrigation and Drainage

2.5.1. Water Resources and Management

(1) Legislative Framework and Policy

The basis of the legislative framework regarding use and management of water resources in Mozambique includes the Water Law (1991), the National Water Policy (1995, revised in 2007), the Water Tariff Policy (1998) and the National Water Resources Management Strategy (2007).

1) Water Law

The Water Law is the basis of the legislative framework regarding water resources. The Law is developed based on a river basin approach to water management. The Law provides the basis for reforms within the water sector and outlines the institutional structure and the principles and policies for water management in Mozambique. The Law is designed to create a participatory and decentralized system of water management within the country. Water uses are classified as common or private use in the Law. Common use is free and exempt from licensing and aims to meet domestic and personal water needs, including small-scale farming. Private use is given by concession or through related laws.

2) National Water Policy

The National Water Policy (NWP), which was approved in 1995 and revised in 2007, outlines specific strategies for the main areas of urban and peri-urban water supply, rural water supply, sanitation and integrated water resource management. The NWP aims to decentralize water resources management to autonomous entities at the basin and provincial levels. According to the policy, the government defines priorities, guidelines and minimum service delivery levels, but does not deliver services. Integrated water management is promoted within the policy as a means to optimize the benefits to communities, while also considering environmental impacts and sustainability of resources over time.

Within the new NWP, the water use for irrigation is expected to contribute to enlarging the base of economic development, creating wealth and better life conditions, and the main objectives of the sector are set as:

a) To improve food security, to increase family income and to create job opportunities, through expanding irrigated area, particularly with small dispersed irrigation systems.
b) To improve the sustainability and to minimize the environmental impacts using the water, through improving water use efficiency and improving capacities of water users for operating and managing irrigation systems.
c) To produce agricultural products for export and for the development of agro-industry.

3) Water Tariff Policy

The Water Tariff Policy approved in 1998 contains six main principles for establishing water tariffs: i)user pays, ii)environmental protection, iii)equity of tariffs, iv)sustainability, v) decentralization, and vi) participative management and mechanisms for decentralization.

4) National Water Resources Management Strategy

The National Water Resources Management Strategy approved in 2007 is the guideline for implementing the Water Policy. The water resources management includes: i)assessment of water resources, ii)monitoring plan of water resources, iii)management of water demand, iv)allocation of water, v)river basin management plan, vi)hydraulic structures, vii)joint management of international water rivers, viii)risk management of flood and drought, and ix)consolidation of Regional Water Administrations (Administrações Regionais de Águas: ARA).

(2) Institutional Framework

The National Water Directorate (DNA) within the Ministry of Public Works and Housing (MOPH) is in charge of policy making and implementation, overall planning, management of the country's water resources and the provision of water supply and sanitation services. Its objectives are to ensure the proper utilization of ground and surface water resources. The National Water Council (CNA) was created in 1991 as a consultative body to the Council of Ministers. The CNA coordinates between agencies involved in water resources management.

In the DNA, the Regional Water Administrations (ARAs) are established under the Water Law, as basin authorities responsible for water development and management. At the national level, water management is the responsibility of the National Water Directorate (DNA), while at the regional level the five ARAs, ARA South, ARA Center, ARA Zambezi, ARA North-central and ARA-North, are responsible. ARAs have administrative, organizational, and financial autonomy through collecting water fees from water users. At present, water fees are charged only to large-scale consumers

such as FIPAG, mining and other industrial users, and large-scale irrigation users of more than 500ha. The major responsibilities of ARAs includes:

a) Planning and allocation of water resources
b) Control of water use, discharge of tributaries, and other activities which affect water resources
c) Licensing and concession of water use and charging water fee
d) Planning, construction and operation of hydraulic infrastructure
e) Authorization and approval of hydraulic infrastructure
f) Providing technical service to public and private sectors
g) Collection and management of hydrological data

Regarding to licensing forthe water use, there are two types of licenses, License and Concession. A License is basically issued for short-term or limited use, of which the validity is 5 years and not allowed to extend more than 10 years, while the Concession does not have validity limitation. For the permanent use, in principle, a Concession is required. In addition to the above licenses, provisional licenses for water use are observed in some provinces such as LIchinga, and must be renewed each year.

Regarding irrigation and drainage development, the large-scale projects are administrated by DNA and CAN, while middle and small-scale projects are administrated by the Department of Hydraulic Engineering of the National Direction of Agricultural Service (DNSA) of MINAG.

2.5.2. Irrigation and Drainage

(1) National Irrigation Policy and Strategy

The National Irrigation Policy and its Implementation Strategy were adopted in 2002, which put a great strategic importance on irrigation. The National Irrigation Strategy was revised in 2010. The objectives of the Strategy are to contribute tor i) increasing agricultural production and productivity, ii) generating surpluses in agricultural products for export, iii) increasing job opportunities in the urban and peri-urban areas and iv) increasing income of the producers, through use of the potential of irrigation agriculture. In the Strategy, three periodical goals are set, the short term goals targeting 2012, the mid-term goals targeting 2015 and long-term goals targeting 2020:

Short-term goals (2012)

- Establishing an autonomous institution to coordinate the action of the irrigation sector.
- Formulating and approving the National Irrigation Program and reinforcing the mobilization of investment capital

Mid-term goals (2015)

- Increasing productivity of food crops in the upland fileds by at least 3 times
- Increasing the use ratio of irrigation systems from the current 60% to at least 80%
- Developing a database of irrigation systems

Long-term target (2020)

- Expanding irrigated area for food crops by at least 50,000 ha, of which at least 20,000 ha will be developed through private investment
- Increasing reservoir capacity to approximately 30 Mm^3 through rehabilitation and construction of a dam

The National Irrigation Program is under formulation at present.

(2) Present Situation of Irrigated Area

The country's tradition of irrigation dates back to the pre-independence period when the total irrigated area reached 100,000 ha. After independence in 1975, the irrigated area in the country was increased and the total equipped area reached almost 120,000 ha in the early 1980s. In the years following independence, the government encouraged the exploitation of existing large irrigation schemes by state companies. These companies, however, became a symbol of inefficiency, mismanagement, and the subsequent deterioration of the irrigation infrastructures. At present, irrigated areas are occupied by smallholders and agricultural enterprises. Small-scale irrigation exists everywhere in the country, either abandoned or partly utilized. Most of the schemes are in a bad to very bad condition, and only a relatively small part of the irrigation schemes is actually irrigated. In most irrigation schemes, surface water from rivers is used. Groundwater is used to a very limited extent by the family smallholder sector.

According to the results of the inventory survey of irrigation infrastructure carried by MINAG in 2001 to 2003 (Table 2.5.1), 118,120 ha are equipped for irrigation, of which 40,063 ha are actually irrigated, consisting mainly of large schemes over 500 ha. After the inventory, 13,356 ha of irrigation areas were rehabilitated or built in the period from 2004 to 2009 according to DNSA/MINAG. Even considering the expansion of the area in operation since 2004, there are still about 60,000 ha of inactive area.

In the north of the country there are only a few large-scale irrigation schemes that are actually irrigated, and only irrigation of small (Class A) and medium (Class B) schemes is operative. In the central and south part of the country, large (Class C) schemes account for approximately 70 to 80% of the equipped area. Class A schemes are mostly operated by farmers individually or organized in an association. Class B schemes are usually managed for industrial exploitation, mainly sugar cane

and rice. Class C schemes are not promoted anymore, as most of the recent projects are aimed at the rehabilitation and development of Class A and B schemes.

Table 2.5.1 Inventory on Irrigated Area and its Use

Descrição	Norte		Centro		Sul		Total	
	(ha)	(%)	(ha)	(%)	(ha)	(%)	(ha)	(%)
Áreas Equipadas para Rega:								
Classe A (<50 ha)	592	17	1428	4	4369	6	6389	5
Classe B (50-500 ha)	1760	53	6653	17	11234	15	19647	17
Classe C (>500 ha)	1000	30	30949	79	60135	79	92084	78
Total	**3352**	**100**	**39030**	**100**	**75738**	**100**	**118120**	**100**
Área realmente regada								
Classe A (<50 ha)	200	30	624	4	2452	11	3276	8
Classe B (50-500 ha)	461	70	1584	10	2635	11	4680	12
Classe C (>500 ha)	0	0	14049	86	18058	78	32107	80
Total	**661**	**100**	**16257**	**100**	**23145**	**100**	**40063**	**100**
Proporção de área equipada realmente regada								
Classe A (<50 ha)		34		44		56		51
Classe B (50-500 ha)		26		24		23		24
Classe C (>500 ha)		0		45		30		35
Total		**20**		**42**		**31**		**34**
Tecnologia								
Rega de superfície	656	99	4200	26	12000	52	16856	42
Rega por aspersão	0	0	11530	71	8330	36	19860	50
Rega por gotejamento	5	1	527	3	2815	12	3347	8
Total	**661**	**100**	**16257**	**100**	**23145**	**100**	**40063**	**100**
Principais culturas de rega								
Cana-de-açúcar	0	0	13799	84.9	10059	43.4	23858	59.6
Horticultura	301	100	210	1.3	6500	28.1	7011	17.5
Arroz	0	0	480	3	3650	15.6	4130	10.3
Tabaco	0	0	445	2.7	0	0	445	1.1
Citrinos	0	0	370	2.3	0	0	370	0.9
Outras	0	0	953	5.9	3036	13.1	4249	10.6
Total	**301**	**100**	**16257**	**100**	**23145**	**100**	**40063**	**100**

Source: MINAG (Inventory of Irrigation Equipped lands, 2001 -2003)

According to the Agricultural Inquiry 2007 carried out by MINAG, the farm households using irrigation is 13% of the national average. Niassa, Carbo Delgado, Nampula and Zambezia provinces show a lower rate around 3 to 8%, while Tete, Manca, Inhambane and Maputo provinces show a higher rate of about 30%.

Table 2.5.2 Percentage of Households Using Irrigation in Agricultural Inquiry 2007

Province	2002	2003	2005	2006	2007
Niassa	8	6	2	6	8
CDelgado	4	1	2	2	3
Nampula	2	2	5	6	6
Zambezia	1	3	2	3	6
Tete	28	19	9	17	30
Manica	22	5	3	10	30
Sofala	6	5	4	4	11
Inhambane	30	10	14	21	28
Gaza	27	15	18	19	17
Maputo	25	19	26	22	31
Nacional	10	6	6	11	13

Source: MINAG Trabalho de Inquérito Agrícola 2007

2.5.3. Water Users Organization

For the large-scale irrigation schemes in Mozambique, the main facilities, such as the main canal and related structures, are operated and managed by a public service corporation while facilities after the secondary canal are operated and managed by Water User's Associations (WUAs) which are organized by irrigation users. For the example of Chokwe Irrigation Scheme, which is one of the most important large-scale irrigation schemes in Mozambique, the main facilities are managed by the Chokwe Irrigation Public Company (Hidráulica de Chókwè Empresa Pública: HICEP), which has responsibilities for supplying and allocating water in the main canal, charging and collecting water fees, operation and maintenance of related facilities. WUAs organized in each irrigation block are responsible for operation and maintenance of the secondary and tertiary irrigation systems.

In Mozambique, the WUAs are legalized by the Association Law (Degree-Law 2/2006) as a farmers' organization because the law for water users' associations has not been prepared.

In general, the capability of WUAs has not been developed, due to a lack of experience in operation and maintenance of facilities, a lack of experience in water management and a lack of financial resources, thus, the irrigation systems are not managed adequately. The government and MINAG as well as donors have made various efforts to enforce the function of WUAs.

For small irrigation system, WUAs, the irrigation systems are operated and managed by a farmer's association or farmer's group, in some cases by the community, without a WUA which is organized specially for operation and maintenance of the irrigation system. The situation of operation and maintenance of facilities by these group is also inadequate in general. To cope with the above situation, the National Irrigation Strategy emphasizes support for organizing and enforcing an association of irrigation users in the development pillars of infrastructure, administration and irrigation use.

2.6. Agricultural Logistics

2.6.1 Markets of the Agricultural Products

The agriculture product market is divided into local market, regional market and international market. The local market supplies agricultural produces from the production area to the public and temporary market within the district, other districts and the capital of the province. The regional market supplies produce from other regions and districts. The international market consists of imports and exports of

agriculture produce and processed products. Since coverage of the irrigation system is low in Mozambique, rain-fed cultivation practice is dominant throughout the country and food staples shortages occurs in the dry season. On the other hand, the northen region retains maize surplus even in the dry season. Nonetheless, maize is imported every year in the southern region. High transportation cost caused by poor road conditions, results in difficulty for the northern maize to complete with imported product in the southern region. Consequently, maize produced in the northern region is exported to neighboring countries such as Malawi and Zimbabwe. High value crops, such as beans and peanuts from the northern region still have competitiveness in the southern region market.

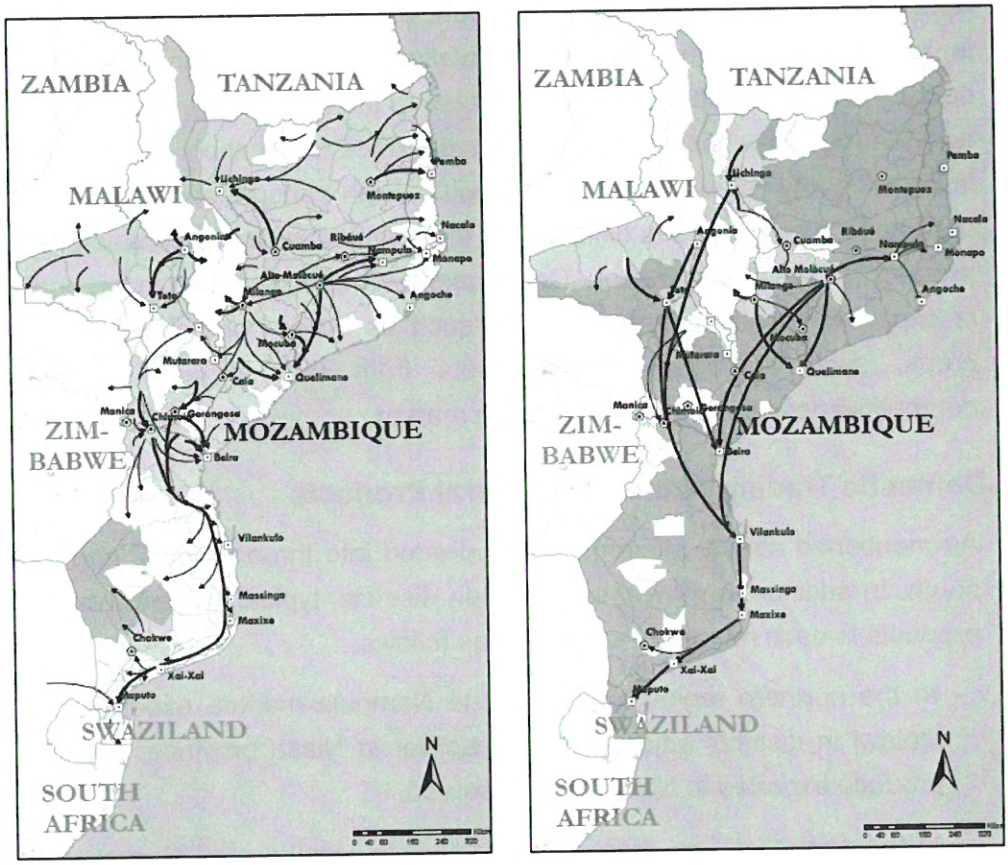
2.6.2 Domestic Trading of the Agricultural Products

As mentioned above, Mozambique is divided into three regions, north, central and south. In addition to movement between districts, typical movements of agricultural products in each region are observed as follows.

- In the northern region, movement to Nampula market, export and import with Malawi in districts adjacent to the border in Niasa province, and movement of produce exported to Nacala are observed.
- In the central region, there is movement to Maputo market, movement to Beira market, and export to Zimbabwe through Tete,
- In the southern region, there is movement from the south and movement from South Africa.

The flow of agricultural produce in Mozambique uses two typical products, maize and beans. Figure 2.6.1 illustrates the movement of maize in Mozambique. Maize produced in the northern region is supplied to districts in the region and neighboring regions mainly for consumption, and to Malawi and port of Nacala for export. Similar phenomenon occurrs in the central region, but they supply some maize to Maputo.

Meanwhile, for beans, a very small quantity was exported to neighboring countries, and large volumes were supplied from the northern region to the central and southern regions. The reason is the high value of beans. According to an interview with a transportation association member, beans are bought in Lichinga at 15 to 17MT/kg to be sold in Maputo at 45 to 50MT/kg. For maize, the profit margin is not as high as beans, they are bought in Lichinga at 3MT/kg and sold for 10MT/kg in Maputo.



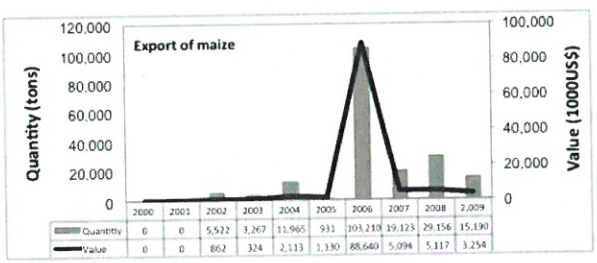
Source: FEWSNET, 2009

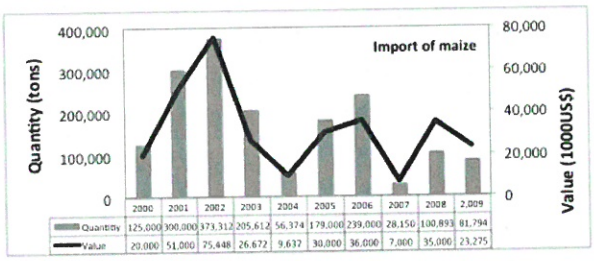
Figure 2.6.1 Production and Market Flow of Maize (left) and Beans (right)

2.6.3 International Trading of Agricultural Products

(1) Maize

As shown in Figure 2.6.2, export of maize varied levels from 15,000 to 30,000 tons. Domestic maize production in 2006 was very good and resulted in about 70,000 tons of maize surplus. Meanwhile, import of maize has tended to decrease since 2003. Overall the excess of import quantity tends to decrease.



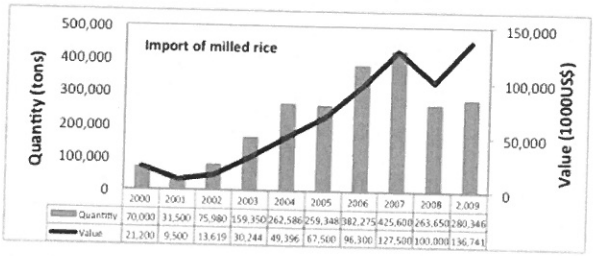


Source: FAOSTAT

Figure 2.6.2 Import and Export of Maize (Quantity and Value)

(2) Rice

The data suggests the level of import of rice (Figure 2.6.3) showed an overall increase in import volume and value from 2001 to 2007, and then diminished to the level of 2004 to 2005. This was caused by a spike in the international market price of rice in 2008, and by an increase in domestic production due to expansion of the production area in 2008. But, about 280 thousand tons (140 million US$) of rice was imported in 2009.

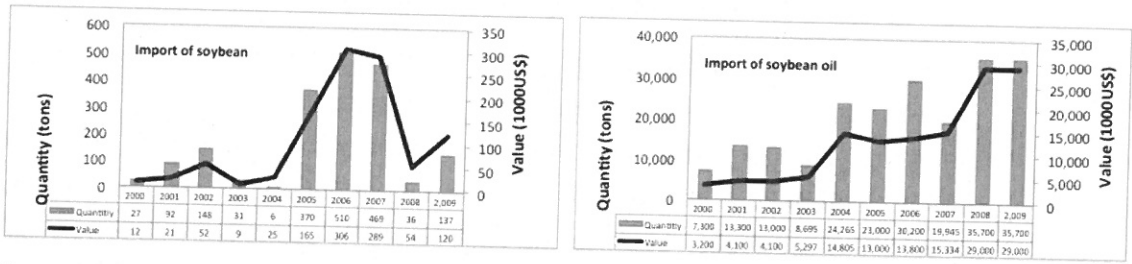


Source: FAOSTAT

Figure 2.6.3 Import of Milled Rice (quantity and value)

(3) Soybean

As illustrated in Figure 2.6.4, the import quantity of soybean appears to have risen during the period of 2000 to 2006, but dropped in 2008. The overall picture from the data is that the import of soybean oil has increased from 2000 to 2009.

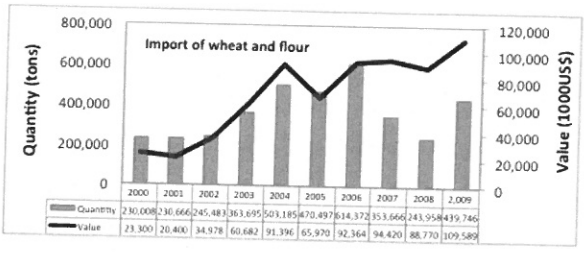


Source: FAOSTAT

Figure 2.6.4 Import and Export of Soybean and Soybean Oil (quantity and value)

(4) Wheat

Mozambique is a major importer of wheat mainly for urban consumption, and data appear to show an increase in quantity for the period from 2000 to 2006, but import quantity dropped in 2007 and 2008 due to the higher international market price. In 2009, a decrease in the international market price to the level of 2006 caused an increase in import quantity.

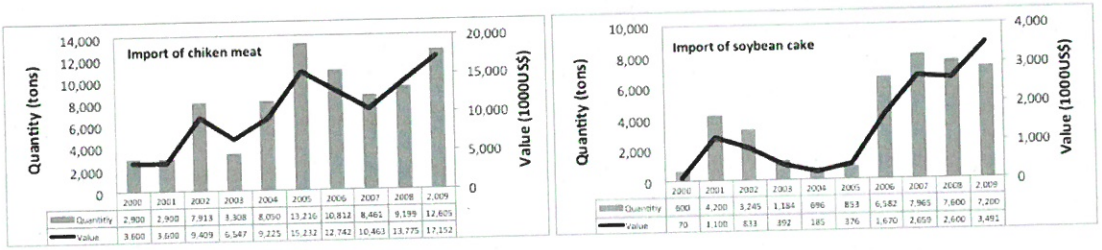


Source: FAOSTAT

Figure 2.6.5 Import of Wheat and Wheat Flour (quantity and value)

(5) Chicken

Figure 2.6.6 shows the import of chicken and soybean cake, which is used as a material for chicken feed. Chicken import started to drop in 2006, but increased from 2008 and reached about 18,000 tons in 2009 to reach the peak for the past years. As mentioned below in the section on soybean, domestic chicken meat production has increased since 2006, causing a one-time reduction in import of chicken meat, and increase of soybean cake. The import quantity of soybean cake varied from 7,000 tons to 8000 tons in the period of 2006 to 2009. Nevertheless, the import of chicken recovered to its peak level of 2005. Strong growth in the demand for chicken meat from the domestic market exists.



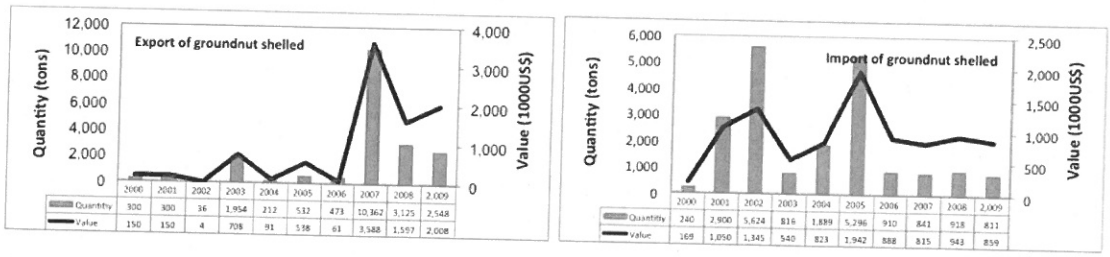
Source: FAOSTAT

Figure 2.6.6 Import of Chicken Meat and Soybean Cake (quantity and value)

Imports of soybean cake increased dramatically. The reason being that in 2006, the government banned selling chicken meat later than 80 days from the day of slaughter. This regulation has stimulated domestic chicken meat production, which was not competitive with imported chicken meat. Domestic chicken meat, which had only 10% of production capacity, has increased its capacity by 20% per year over the past 5 years, and investment in chicken production has continued. The international market price of soybean has increased since 2007 as well. Consequently, the demand of domestic soybean is rapidly expanding. A poultry producer in Nampula said that the price of imported soybean cake is 600US$/ton (16.86MT/kg) and one from Zambezia costs 18MT/kg (12 to 13MT/kg at farm gate price).

(6) Peanut

Peanut has strong price elasticity of demand. In Figure 2.6.7, data appears to show that import of peanut quantity decreases when the price increases, and vice versa. Since the international market price went up in 2006, the export quantity has kept increasing whereas the import quantity has remained at a low level.

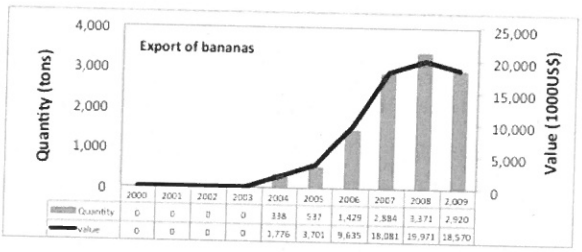


Source: FAOSTAT

Figure 2.6.7 Import and Export of Peanut (quantity and value)

(7) Banana

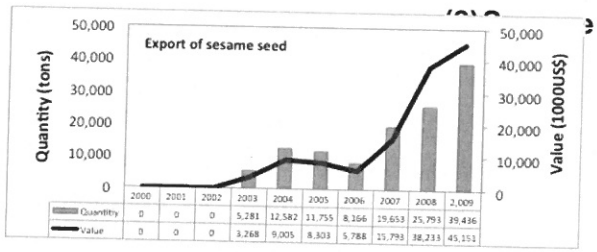
As illustrated in Figure 2.6.8, export of banana started in 2004, and continued increasing its volume and value. In Nacala Corridor, South Africa funded Matanuska in alliance with the USA funded Chiquita Banana, exports banana to the European market through Nacala port.



Source: FAOSTAT

Figure 2.6.8 Export of Banana (quantity and value)

Data for sesame (Figure 2.6.9) appears to show an overall increase both in export volume and value on the order of 7.5 times in volume and 13.8 times in value from 5,300 tons with about 3,300 US$ in 2003 to about 40,000 tons with about 45,000 US$ in 2009.



Source: FAOSTAT

Figure 2.6.9 Export of Sesame (quantity and value)

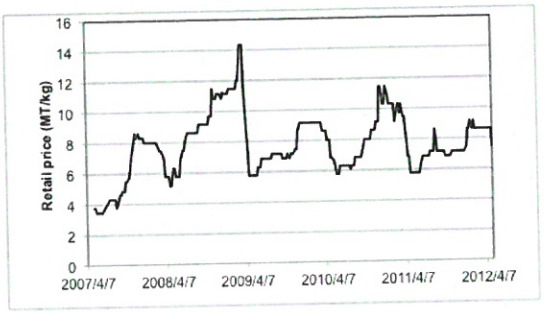
(9) Beans

There is no statistical information on the trade of beans. 6.5million US$ of beans were exported in 2009, but type of beans were not classified. In Nampula, Export Marketing, which is Indian-based grain trading company, exported 7,000 tons of mung beans and 23,000 tons of pigeon peas in 2011. They collected the beans directly from the producer through collectors, and exported them to India.

2.6.4 Pricing Mechanism of Agricultural Products and Recent Trends

(1) Maize

Maize is cultivated by rain-fed practice, and the one harvest season, April-June, the same every year. So, the price of maize in Nampula has a seasonal pattern with a peak in January and the bottom in May as illustrated in Figure 2.6.10. Meanwhile, maize cultivated in the southern region is supplied to the southern region market from June to September, after which, the supply volume from the southern region is tapered. Maize from South Africa is supplied in its place until next harvest season. Thus, the maize price in the southerm region is affected by the price in South Africa. The prices were varied from 6 to 12 MT/kg over the period of 2007-2012.



Source: SIMA

Figure 2.6.10 Market Price of Maize Grain in Nampula

(2) Cassava

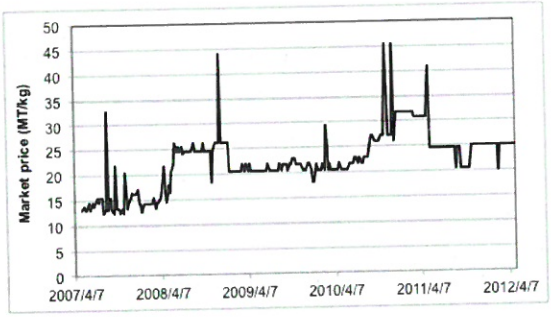
As shown in Figure 2.6.11, data appear to show an overall increase of more than double over the past five years, but the price of cassava flour is relatively stable among staple crops. Because cassava can be harvested throughout the year, producers can supply according to demand of the market. The prices over the past year varied between 15 and 18 MT/kg.

Source: SIMA

Figure 2.6.11 Market Price of Cassava Flour in Nampula

(3) Milled Rice

Mozambique relies on import for domestic consumption, and rice prices reflect the international market price. There is no seasonal change of prices. The market price over the past year fluctuated between 20 and 25 MT/kg.

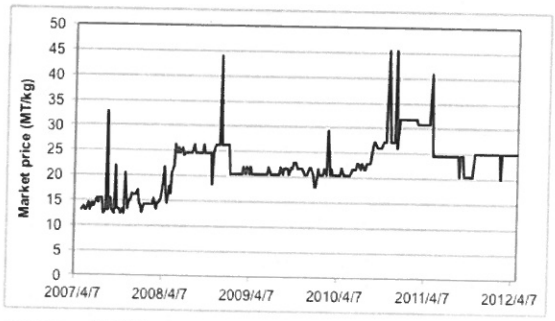


Source: SIMA

Figure 2.6.12 Market Price of Milled Rice in Nampula

(4) Cowpea

The retail price of cowpea is relatively lower than other beans. The price has been stable over the past year at around 25 MT/kg, and there is no seasonal fluctuation.

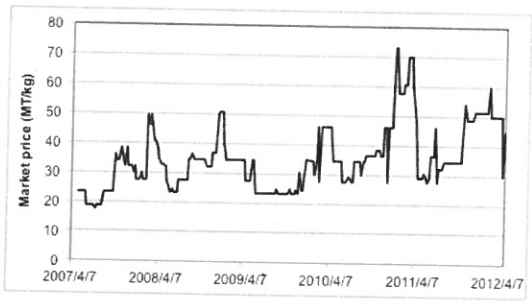


Source: SIMA

Figure 2.6.13 Market Price of Cowpea in Nampula

(5) Haricot bean

Haricot bean has strong demand allover the country, and is sold at a high price. The prices fluctuated between 20 and 70 MT/kg in Nampula. Haricot bean is one of the crops cultivated in the northern region, which can be competitive in central and southern regions.

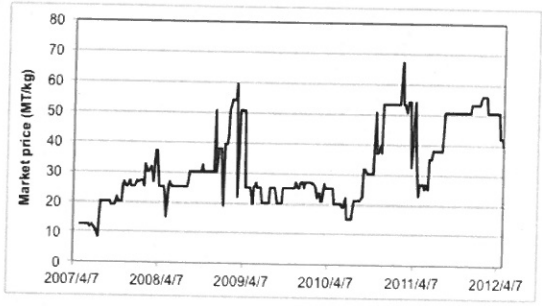


Source: SIMA

Figure 2.6.14 Market Price of Haricot Bean in Nampula

(6) Peanut

There is no seasonal pattern in prices of peanuts. The prices fluctuated between 10 and 50 MT/kg over the past fice years.



Source: SIMA

Figure 2.6.15 Market Price of Peanuts (Small with Shell) in Nampula

2.7. Agro-processing

2.7.1 Large-scale Agro-processing

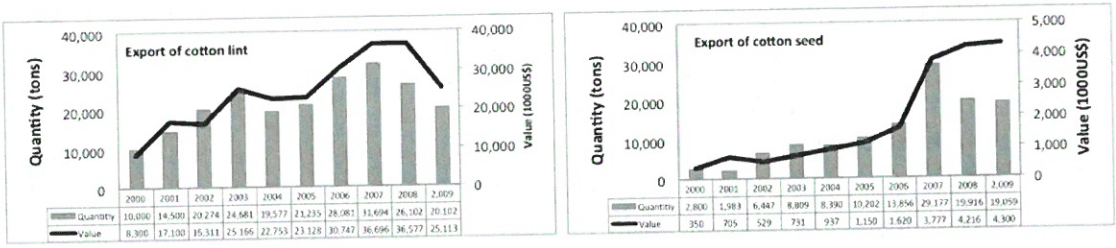
The large-scale agro-processing industries shown below have a long history. Investments in agro-processing are predominantly geographically located as follows: (1) maize in Nampula, Maputo and Sofala, (2) cotton in Nampula, Zambezia and Cabo Delgado, (3) cashew in Nampula, Gaza, and Inhambane, and (4) tobacco in Nampula, Tete, Manica, Cabo Delgado, Gaza and Sofala, (5) tea in Zambezia, and (6) sugar in Maputo and Sofala.

Maize is one of the food staples in Mozambique, and large-scale mills located in provincial capitals supply maize flour to the local market. These millers buy maize and sell flour after processing and packaging.

(1) Cotton

Data (Figure 2.7.1) appears to show an overall increase in cotton export from 2000 to 2007, and a decrease from 2008. The global recession might have affected the international cotton market. The quantity and value dropped from 32,000 tons with about 36.7 million US$ in 2007 as a peak to 20,000 tons with 25.1 million US$ in 2009.

Mozambique exports cottonseed as well. Like cotton, export of cottonseed dropped in 2008, but export value increased and reached the highest value in 2009.

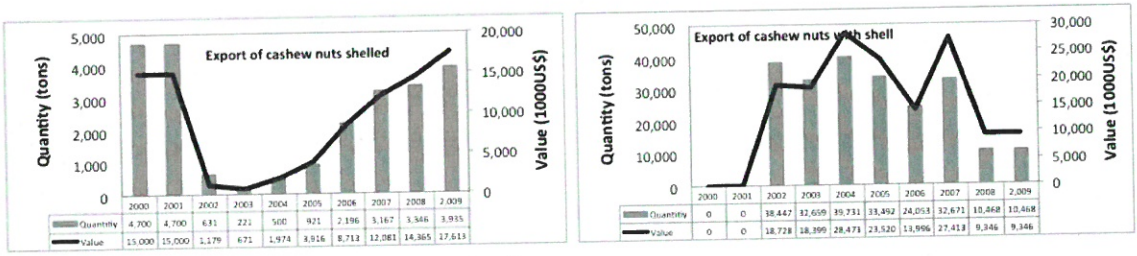


Source: FAOSTAT

Figure 2.7.1 Export of Cotton (left) and Cottonseed (right) (quantity and value)

(2) Cashew nut

Figure 2.7.2 shows export of both shelled and unshelled cashew nut. Since 2003, both quantity and value of shelled cashew nut has steadily increased reaching about 4,000 tons at 17.6 million US$. Contrarily, unshelled cashew nut was exported at 2.5 times this amount with 10,000 tons in 2009, but the value was about half of the shelled nuts ar 9.3 million US$.

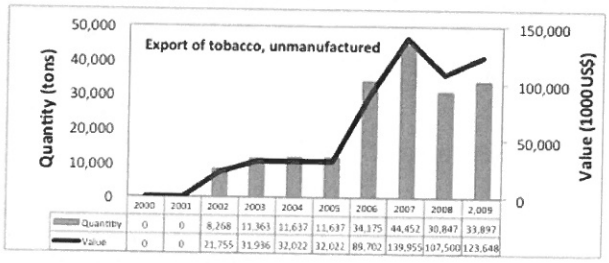


Source: FAOSTAT

Figure 2.7.2 Export of Cashew Nut Shelled (left) and with Shell (right) (quantity and value)

(3) Tobacco

As shown in Figure 2.7.3, in 2006, export of tobacco jumped up to 34,000 tons, three times the previous year. Export quantity has been more than 30,000 tons since then. The export quantity and value in 2009 were 34,000 tons and 123.6 million US$.

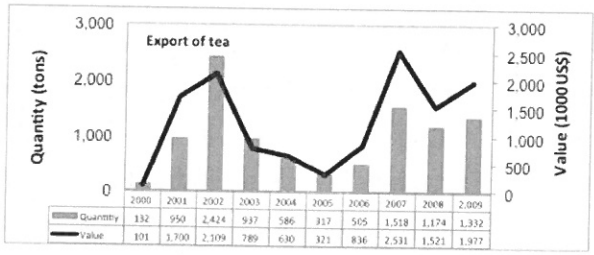


Source: FAOSTAT

Figure 2.7.3 Export of Tobacco (quantity and value)

(4) Tea

As illustrated in Figure 2.7.4, in the period of 2007 to 2009, the quantity of tea export was relatively high and stable compared to earlier years. The export quantity and value in 2009 were 1,300 tons and 2.0 million US$.

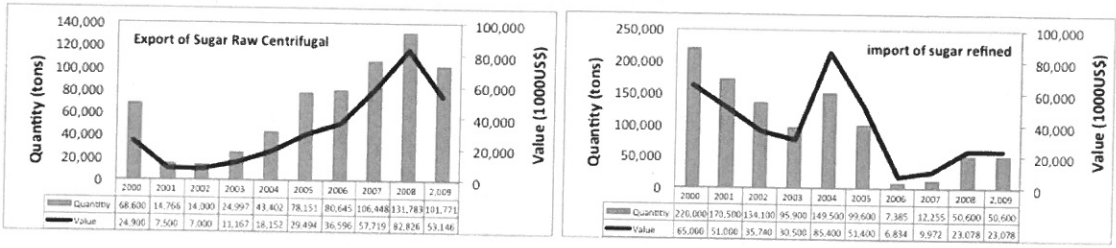


Source: FAOSTAT

Figure 2.7.4 Export of Tea (quantity and value)

(5) Sugar

Data suggests that there was a steady increase of molasses (sugar raw centrifugal) export in the period from 2001 (3,400 tons) to 2008 (132,000 tons). The value also increased from 7.5 million US$ to 83.1million US$ respectively. In contrast, import of refined sugar decreased to 51,000 tons in 2009, one quarter the quantity in 2000.



Source: FAOSTAT

Figure 2.7.5 Import and Export of Sugar (quantity and value)

2.7.2 Small-scale Agro-processing

Small-scale agro-processing such as rice, maize and cassava mills are dominant all over the country. Mills are located in and around the center of districts and cities, and provide milling service to customers. In rural areas, millers do not buy raw materials to sell milled products, but only provide milling service.

2.8. Investment in the Agriculture Development

2.8.1. Government Policies for the Agricultural Investment Promotion and Regulations

(1) General Conditions of the Investment Environment of Mozambique

In reviewing and comparing the general investment environment, the "Doing Business" Index[1] developed by the World Bank was utilized as the point of reference, highlighting the ease with which an entrepreneur is able to open and operate a business while complying with the relevant regulations of the country.

Table 2.8.1 below sets out the relevant "Doing Business" index scores for Mozambique and its neighboring countries with Mozambique being ranked 139th in the overall 2012 ranking, down from 132nd in 2011. Among its seven neighboring nations, Mozambique ranks 5th while South Africa ranks at the top of the seven countries, and 2nd in sub-Saharan Africa followed by Mauritius. In terms of the "Starting Business" indicators, Mozambique ranks 70th in the world, which indicates that Mozambican investment regulations, including licensing procedures, are relatively friendly to investors wishing to start a business. In addition, Mozambique stands at 18 in the overall ranking of the 46 countries of sub-Saharan Africa, which indicates that the Government of Mozambique has created a favorable regulatory environment conducive to operating a business compared to other countries in sub-Saharan Africa.

Table 2.8.1 Doing Business Index 2012 of Mozambique and Neighboring Countries

Country	Overall Rank (out of 183 countries)		Indicator "Starting a Business"	Overall Rank in Sub-Saharan Africa
	2012	2011		
Mozambique	139	132	70	18
South Africa	35	36	44	2
Zambia	84	80	69	7
Tanzania	127	125	123	14
Madagascar	137	144	20	17
Malawi	145	141	139	21
Zimbabwe	171	168	144	36

(2) Investment Promotion Agencies

In 2009 Mozambique's agriculture sector accounted for 31% of GDP, and employed nearly 80% of the total labor force.[2] The Government of Mozambique puts forth in

[1] Doing Business ranks economies based on 10 areas of regulation: 1) starting a business; 2) dealing with construction permits 3) getting electricity; 4) registering property; 5) getting credit; 6) protecting investors; 7) paying taxes; 8) trading across borders; 9) enforcing contracts; and 10) resolving insolvency.
[2] Economic and Sector Work: Agribusiness Indicator Mozambique, World Bank 2012

the Strategic Plan for Agricultural Sector Development (PEDSA 2010 - 2019) a policy direction, emphasizing the importance of the value chain approach to agriculture development, which has laid the foundation for the current favorable agribusiness environment. This implies that the promotion of private initiatives in commercial agriculture and agribusinesses is key to the sustainable and inclusive growth of the agriculture sector, involving more small-scale farmers in production value chains. In order to attract foreign and domestic investment in the agriculture/agribusiness sector, two separate government agencies, the Investment Promotion Center (CPI) and the Agriculture Promotion Center of the Ministry of Agriculture (CEPAGRI), have worked on specific activities in investment promotion as summarized below. In relation to the Nacala Corridor area, the Malonda Foundation, a non-profit private entity, has worked in Niassa province since 2005 with the aim of promoting investment in order to strengthen the region's economic situation, which in turn contributes to the improving of the livelihoods of local people.

1) Investment Promotion Center (CPI)

The CPI, established in 1993 under the jurisdiction of the Ministry of Planning and Development, handles Mozambique's private investment development. As the window for both foreign direct and domestic investment, CPI provides investment promotion services, such as the dissemination of investment information and consultations on business ideas/opportunities, acting as a "one-stop service" provider for investors. CPI receives investment project proposals from investors, and processes them for approval according to the Regulation of Investment Law (Decree No. 43/2009 of 21th August). CPI has five branch offices in Beria, Chimoio, Tete, Quelimane and Nampula with offices working closely with local governments to support investors in negotiating land-use rights and preparing of necessary documents for investment proposals.

2) Agriculture Promotion Center (CEPAGRI)

CEPAGRI has a specific mandate to: i) promote agribusiness and agro-industry investments and trade; ii) analyze agribusiness potential by conducting technical research/studies; and iii) coordinate the integration of projects/initiatives implemented by different actors, such as the government, NGO/donors and private business, in order to maximize the impacts on agriculture development. CEPAGRI works closely with CPI in reviewing investment project proposals related to agriculture/agribusiness development, providing technical comments and feedback, which are then examined in detail during the approval process for each investment proposal. CEPAGRI has 4 sub-offices in Gaze, Manica, Zambezia, and Nampula provinces.

3) Malonda Foundation

The Malonda Foundation was established in 2005 in technical cooperation with the Swedish International Cooperation Agency with the aim of reducing poverty in Niassa province through the promoting of private investment. Since 2011 the Malonda Foundation has focused more attention on investment promotion activities, providing information on potential investment opportunities in Niassa province through their website and through advisory services to investors regarding the acquiring of necessary licenses/permissions for starting a business.[3] The Malonda Foundation works closely with concerned local government offices to facilitate the establishment of partnerships among the different stakeholders, community representatives, NGOs, local businesses and investors in order to create a favorable business environment, attracting more investment to the region.

(3) Investment Incentives

The investment environment in Mozambique is broadly supportive of the agriculture sector. Fiscal and non-fiscal investment incentives are provided to both foreign and domestic investment projects in the manner summarized in Table 2.8.2. In addition, a special Corporate Income Tax (IRPC) rate has been offered exclusively to the agriculture sector until the 31st of December 2015.

Table 2.8.2 Investment Incentives for the Agriculture Sector

Items	Incentives	Duration
• Custom duties and VAT on the import of equipment	• Exemption	• First 5 years of the project
• Corporate Income Tax (IRPC) for the entire agriculture sector	• Special rate 10% (normal IRPC rate: 32%)	• Until the 31st of December 2015
• Corporate Income Tax (IRPC) for new investment projects	• 80% reduction of the above rate (applied IRPC rate is 2%) • 50% reduction (applied IRPC rate will be 16%)	• Until the 31st of December 2015 • From 2016 to 2025
• Cost of professional training for Mozambican employees	• Deducted from taxable income of IRPC	• First 5 years of the project
• Costs of construction/ rehabilitation of social infrastructures (roads, water supply, electricity, etc.)	• Deducted from taxable income of IRPC at the below rate. ✧ 110% of the expenditure in Maputo ✧ 120% in other provinces	• 5 tax years

Source: Code of Fiscal Benefit, Law No. 4/2009 of 12th January, the Government of Mozambique

[3] The Malonda Foundation gives priority to the agriculture, forestry, tourism, and mining sectors in the investment promotion.

(4) Limiting Factors on Agriculture/Agribusiness Investment

<Policy Environment>

Though the overall policy direction and investment environment of Mozambique have been favorably received by the agriculture/agribusiness developers based on survey results,[4] the survey also indicates that the private sector seeks to have the issues of limited transparency in the formulation of policies, and the inconsistent implementation of some regulations, decrees and procedures addressed. One example of these policy changes is the waiving of duties on maize and soybean feed imports, which is viewed critically as beneficial to large, established agribusinesses and trading companies, while discouraging local investment in maize and soybean production and processing.[5]

<Financing>

The major barrier to agriculture/agribusiness investment is access to affordable sources of financing. Credit extended to agribusiness or agricultural producers is costly in Mozambique since the interest rates for commercial bank loans range from 20% to 25% depending on the creditworthiness of the client/project and quality of collateral. An additional limiting factor is the term of the loans since many banks do not offer loans for more than 5 years, which thereby limits the types of investments that borrowers may undertake.[6]

<Acquiring of a land-use right/ DUAT and collateral for a loan>

An investor has to undertake a long and complex process to acquire a DUAT according to the Land Law Regulation (Law No. 19/97 of 1st of October), which requires the holding of a series of public consultations, the conducting of topographical demarcation and the obtaining of documents from different government offices, all of which incur costs. And even when a DUAT has been issued, the land cannot be used as collateral for a loan, a fact that is regarded as a major limiting factor on the increasing of credit to agriculture. However, banks do accept farm buildings, warehouse and private irrigation systems as collateral.

(5) Application Procedures for Investment Proposals

With simplified licensing procedures, the Regulation of Investment Law (Decree No. 43/2009 of the 21st of August) stipulates the details for acquiring authorization both for foreign direct and domestic investment. CPI plays a leading role in the processing of investment proposals, coordinating inter-institutional meetings with relevant ministries and state agencies for the authorization of the proposal. A decision on the

[4] "Agribusiness Indicators : Mozambique" , April 2012, World Bank
[5] Ibid.
[6] Ibid.

approval of an investment proposal must be made by the authorities according to the total investment value as summarized in Table 2.8.3 below. An investor receives notification on the final result of the screening within 17 days of the official acceptance of the investment proposal by CPI.[7]

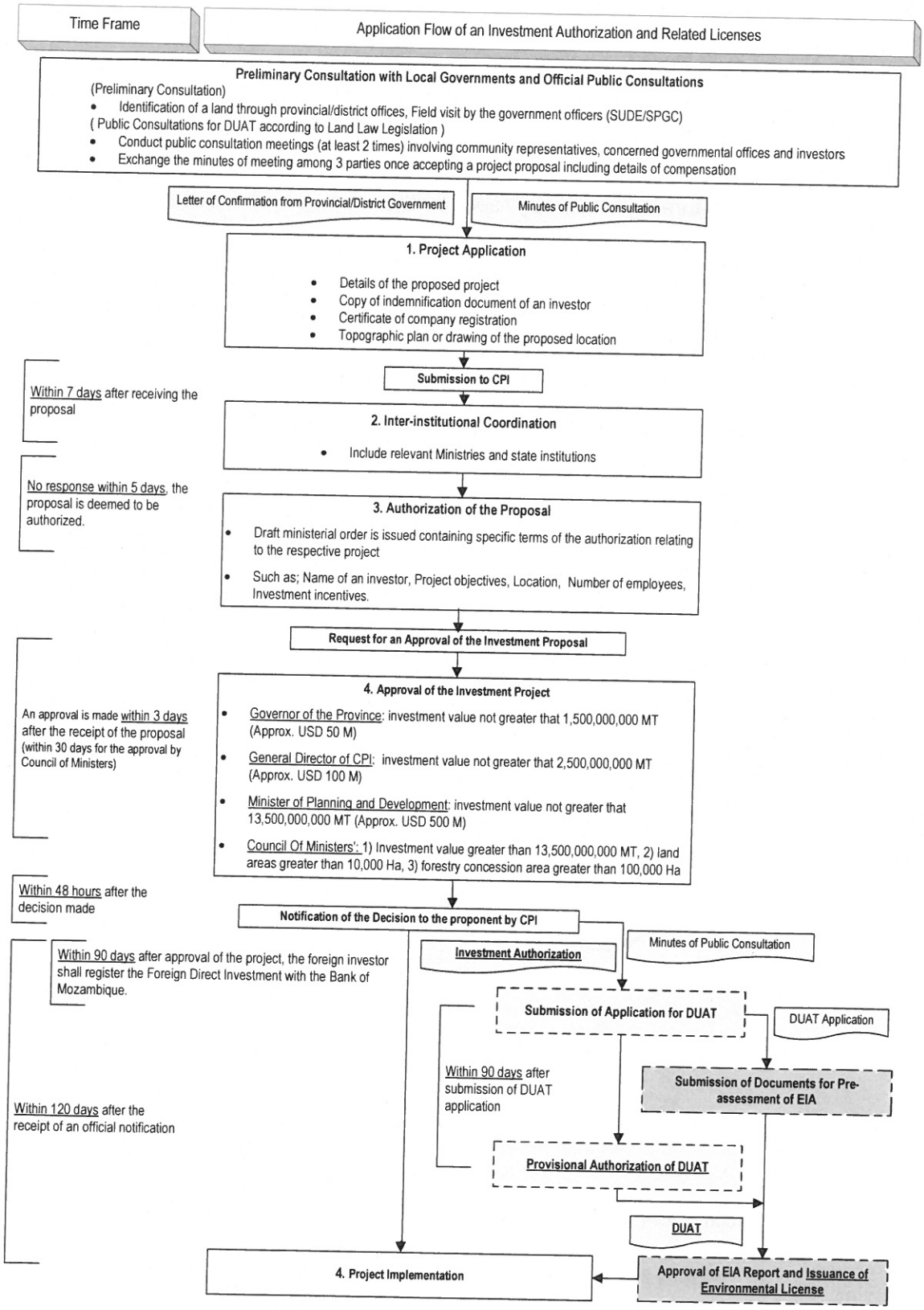
Table 2.8.3 Decision Making Authority for Investment

Decision made by:	Conditions
• The Governor of the Province (in which the proposed investment project will be carried out)	• Investment value is not greater that 1,500,000,000 MT (approx. 50 Mil US$).
• The General Director of CPI	• Investment value is not greater that 2,500,000,000 MT (approx. 100 Mil US$).
• The Minister of the Planning and Development	• Investment value is not greater that 13,500,000,000 MT (approx. 500 Mil. US$)
• The Council of Ministers	• Investment value is greater than 13,500,000,000 MT (approx. 500 Mil. US$); • Land area required for the project is greater than 10,000 ha; or • Forestry concession area is greater than 100,000 ha.

Source: the Regulation of Investment Law, Decree No. 43/2009 of the 21st of August

Other licenses required for the starting of business are a "DUAT (land-use right)" and "an environmental license" with the acceptance of an environmental assessment report. Application procedures for those licenses are interrelated with that of the investment proposal, as illustrated in Figure 2.8.1, for which the steps are as follows: i) preliminary consultation with local government and the holding of official public consultations; ii) the submission of an investment proposal to CPI with a supporting letter issued by the local government and the minutes of the public consultation meeting attached; iii) the submission of a DUAT application after acquiring an investment authorization from CPI; and iv) the acceptance of an environmental assessment report and the issuance of an environment license after the provisional DUAT has been authorized.

[7] In case a decision is made by the Councils of Ministers, it will take around 45 days.



(Source: JICA Study Team)

Figure 2.8.1 Application Flow for the Investment Authorization and Related Licenses

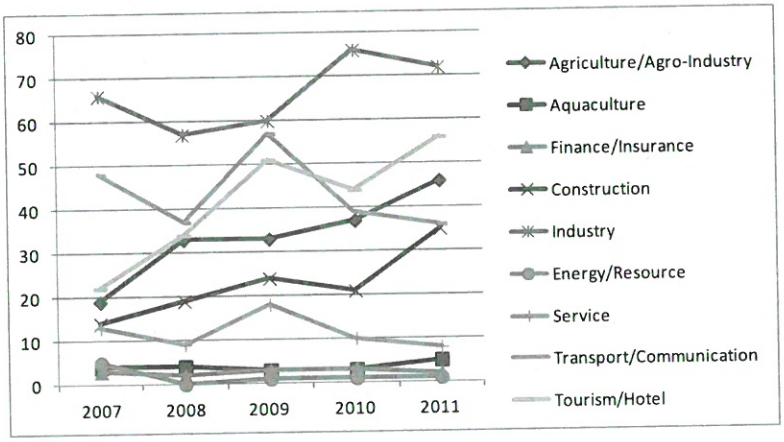
2.8.2. Agricultural Investments

As shown in Table 2.8.4 below, total investment value in Mozambique over the past five years has fluctuated from 1 billion US$ to 8 billion US$ per annum due to the influence on investment volume of large-scale investments in the energy/resource sector in 2007 and 2010, and the agriculture sector in 2009.[8] In terms of investment in the agriculture/agro-industry sector, the number of investment projects has increased from 19 in 2007 to 46 in 2011, accounting for 27.6% of the total investment volume in 2011. Though large-scale forestry and bio-fuel projects have contributed to the increase in investment volume, it is self-evident that agriculture is an important economic sector in Mozambique, accounting for 20 to 30% of the total investment value for the past 5 years, excluding large-scale projects in the energy/resource sector. Figure 2.8.2 shows the trends in the number of approved investment projects for each sector over the past five years.

Table 2.8.4 Total Investment Value in Mozambique (1,000 US$)

Sectors	2007				2008				2009				2010				2011			
	Amount	%	No.	%	Amount	%	No.	%	Amount	%	No.	%	Amount	%	No.	%	Amount	%	No.	%
Agriculture/Agro-Industry	581,111	7.2	19	9.8	484,688	44.9	33	16.9	4,915,607	85.5	33	13.2	388,104	12.6	37	15.8	787,336	27.6	46	17.6
Aquaculture	13,236	0.2	4	2.1	745	0.1	4	2.1	30,294	0.5	3	1.2	6,264	0.2	3	1.3	8,194	0.3	5	1.9
Finance/Insurance	1,999	0.0	3	1.5	12,833	1.2	2	1.0	20,218	0.4	3	1.2	75,110	2.4	3	1.3	69,298	2.4	2	0.8
Construction	18,548	0.2	14	7.2	43,139	4.0	19	9.7	77,255	1.3	24	9.6	38,238	1.2	21	9.0	600,162	21.0	35	13.4
Industry	402,361	5.0	66	34.0	215,932	20.0	57	29.2	191,631	3.3	60	24.0	169,202	5.5	76	32.5	370,728	13.0	72	27.6
Energy/Resource	6,582,247	81.5	5	2.6		0.0		0.0	3,656	0.1	1	0.4	1,900,000	61.5	1	0.4	157,000	5.5	1	0.4
Service	71,231	0.9	13	6.7	91,731	8.5	9	4.6	78,100	1.4	18	7.2	48,249	1.6	10	4.3	515,128	18.1	8	3.1
Transport/Communication	272,188	3.4	48	24.7	191,186	17.7	37	19.0	264,129	4.6	57	22.8	134,017	4.3	39	16.7	95,162	3.3	36	13.8
Tourism/Hotel	129,347	1.6	22	11.3	40,000	3.7	34	17.4	167,730	2.9	51	20.4	331,071	10.7	44	18.8	249,556	8.7	56	21.5
Total	8,072,268		194		1,080,254		195		5,748,620		250		3,090,255		234		2,852,564		261	

Source: CPI Investment Summary Data



Source: CPI Investment Summary Data

Figure 2.8.2 Number of Approved Investment Projects by Sector

[8] In 2009, investment proposals for two large-scale plantation projects in Zambezia and Nampula provinces were approved.

2.9. Legal System and Land Registration

2.9.1. Land Legal System

Land Law 19/97 reviews Law 6/79 the first land law enacted after the country's independence, to ensure access and security of land tenure and to make it, as established by the Constitution, the source of creation of wealth and social welfare (Art.109), encouraging its use by sectors such as agriculture, which is the base of national development (Art. 103). Thus, the Law establishes how to use, modify, transfer and extinguish the Land Use Rights.

The main topics covered by the Law are listed below:

- The land as a state property, cannot be sold, alienated, mortgaged or pledged, and it is part of the State Land Fund;
- Total protection zones (areas of preservation, security, etc.) and partial zones (border areas, coastline, etc.) are of public domain;
- The Land Use Rights (DUAT) may be granted to Mozambique citizens and foreigners (foreigners residing for at least five years in the country and international companies duly registered); individuals and local communities (according to customary practices); or individuals who are using the land for at least 10 years;
- The DUAT title will be issued by the Provincial Service of Geography and Registry (SPGC), nevertheless it is not necessary in the case of individuals and local communities (according to customary practices), or national individuals who have been using the land for at least 10 years;
- Changes, evidence of land use, transmission and extinction of DUATs;
- The DUAT for economic activity has a maximum term of 50 years, renewable for a similar period, if requested;
- Deadlines do not apply to DUATs acquired by local communities, private homes, of family farming;
- Responsibility to issue licenses and DUATs for areas not covered by urbanization plans:
  - ✓ Use of land up to 1,000 ha = Provincial Governors;
  - ✓ Use of land between 1,000 and 10,000 ha = Minister of Agriculture;
  - ✓ Use of land above 10,000 ha = Council of Ministers;
- Participation of local communities in the management of natural resource and conflicts, etc.;
- Provisional authorization, after the request of DUAT, (5 years for locals and 2 years for foreigners); final authorization, issuance of the title;
- Annual authorization fees;
- Domestic cooperatives and associations of small-scale farming are exempt from fees.

The Law Regulation, Decree 66/98, brings details on administrative procedures covering topics such as: acquisition of DUAT by national individuals who occupy the land in good faith, local communities, co-certification, rights and duties of DUAT holders, deadlines (request the extension of use for another 50 years, must be done12 months before the deadline stated in the title), evidence of land use, project/ plan implementation; demarcation, monitoring, taxes, and temporary tax exemption.

The Land Law, its regulations and amendments are intended to guarantee the rights of land use by the Mozambican people and to promote domestic and foreign investments. Those measures grant importance to the Mozambican citizen, by recognizing customary rights and practices of local communities, by including the communities in the processes of obtaining DUAT, and establish links between legal agencies of the state and community authorities. Regarding investment, the Law recognizes that domestic and foreign private investments are the driving force of Mozambique development.

2.9.2. Registration System

The National Land Registry Office was created, under the Land Law, to organize and understand the use of land. It is a single system under the responsibility of the National Land and Forests Directorate (DNTF). The DNTF gathers information and enables government authorities: a) to know the economic and legal situation of land; types of occupation and use; soil fertility; forest areas; water reserves, flora and fauna; b) to organize the land use, protection and conservation; c) to indicate the regions suitable for specialized productions and d) to issue the Land Use Rights Title(DUAT).

This decentralized system receives information from the country's provinces, through the Provincial Services of Geography and Registry – SPGC; and its update occurs periodically, when a DUAT is officially issued after the granted area is demarcated (geo-referenced).

2.9.3. Land Use Rights (DUAT)

The DUAT title, Land Use Right, is issued by the National Land and Forests Directorate (DNTF) and the Provincial Services of Geography and Registry (SPGCs), and is intended for:

1. Occupancy by individuals and local communities, according to customary norms and practices (tradition) that do not contradict the Constitution (DNTF);
2. Occupancy by national individuals who in good faith, have been using the land for at least ten years (DNTF), and
3. Formal occupation of individuals or collective ventures, national or foreign that have an approved Operating Plan (SPGCs).

Although the three categories are recognized as legitimate by the Mozambican state, only the occupations related to item 3 are listed in total in the National Land Registry Office, because they are concessions duly demarcated and authorized on a provisional or definitive basis (issuance of DUAT). The occupations described on items 1 and 2, although they can request a title exempt from fees, usually it does not occur, maybe due to demarcation costs. So, the Registry Office does not have precise information on occupation types 2 and 3.

(1) Cost of DUAT

The costs involved in the DUAT application process are regulated by the government, and are charged according to the Table 2.9.1 below, which specifies the amount regarding **Process Procedures** and Annual Amount charged per **Specific Activity/ hectare**.

Table 2.9.1 Tax Table

Temporary authorization (**Process Procedure Tax**)	1.500,00 MT
Permanent authorization (**Process Procedure Tax**)	750,00 MT
Anual Tax (for commerce)	75,00 MT/ha
Annual Tax for Specific Activities:	
Livestock cattle	5,00 MT/ha
Restocking of Wildlife	5,00 MT/ha
Permanent crops	5,00 MT/ha
Agriculture	37,50 MT/ha
Tourism, summer house and commerce located within three kilometers bordering the area of coastline public domain	500,00 MT/ha

Source: Ministerial Order no. 144/2010 of 24 August 2010.

The calculation also involves the adjustment Table 2.9.2 below that is multiplied over the amount of the "annual tax for specific activities" of the Table 2.9.1.

Table 2.9.2 Index Table

Index applied to the annual tax for a national individual	0,8
Land Bordering:	
Partial protection zones	1,5
Priority areas for development	0,5
Other zones	1,0
Size: Up to 100 ha	1,0
From, 101 to 1000 ha	1,5
Superior to 1000 ha	2.0
Purpose of the use: Associations with charitable purpose	0,5

Source: Decree no. 66/98 of December 8, Article 41, Annex 2 and 3.

The following is an example of the calculation concerning the fee paid annually by **a national individual** who works in agriculture, in an area of 900 ha, according to explanation of the SPGC Nampula:

37.50 MT (agriculture) x 900ha (area) = 33,750 x 0.8 MT (index applied for the Mozambican citizen) = 27000.00 MT

In the case of a ***foreign individual****:*

37.50 MT (agriculture) x 900 ha (area) = 33,750 x 1.5 MT (index for non-Mozambique citizen) = 50635.00 MT

(2) Local Community Authority and the DUAT

The process for obtaining the DUAT to implement an Operating Plan in a particular area requires the consent of the Local Community Authority. Therefore, it is important to understand that structure, a hierarchical organization, traditionally established.

The Mozambican government, through the Ministry of State Administration, MAE, recognizes this hierarchy by means of the Decree no. 15 of June 20, 2000, which was regulated by the Ministerial Diploma. 107-A/2000 of August 25th that defines the relationship between the State Legal Authorities and the Community Authorities, establishing rights and responsibilities of each authority and setting a monthly allowances for each one of the following leaders, the RÉGULO, traditional chief, 1st LEVEL leader;2nd LEVEL leader, and; 3rd LEVEL leader.

(3) Private investment and the DUAT

The National Land Policy assumes that land is one of the most important natural resources that Mozambique has, that the state holds the land as its property, and that local population as well as domestic and foreign investor have guarantee of access and use of land.

Private investment is considered by the government as the great promoter of its development policy crucial to mitigate poverty. Investments in agriculture and tourism depend on the access to land and require the DUAT.

Although the DUAT, by definition, is not a right that equals to the concept of private property, its legal content offers security, making it possible, for example, concession of an area for a total period of 100 years - long enough to ensure a good return on invested capital.

(4) Process to Obtain the DUAT

The Provincial Services of Geography and Registry (SPGC) of each province concentrates the necessary procedures to request DUAT – Land Use Rights, and provides to interested individuals, information regarding:

a) Legislation;
b) Documents required to start the process;
c) Fees and taxes;
d) Requirements related to the process: outline, location maps and demarcation;
e) Benefits, restrictions or constrains on claims of interested parties, and;
f) Claims and appeals.

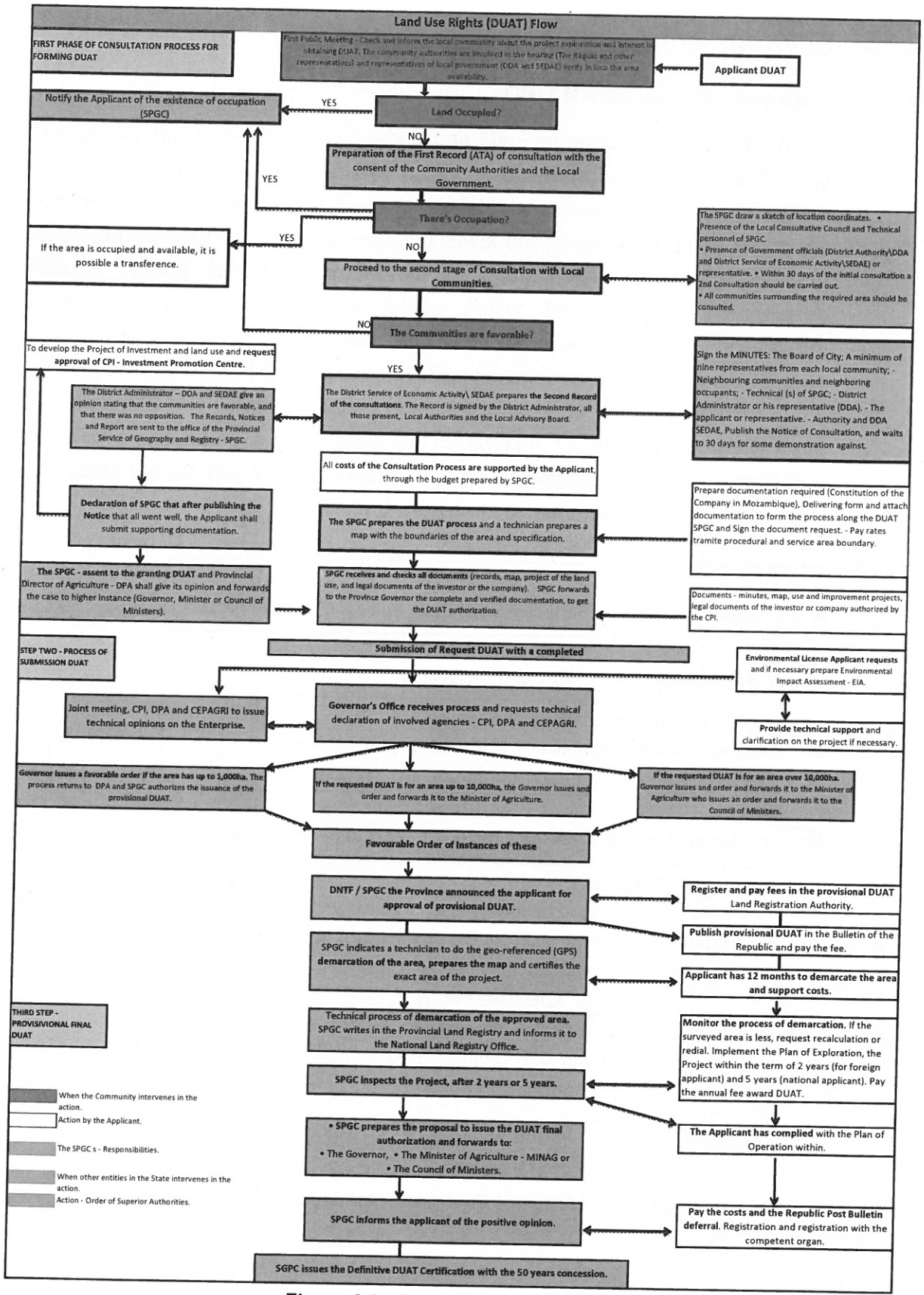


Figure 2.9.1 Land Use Rights (DUAT) Flow

2.10. Environmental and Social Considerations

2.10.1. Approach of ProSAVANA-PD

"JICA Guidelines for Environmental and Social Considerations (April 2010)" will be applied throughout the study. Since ProSAVANA-PD envisages formulation of a master plan, 'strategic environmental assessment' (an assessment implemented at the policy, planning and program levels but not a project-level EIA) will be the basic methodology. In the later stage of the study, once the 'priority agriculture development projects' and 'quick impact projects' are identified, screening (classifying proposed projects into four categories) and scoping (choosing alternatives for analysis, a range of significant and potentially significant impacts, and study methods) will be conducted for each project. Simplified resettlement action plans will also be drafted for the projects that require land expropriation or involuntary resettlement. All these processes shall maintain harmony with related Mozambican legislation. Steps are summarized in Figure 2.10.1.

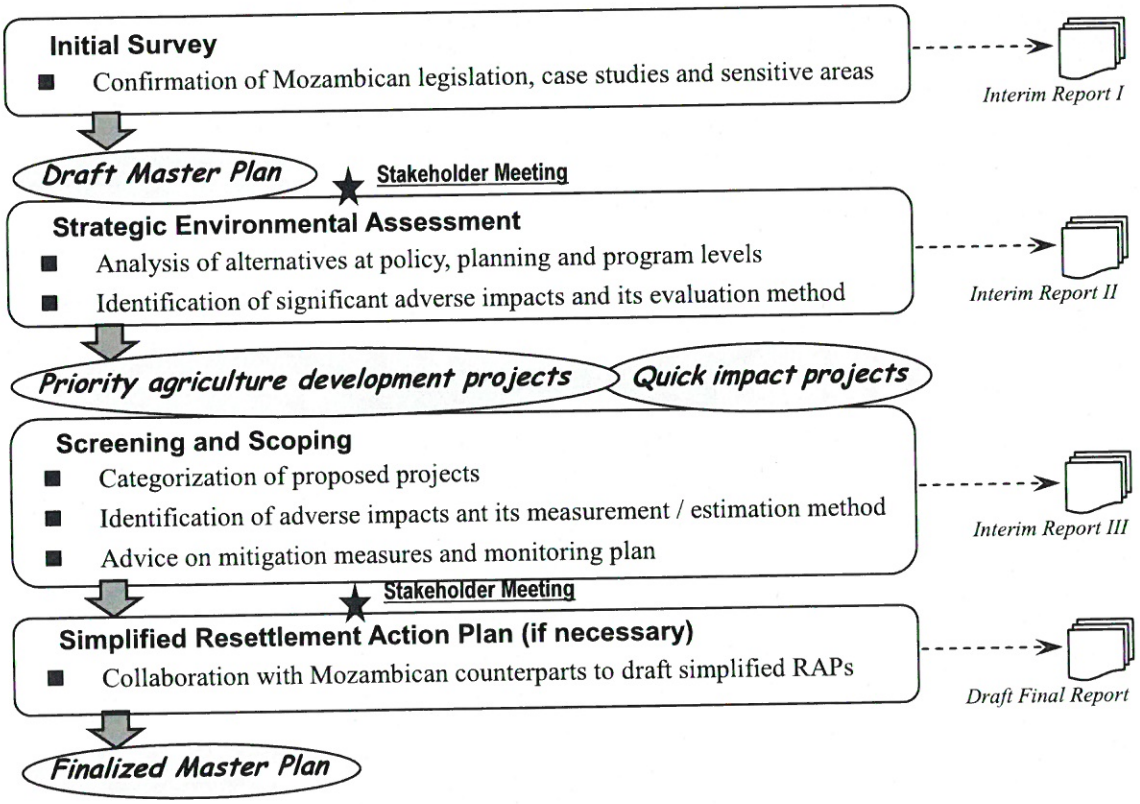


Figure 2.10.1 Steps of Environmental and Social Considerations

2.10.2. Legal Framework

(1) General

Environmental and social protection in Mozambique is supported by a number of framework laws and specific regulations (Table 2.10.1) based on the Republic's Constitution.

Table 2.10.1 Legal Framework of Environmental and Social Protection

Major Legal Instruments (only those related to Agriculture/Agro-industry Sector)	Responsible Organs (central / provincial)
Environment in general, Environmental Impact Assessment	
✧ Law no.27/97: Environment Law ✧ Decree no.45/2004: Regulation on Process of Environmental Impact Assessment (plus, Ministerial Orders no.198/2005, 129/2006,130/2006, 182/2010) ✧ Decree no.11/2006: Regulation on Environmental Inspection ✧ Decree no.25/2011: Regulation on Process of Environmental Audit ✧ Decree no.5/2012: Regulation on Simplified License	MICOA / DPCA
Pollution, Waste	
✧ Decree no.18/2004: Regulation on Norms of Environmental Quality, Emissions and Effluents (plus, Decree no.67/2010) ✧ Decree no.13/2006: Regulation on Waste Management ✧ Decree no.6/2009: Regulation on Management of Pesticides	MICOA / DPCA MINAG / DPA (for pesticide)
Land, Forest and Wildlife, Protected Areas	
✧ Law no.19/97: Land Law ✧ Decree no.66/98: Regulation on Land Law (plus, Decrees no.1/2003, 43/2010, Resolution no.70/2008 and Ministerial Orders no.29-A/2000, 144/2010, 158/2011) ✧ Decree no.60/2006: Regulation on Urban Land ✧ Law no.10/99: Forest and Wildlife Law ✧ Decree no.12/2002: Regulation on Forest and Wildlife Law (plus, Decree no.11/2003 and Ministerial Orders no.55/2003, 93/2005)	MINAG / DPA MITUR (for national parks and reserves)
Water	
✧ Law no.16/91: Water Law ✧ Decree no.43/2007: Regulation on License and Concession of Water ✧ Decree no.47/2009: Regulation on Small Dams	MOPH / ARA (at regional level)
Cultural Heritage	
✧ Law no.10/88: Cultural Heritage Protection Law ✧ Decree no.27/94: Regulation on Protection of Archaeological Heritage ✧ Law no.13/2009: National Liberation Heritage Protection Law ✧ Decree no.72/2009: Regulation on National Liberation Heritage Protection Law	MEC / DPEC
Territorial Arrangement, Land Expropriation, Resettlemen	
✧ Law no.19/2007: Territorial Arrangement Law ✧ Decree no.23/2008: Regulation on Territorial Arrangement Law (plus, Ministerial Order no.181/2010) ✧ Resolution no.63/2009: Conservation Policy and its Implementation Plan, Annex 4 ✧ (Approved in May 2012 by Council of Ministers, yet to be promulgated): Regulation on Process of Resettlement caused by Economic Activities	Council of Ministers / Province Government MICOA (for resettlement from protected areas)

Source: JICA Study Team

Mozambique is also a signatory of the following international agreements on the natural environment:

- AU African Convention on the Conservation of Nature and Natural Resources (ratified in 1981)
- Convention on International Trade in Endangered Species of Wild Fauna and Flora (ratified in 1981)
- UNESCO Convention Concerning the Protection of the World Cultural and Natural Heritage (ratified in 1982)
- UN Convention on Biological Diversity (ratified in 1994)
- SADC Protocol on Wildlife Conservation and Law Enforcement (ratified in 2002)
- UNESCO Convention on Wetlands of International Importance Especially as Waterfowl Habitat (ratified in 2003)
- SADC Protocol on Forest Activities (ratified in 2009)

(2) Zones for Protection

Mozambican legislation defines several types of zone for protection as summarized in Table 2.10.2. According to Land Law and its Regulation, both "zones for total protection" and "zones for partial protection" prohibit most human activities therein, but some activities may exceptionally be acceptable if duly licensed by competent authorities. Acquisition of DUAT (right to use and benefit of land) is not allowed in these zones.

Forest and Wildlife Law and its Regulation prohibit in national parks all such activities (except for by scientific reasons or by necessity of park management) as hunting, forestry, agriculture, mining, livestock farming, research, survey, sounding, landfill, any works that may alter terrain or vegetation, pollute water or disturb flora and fauna, and, introduction of animal or plant species regardless of being native or exotic, wild or domestic. Utilization of natural resources existing in national reserves is subject to environmental license and each reserve's management plan, as long as it may not damage the specific objective of the reserve's creation. In case of "zones of historical cultural value and use" local communities' right to access to forest and wildlife resources in accordance with customary norms and practices is guaranteed for either economic, social or cultural purpose, as long as the communities respect related restrictions such as protection of certain species and payment of exploitation fee.

It is worth mentioning that GOM recently approved the "Conservation Policy and its Implementation Strategy (Resolution no.63/2009)" where reclassification of the conservation areas is proposed in order to set up a new system more adequate to actual reality.

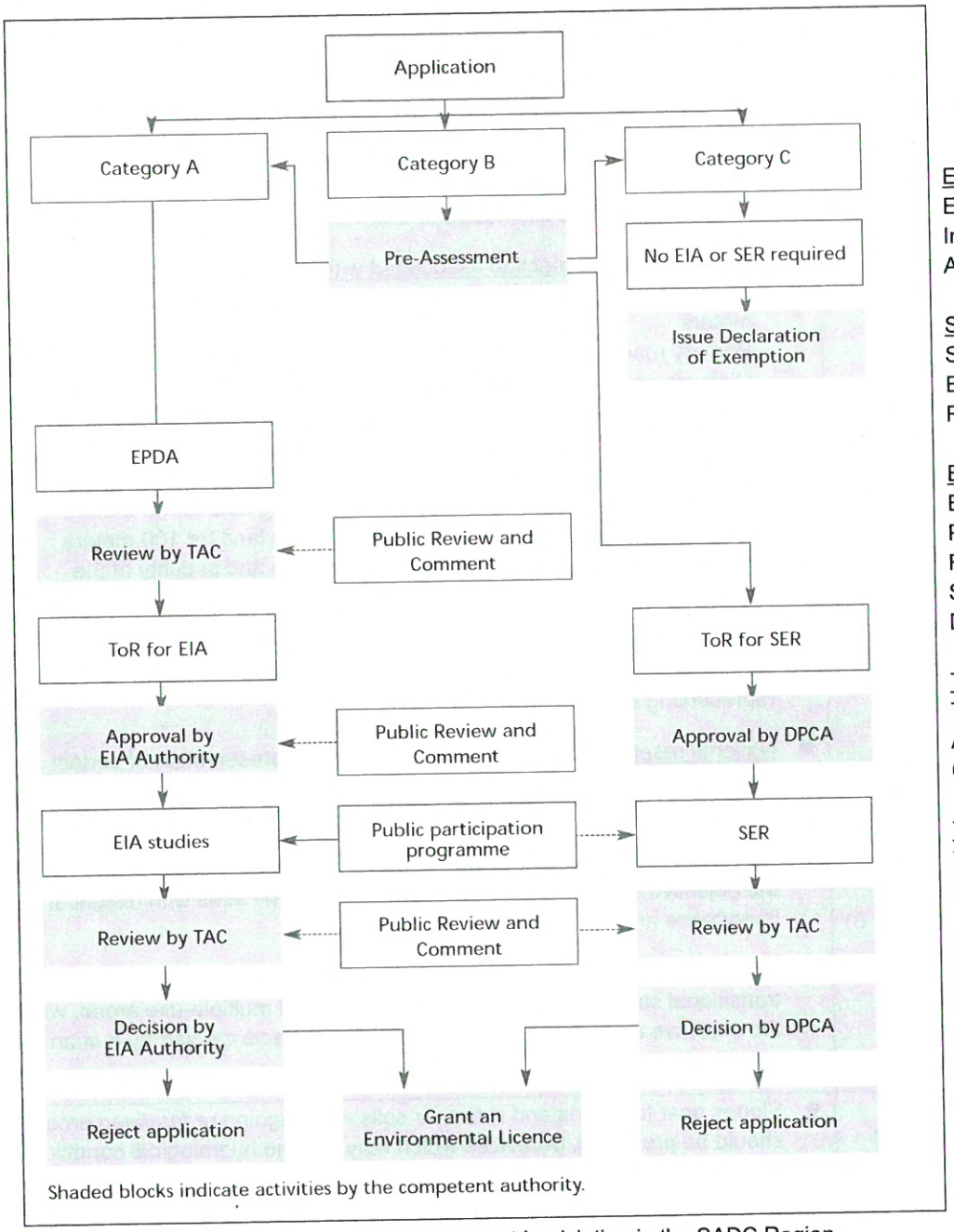
Table 2.10.2 Zones for Protection by Mozambican Legislation

Legal Background	Zones for Protection
Land Law (Articles 7, 8, 9) in 1997	● Zones for total protection: areas oriented for activities of conservation or preservation of nature, as well as defense and security of the country. ● Zones for partial protection: - Inland water bodies, territorial waters, exclusive economic zone - Continental shelf - Strip of land along navigable rivers and lakes, up to 50 meters measured from the water's edge at maximum level - Strip of land up to 100 meters adjoining to water sources - Strip of seashore and the lands around islands, bays and estuaries, up to 100 meters measured from the water line at high tide toward inland - Strip of land surrounding dams up to 250 meters - Strip of land with 2 kilometers of width along terrestrial border
Regulation on Land Law (Articles 4, 5, 6, 7, 8) in 1998	● Zones for partial protection associated with public infrastructure: - Secondary and tertiary roads, and the strip of adjoining land for 15 meters - Primary roads and the strip of adjoining land for 30 meters - Highway or roads of 4 lanes, and the strip of adjoining land for 50 meters - Aerial, superficial, underground or submarine facilities and ducts related to electricity, telecommunication, petroleum, gas and water, and the strip of adjoining land for 50 meters - Railways and stations, and the strip of adjoining land for 50 meters - Airports and airstrips, and the strip of adjoining land for 100 meters - Military facilities and other facilities for defense and security of the country, and the strip of adjoining land for 100 meters
Forestry and Wildlife Law (Articles 10, 11, 12, 13) in 1999	● National parks: Territorial space delimitated for preservation of natural ecosystems, generally areas of great scenic beauty and those representing the country's heritage ● National reserves: Territorial space oriented for preservation of certain species of flora and fauna which are rare, endemic, threatened, extinguishing or declared to be in decline, as well as fragile ecosystems
Regulation on Forestry and Wildlife Law (Articles 2, 3, 4, 5, 6, 7, 8) in 2002	● Zones of historical cultural value and use: Territorial space delimited with the objective of protecting sacred forests and other sites with historical importance and cultural use for local community ● Buffer zone: Terrain surrounding a zone for protection, which forms a transitional strip between the protected area and multiple-use areas, with the objective of controlling and reducing the impacts caused by human activities
Water Law (Articles 57, 58) in 1991	● Slopes near fountains and rivers, or soils with ongoing or foreseen erosion should be protected. (Activities which may change hydrological conditions need authorization.)
Regulation on Protection of Archaeological Heritage (Article 21) in 1994	● Zones for archaeological protection: Zones surrounding archaeological sites or other areas with evidence of archaeological elements of inestimable scientific value and importance for future generations

Source: JICA Study Team

(3) Environmental Impact Assessment

Mozambican legislation requires an EIA for all public and private activities that may influence environmental components either directly or indirectly. The process of EIA is different depending on the categorization of the proposed project (see Figure 2.10.2).



Acronyms

EIA
Environmental Impact Assessment

SER
Simplified Environmental Report

EPDA
Environmental Pre-viability Report and Scope Definition

TAC
Technical Assessment Commission

ToR
Terms of Reference

DPCA
Provincial Directorate for Coordination of Environmental Affairs

Source: Handbook on Environmental Assessment Legislation in the SADC Region

Figure 2.10.2 Flowchart of EIA Process

Table 2.10.3 Criteria of Project Categorization for EIA

Category	Activity (only those related to Agriculture/Agro-industry Sector)
A	➢ All activities related to and/or situated in the sensitive areas described in **Table 3.10.1** ➢ Parceling for agriculture of more than 350ha with irrigation or 1,000ha without irrigation ➢ Conversion of agricultural land for commercial, urban or industrial purposes ➢ Conversion of areas equal to or more than 100ha of agricultural land without cultivation for more than 5 years to intensive agriculture ➢ Introduction of new crops and exotic species ➢ Irrigation systems for areas of more than 350ha ➢ Aquaculture or marine fish culture with production more than 100 tons/year and area equivalent to or greater than 5ha ➢ Intensive animal breeding of more than: 100,000 poultry; 3,000 pigs and/or 100 breeding sows; and, 500 cattle and individual or cumulative area of less than 2,000ha (4ha/animal) ➢ Aerial or terrestrial spraying over individual or cumulative are greater than 100ha ➢ Factory for animal feed with production of 2,000 tons/month ➢ Production of animal oils and fats (production equal to or greater than 75 tons/day) and vegetable oils and fats (production equal to or greater than 300 tons/month) ➢ Sugar mills including the cultivation of sugarcane ➢ Reclamation, parceling and exploration of indigenous vegetative cover with individual or cumulative area greater than 100ha ➢ Deforestation with more than 50ha, reforestation and forestation of more than 250ha ➢ Commercial exploitation of natural fauna and flora ➢ Industrial allotment with more than 15 ha ➢ All principal roads outside urban zones, construction of new roads ➢ Water conduits of more than 0.5m diameter and with more than 10km in length ➢ Dams and weirs with an inundated area equivalent to or greater than 5ha ➢ Exploration for, and use of, underground water resources including the production of geothermal energy which imply the extraction of more than 500 m^3/h or 12,000 m^3/day ➢ Manufacture of pesticides ➢ Production or processing of fertilizers
B	➢ All activities that do not appear in the Categories A and C
C	➢ Irrigation schemes with individual or cumulative area between 50 and 100ha ➢ Transformation or removal of indigenous vegetation with areas between 100 and 200ha without irrigation ➢ Exploration for, and use of, underground water resources including the production of geothermal energy which implies extraction of more than 200 m^3/year ➢ Poultry farming in pavilion with capacity between 1,000 and 1,500 poultry ➢ Fruit and flower preservation industries with production equal to or greater than 300 tons/day ➢ Animal feed production factories with production less than 1,000 tons/month ➢ Cashew nut processing factories

A: Projects that may have a significant impact on the environment and therefore a full EIA is required.

B: Projects that do not significantly affect populations or environmentally sensitive areas: the negative impacts can readily be mitigated and few are likely to be irreversible, and therefore only SER is required.

C: Projects that are likely to have insignificant, negligible or minimal effect on the environment, none of which are likely to be irreversible, and therefore do not require either EIA or SER.

Source: Adapted from "Decree no.45/2004 Regulation on the Process of Environmental Impact Assessme nt" and "Handbook on Environmental Assessment Legislation in the SADC Region"

Projects in Category A need authorization by MICOA at the central level, while projects of Category B are authorized by DPCA at the provincial level to obtain an environmental license. At the district level, SDPI is responsible for environmental affairs but its role is still limited in EIA and licensing. The applicant should bear all the costs of EIA or SER and the licensing fee. In Mozambique, only professional consultants registered at MICOA can undertake EIA or SER. Public participation is obligatory for Category A projects and optional for Category B projects, whereas it turns obligatory when the project implies resettlement, relocation of goods or restriction on use of natural resources. Technical reports produced during the EIA process should be open and available to public consultation, and its records are required as attachment to the EIA/SER study report. The period of an EIA can vary by many factors: it is known that is some cases more than a year was needed. Once authorized, the project has to start its activity within two years from the date of issue of the license. An environmental license will be valid for five years, renewable for an equal period.

An EIA study report must consist of an executive summary, main report, environmental management plan, public participation report and an annex. Socio-economic impacts on local communities are also included in the same EIA study. DUAT (either application or provisional authorization) and an investment proposal for CPI must be attached as an annex. The necessity for and procedure of resettlement action plan (RAP) is not clearly stated in the "General Guideline for Elaboration of Environmental Impact Study (Ministerial Order no.129/2006 by MICOA)": however, in an example case in the study area, a RAP was submitted together with the EIA study report but it took more than half a year to be approved. Implementation of an environmental management plan as well as RAP, including periodical monitoring and audit, follow the issuance of license and start of the project activities. Some case studies will be described in Chapter 3.

Very recently, "Regulation on Simplified License (Decree no.5/2012)" was approved by Council of Ministers. According to this new legal instrument, certain kind of economic activities including agriculture can be exempt from EIA studies or SER by obtaining 'simplified license' which is valid for an indefinite period. However, this is not applicable to foreign legal representatives. It will be important to gather and analyze example cases of agricultural projects to which this new system is being applied. Eligible activities for 'simplified license' include the following:

- Agriculture up to 350ha with irrigation or 1,000ha without irrigation
- Animal husbandry (up to 50 head of cattle, 3,000 pigs and/or 100 sows, and, 100,000 poultry).

2.11. Foreign Donors for Agriculture and Rural Development

2.11.1. Aid Coordination

Mozambique is one of the most active countries of aid coordination in sub-Saharan Africa, and a large number of donor countries and organizations provide general budget support. Currently, 19 countries and organizations (Germany, Belgium, Denmark, United Kingdom, Italy, Finland, France, Ireland, Norway, Netherlands, Portugal, Sweden, Switzerland, Canada, Spain, Austria, World Bank, EU and African Development Bank) provide general budget support, and are called PAPs (Program Aid Partnership) or G19. Because the framework of general budget support by G19/PAPs becomes the framework of monitoring and evaluation of PARPA as the Poverty Reduction Strategy Paper of Mozambique, G19/PAPs has a great influence in determining the development policy in Mozambique.

On the other hand, donors that have not given general budget support such as Japan, the United States and UN agencies, are collectively referred to as Non-PAPs. It is said that the macro perspective channels of Non-PAPs to make a policy dialogue with the Government of Mozambique are limited. Japan is participating as an observer to the meeting of the general budget support in the donor meeting holding on a regular basis and a joint meeting between the donors and the Government of Mozambique (Mozambique Country Evaluation, Ministry of Foreign Affairs of Japan, 2009)

Recently, the World Bank announced the "Partnership Strategy of Mozambique 2012-2016" in April 2012. This strategy will plan to support programs reaching 1.04 billion US$, and includes aims for extensive economic growth. In the 2011 annual review, the G19 was evaluated as "satisfactory" regarding the implementation of the outcomes of the Government of Mozambique, and expressed general budget support of 2013 will continue to be carried out. On the other hand, they are seeking further efforts from the Government of Mozambique regarding to anti-corruption to improve the transparency of public administration including the publication of contents such as contracts with mining companies and government and facilitate the implementation of the education sector strategic plan.

2.11.2. Donors' Trend of Assistance for Agriculture and Rural Development Sector

According to a report by the Netherlands' government, the Government of Mozambique and partners agree that an important policy shift is needed to broaden growth and to allow larger segments of the population to benefit from it (inclusive growth). In particular, agricultural productivity of smallholders is at a very low level. There is an urgent need to stimulate agricultural productivity and rural development

in general; agricultural production and productivity are major bottlenecks to the country's economic development. At least 70% of Mozambican families live in rural areas, and most of these are involved in agriculture. However, Mozambicans do not cultivate enough to feed themselves. If all food produced annually was divided equally to all Mozambican families, it would not suffice to provide them with the necessary calories.

Significant technical constraints (access to improved seeds, extension services, fertilizers, etc.) hinder production and market chain development. Lack of enabling infrastructure (roads and electricity) further contributes to the stagnation of agricultural productivity at levels between 30% and 60% of available potential (Gender Policies and Feminization of Poverty in Mozambique, CMI 2008). The involvement of the political elite in food imports, an example of state-party-business nexus (Chatham House Report, 2010) is not conducive to private initiative. Risk-adverse financial providers are hindering access to capital and financial services (only 4% of the rural population has access to capital) further limit the development of viable and sustainable commercial agriculture, in which government and the (smallholder) private sector jointly operate. In general, the government promotes large plantation investments that contribute to the development of the macro-economy and create some job opportunities but are not focused on social development, which requires the development of the small and medium agricultural enterprise sector.

Also, smallholder farmers have no secure land access, which affects long-term investments. An initially strong political commitment to pro-poor land reform, expressed in the innovative land law, securing land rights for rural communities and promoting private investment is being challenged by a tendency to make quick gains, neglecting community land rights.

The opportunities lie in the integration of competencies of all actors involved (donors, NGOs, private and public sector) through practical work, research on market chain development and through professional and vocational training. Enhanced access to capital by local actors (farmers, processors and traders) in the agricultural and rural sector is essential.

Mozambique is highly dependent on aid flows. In 2011, 44% of the State Budget came from external sources, and there were dozens of sectorial programs and common funds, as well as hundreds of projects being implemented in the country. Tax revenues, however, have recently increased. In 1996, tax revenues represented 9.9% of GNP and in 2011, they represented around 16%. Gradually, Mozambique is catching up with other low-income SADC countries, such as Malawi (18% of GDP) and Zambia (18% of GDP), and the government still has a huge potential to improve

its revenue collection at both central and municipal level (Netherlands Embassy Maputo-Mozambique Multi-Annual Plan 2012-2015, Ministry of Foreign Affairs, 2011).

CHAPTER 3 PRESENT CONDITION AND ISSUES OF THE AGRICULTURE IN THE STUDY AREA

3.1. Present Conditions of the Study Area

The Nacala Corridor is started from Nacala Port in east side of Nampula province in northern Mozambique and connecting to Blantyre in Malawi and Zambia. Along the corridor, road and railway is developing in this moment.

The Nacala Corridor area where is the Study Area, is located across the provinces of Nampula, Zambezia and Niassa. The provinces of Nampula and Niassa are included in the north region and the province of Zambezia is included in the central region of Mozambique. Area and population of each province are as follows:

Table 3.1.1 Area and Population of the Three Provinces

Province	Area (km²)	Population (2010)	Population density (hab./km^2)
Nampula	81,606	4,414,144	54.1
Zambezia	105,008	4,213,115	40.1
Niassa	129,056	1,360,645	10.5

Source: Statistic Yearbook 2010, INE.

The population of the Nampula province in 2010 was approximately 4.4 million inhabitants, being one of the most populated provinces in Mozambique, together with the Zambezia province. The population is concentrated in the municipalities of Nampula and Nacala which together with 6 coastal districts, concentrate more than 40% of the total population of the province. The Zambezia province has a population of approximately 4.2 million inhabitants, with the biggest province next to the Nampula province. The population is concentrated in the municipality of Quelimane and surrounding area. On the other hand, the Niassa province has a population of 1.4 million inhabitants, being the least populated province in the country. The population is concentrated in the municipalities of Lichinga and Cuamba, totaling approximately 30% of the total population of the province.

In these provinces, the Study Area was selected along the "Nacala Corridor" consisted of 14 districts. Total area of the Study Area is estimated as 65,907 km^2 and it is about 8.7% of whole territory.

In the second Joint Coordination Committee held in June 2012, two districts of Niassa, such as Manjune and Sanga, are integrated in the target area of ProSAVANA. So that, some topics are described about both districts.

3.1.1. Topography

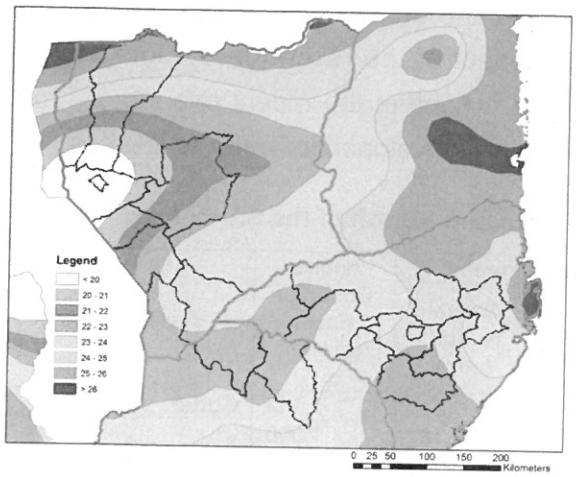
Altitude of the Study Area ranges from below 100m to over 2,400m above sea level. Flat and low coastal plain characterizes the eastern region (Meconta, Mogovolas and Monapo Districts). Altitude arises westward, and a hilly zone extends up to the central region (Muecate, Murrupula, Nampula, Ribaue Districts, also part of Alto Molocue and Malema Districts) with prominent peaks such as Mount Mepalue (1,777m asl). There is a massif of steep-sloped high mountains in the southern region (Alto Molocue, Gurue and Malema Districts), being Mount Namuli the highest point (2,419m asl) of the Study Area. In the middle-western region (Cuamba and Mandimba Districts) the topography is largely represented by floodplain along Lake Amaramba (630m asl). Lichinga Plateau extends in the northwestern region (Lichinga and Ngauma Districts) with relatively elevated altitude up to Monte Livigire (1,728m asl). To the west end, the terrain drops to the shore of Lake Niassa (470m asl). Through most part of the Study Area, the landscape is characterized by numerous inselbergs. The geological foundation of the Study Area consists of metamorphic rocks such as quartzite, schist and gneiss, occurring between them volcanic as well as sedimentary rocks. Almost all the river basins of the Study Area drain towards the Indian Ocean, with a few exceptions draining toward Lake Niassa.

3.1.2. Climate

The mean annual temperatures in the Study Area vary from 25 to 26 ºC in the eastern (coastal) area, represented by Monapo, and it declines to from 22 to 23ºC in the western (inland) area, represented by Cuamba. In the high land area of Lichinga, the mean annual temperature goes below 22 ºC. The mean maximum and minimum temperature is from 32 to 33 ºC and more than 20 ºC in the eastern area, and from 28 to 29 and from 15 to 16 ºC in the western area. Lichinga has cooler climate due to the high elevation, which is below 27 ºC for maximum and below 16 ºC for minimum. (Refer to Figure 3.1.1)

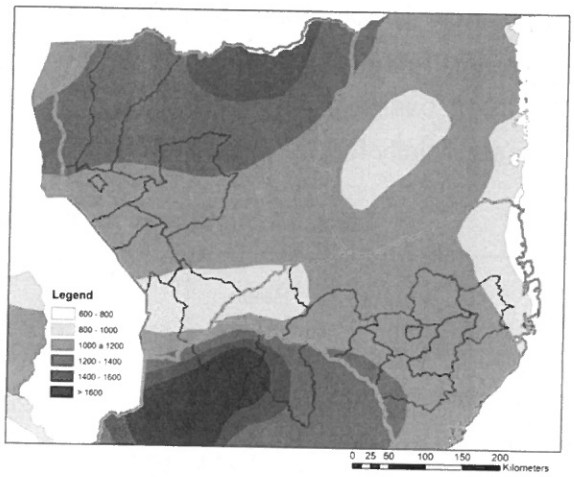
The rainy season goes from November to April and the dry season goes from May to October. According to the isohyet of annual precipitation shown in Figure 3.1.2, the mean annual precipitation ranges from 1,000 to 1,200 mm in the major part of the Study Area, besides there are the area with from 800 to 1,000 mm of precipitation in Monapo, Meconta, Mogovolas, a part of Malema and Cuamba, and the area over 1,200 mm of precipitation in Gurue and Alto Molocue. Some mountainous area in Gurue shows more than 1,600 mm of annual precipitation.

Table 3.2.1 shows the mean monthly precipitation of selected districts. Even though some difference is observed, the precipitation from October to April occupies more than 94% of annual one and more than 99% of precipitation is observed until June.



Source: IIAM

Figure 3.1.1 Annual Mean Temperature



Source: IIAM

Figure 3.1.2 Annual Precipitation

Table 3.1.2 Mean Monthly Precipitation of Selected Districts (unit : mm)

Station	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual	Year / Source
Malema	12.5	71.8	278.5	445.2	295.9	151.5	44.7	2.8	0.9	1.6	0.0	0.0	1,241	98/99-10/11 DPA
	1%	6%	28%	62%	85%	96%	100%	100%	100%	100%	100%	100%		
Nampula	16.2	29.3	318.4	362.1	208.7	179.6	79.2	33.2	27.2	4.5	7.0	2.4	1,065	98/99-10/11 DPA
	1%	4%	29%	57%	74%	88%	94%	97%	99%	99%	100%	100%		
Meconta	10.1	49.6	128.5	230.5	193.5	145.2	62.7	4.0	14.6	4.9	1.5	1.0	857	98/99-10/11 DPA
	1%	7%	22%	49%	72%	90%	97%	97%	99%	100%	100%	100%		
Cuamba	21.6	88.5	232.5	353.3	220.6	123.3	49.9	6.8	0.5	4.2	3.6	4.7	1,087	96/97-06/07 INM
	2%	10%	31%	63%	83%	94%	98%	99%	99%	99%	100%	100%		
Lichinga	26.9	78.9	280.8	334.7	255.5	208.0	53.3	12.6	1.9	0.8	1.6	1.0	1,256	00-10 INM
	2%	8%	31%	57%	78%	94%	99%	100%	100%	100%	100%	100%		

Source: DAP Nampula, INM

3.1.3. Water Resources

The Study Area is divided to 2 major river basins, one is the Rovuma river basin and another is the Lurio and other river basins. The districts of the Study Area in Niassa Province except for Cuamba are located in the Rovuma river basin. They belong mainly to the Upper Lugenda Sub-basin, which is the most upper sub-basin in the south direction of the Rovuma Basin. A limited part of Lichinga District belongs to the Lucheringo and Middle Lugenda Sub-basin. Sanga and Majune District belongs to the Lucheringo and Middle Lugenda Sub-basin respectively. Cuamba and districts from Nampula and Zambezia Province are located in the major river basins of ARA-CN jurisdiction - from South to North, Licungo, Melela, Molocue, Ligonha, Meluli, Monapo, Mecuburi and Lurio. All of major basins and its rivers run through the Study Area to a greater or lesser. The districts of the Study Area stand on the upper reach of each river basin due to its inland location. The character of river basin and

runoff is summarized in Table 3.1.3. Due to the limitation of available data, the information on runoff is rather old and the effect of the recent development of the river basins is not considered. It is required to confirm the recent change of runoff especially for the Monapo River, which is quickly developed its water resources.

Table 3.1.3 Character of River Basin and Runoff of the Study Area

Basin	Area of Basin (km^2)	Basin Rainfall (mm)	Station at the lowest reach			Annual Runoff of Basin (million m^3)	Related District
			Station	Catchment Area (km^2)	Annual Runoff (mm)		
Licungo	22,531	1,400	E91	20,400	317	7,142	Gurue
Melela	8,287	1,330	E99	5,500	181	1,500	
Molocuè	1,372	1,274	E192	1,200	192	263	Alto Molócue
Ligonha	14,552	1,134	E132	5,410	257	3,740	Ribaue
Meluli	9,398	1,160	E127	5,200	256	2,406	Mogovolas, Murrupula
Monapo	7,734	1,095	E140	6,000	126	975	Monapo, Nampula, Muecate
Mecuburi	8,925	1,258	E122*	1,438	57	509	Muecate
Lurio	61,423	1,029	E128:*	56,200	142	8,722	Cuamba, Gurue, Malema, Ribaue
Malema	1,000	-	E142*	1,000	769	769	Malema
Upper Lugenda	15,938	-	E215	14,735	262	3,865	Lichinga, Ngauma, Mandimba, Cuamba, Gurue, Malema, Ribaue
Middle Lugenda	25,952	-	E202*	42,400	168	7,126	Majune
Lucheringo	11,184	-	-	-	-	-	Sanga, Lichinga

Remarks: * Observation was stopped before 1980's and not recovered at present.
Source: ARA-CN, ARA-N, Report of Development of the Ruvuma River Basin Monograph and Joint Integrated Water Resources Management Strategy

3.1.4. Soil

In Mozambique, several versions of soil map are available as shown in Table 3.1.4. It should be noted that large areas in northern region are only known at exploratory level or from satellite imagery interpretation without proper ground check. Detailed soil survey and mapping of the Study Area is under way by IIAM and ProSAVANA-PI.

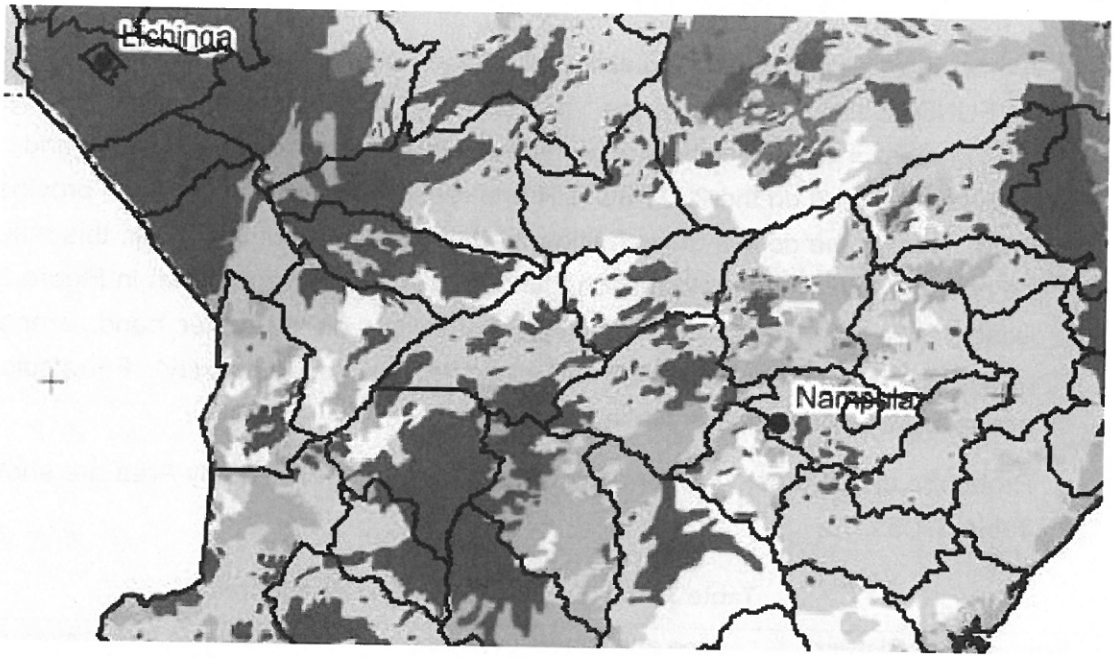
Table 3.1.4 Soil Maps of Mozambique

Year	Elaborated by	Description
1994	IIAM (formerly INIA)	Soil maps covering whole country at scale 1: 1,000,000 according to FAO/UNESCO soil classification system; Available for each province.
2002	IIAM (formerly INIA)	A new international standard of soil classification system (WRB: world reference base for soil resources) was applied to 1994 soil maps.
2003	ISRIC / FAO / UNEP	Soil and terrain digital database (SOTER) covering 8 countries of southern Africa which also provides estimate of soil parameters: In case of Mozambique, scale 1: 2,000,000 based on above soil maps.
2010	FUNDAG / IIAM	National soil map at scale 1: 250,000 according to WRB soil classification system, elaborated as part of "Agro-climatic Micro-Zoning Program (STABEX)" based on 2003 SOTER.
2011	EMBRAPA (in ProSAVANA)	Soil classification system of Brazil was applied to 1972 national soil maps of Mozambique elaborated by INIA at scale 1: 2,000,000.

Source: JICA Study Team

In Nampula Province, soils of several districts such as Monapo, Muecate, Nampula and Ribaue were surveyed in more detail in 1995. Comparing the scale, applied soil classification system and published year of above soil maps, it would be most recommendable to use 2010 soil map elaborated by FUNDAG / IIAM for the purpose of the present study.

As shown in Figure 3.1.3, major soil types in the Study Area correspond relatively well to the relief. Lixisols dominate from the flat and low coastal plain of the eastern region, extending through the hilly zone of the central region, up to part of middle-western region. Ferralsols occupy most part of the Lichinga Plateau of the northwestern region, and also can be seen in the massif of steep-sloped high mountains of the southern region. Arenosols are distributed mostly in the southern region and partly in the central to eastern region. Gleysols and fluvisos represent the vast floodplain along Lake Amaramba in the middle-western region. Acrisols occur as relatively small spots through the Study Area except Lichinga Plateau. Finally, leptosols are distributed quite locally representing rock mountains and inselbergs.



Source: JICA Study Team (adapted from "Agro-climatic micro-zoning program, FUNDAG/IIAM 2010")

Legend	Soil Type	Characteristics
Light Gray	Lixisols	Higher clay content in subsoil; Low-activity clays; High base saturation
Red	Ferralsols	Deeply weathered; Red or yellow; High content of sesquioxides
Orange	Arenosols	Sandy; Weak development by in situ weathering or on recent deposits
Blue	Gleysols	Wetland soils; Saturated with groundwater for long periods unless drained
Light Green	Fluvisols	Young soils developed in alluvial deposits
Light Yellow	Acrisols	Acidic; Higher clay content in subsoil; Low-activity clays; Low base saturation
Dark Green	Leptosols	Very shallow soils over rock; Extremely gravelly and/or stony.

Figure 3.1.3 Soils in the Study Area

Very limited information is available on the soil fertility of the Study Area. 2003 SOTER (soil and terrain digital database) by ISRIC/FAO/UNEP provides estimate of soil parameters based on digital elevation model and interpolation among only 127 soil profiles for whole country, whereas real values of soil physico - chemical properties obtained by analysis or measurement are still critically insufficient. Detailed soil survey is being undertaken by IIAM and ProSAVANA-PI, but the results remains yet to be published. According to provisional data provided by ProSAVANA-PI team and JIRCAS, the soils of the Study Area are almost neutral or only weakly acidic, except for several samples in Gurue Districit with pH lower than 6, thus not having severe acidity problems. Salinity problem is not reported, either. Nutritional level of nitrogen, phosphorous and potassium is reported to be fair to deficient, especially low for potassium. Texture was mostly sandy with a few exceptional clayey soils. Other problems such as contamination, compaction, alkaline or sodic soils, depletion of organic matter, or existence of acid sulfate soil, are not reported (however, this does not guarantee that such problems do not exist currently or will not occur in the future).

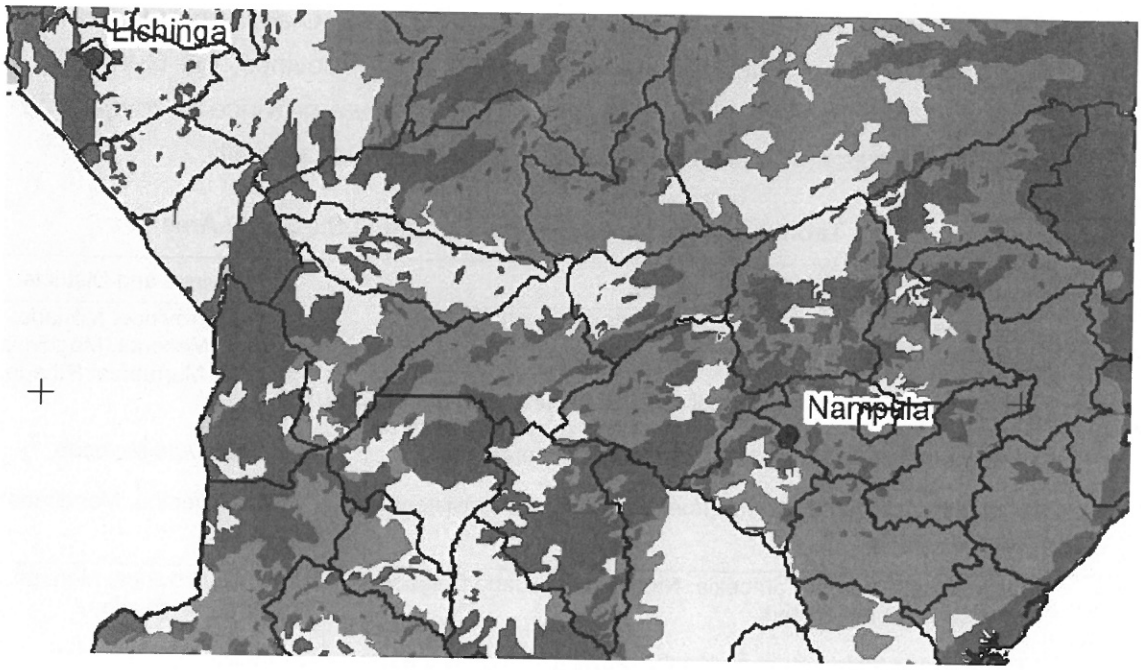
A map showing agricultural suitability of soils at national scale was produced in 2010 by FUNDAG/IIAM, as part of the "Agro-climatic Micro-Zoning Program (STABEX)". This process involved evaluation of natural fertility, compaction, stoniness and depth of the soils based on the 2003 SOTER and recent additional information provided by IIAM. Though the details of evaluation methodology are not fully clear, this map can be cited as one of the most reasonable cases at present. As shown in Figure 3.1.4, lixisols gain good evaluation as "high suitability"; on the other hand, arenosols, gleysols, fluvisols and leptosols are classified as "low suitability". Ferralsols and acrisols are evaluated as "middle suitability".

Problems of soil erosion reported in several districts of the Study Area are shown in Table 3.1.5.

Table 3.1.5 Soil Erosion in the Study Area

Province	District	Type and Cause of Erosion	Locally applied measures
Nampula	Mogovolas	Gully (Rain, Disordered land use, Human activities)	Planting protection trees (acacias) and construction of barriers.
	Monapo	Gully (Rain, Disordered land use, Human activities)	Construction of barriers and planting vegetation (nacaraca).
Zambezia	Alto Molocue	Laminar, Gully, Landslide (removal of vegetation from mountain slopes)	-
	Gurue	Gully (Rain, Removal of bush)	-

Source: Adapted from "Action Plan for Prevention and Control of Soil Erosion 2008-2018, MICOA 2007"



Legend (Green: High, Yellow: Middle, Red: Low)

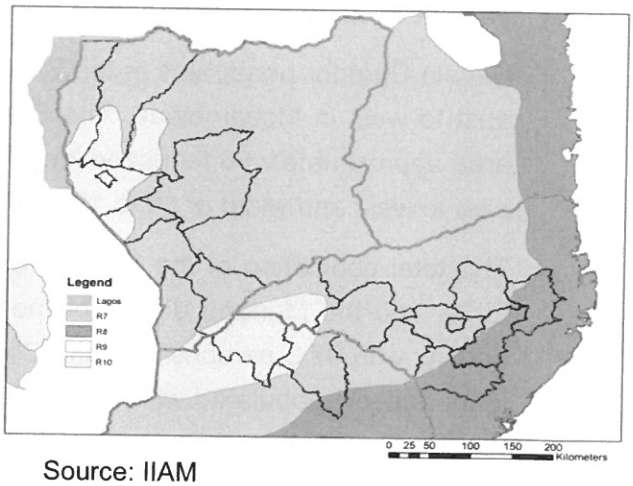
Source: JICA Study Team (adapted from "Agro-climatic micro-zoning program, FUNDAG/IIAM 2010")

Figure 3.1.4 Agricultural Suitability of Soils in the Study Area

3.1.5. Agro-Ecological Zoning

The annual mean temperature in the Study Area varies from 20 °C around Lichinga district to over 25 °C around Mogovolas district, as shown in Figure 3.1.1. The Gurue district has lower temperature rather than surroundings caused by higher altitude. The annual precipitation is over 1,000 mm in the almost area except of Cuamba district and a part of Malema district. The precipitation in Gurue district is over 1,600 mm annually.

The Study Area is covered by the 3 agro-ecological zoning, such as R7, 8, and 10, as shown in the Figure 3.1.5 and Table 3.1.6. The eastern part of Nampula province is covered by R8 zone, which has high temperature more than 25 °C and precipitation between 800 and 1200 mm annually. The central part of Nampula province, Alto Molocue district in Zambezia province, and the south-east part of Niassa province is covered by



Source: IIAM

Figure 3.1.5 Agro Ecological Zoning in the Study Area

R7 zone, which has the temperature between 20 to 25 °C and precipitation between 800 and 1000 mm. The Malema district in Nampula province, the Gurue district in Zambezia province, and the Lichinga district in Niassa province is covered by R10 zone, which has much precipitation more than 1200 mm annually.

Table 3.1.6 Agro-ecological Zoning in the Study Area

Zone	Description	Province and Districts
Zone 7	This area includes the land between 200 and 1,000 meters in altitude (sub-planaltic, low planaltic, and midplanaltic). The annual rainfall and potential evapo-transpiration of the region ranges from areas above 25 °C (classified as warm region) and others with temperatures of 20-25 °C (moderately warm). The texture of the soils varies from sandy to clay, consistent with the topography.	Nampula Province: Monapo, Muecate, Meconta, Mogovolas, Nampula, Murrupula, Ribaue, Malema Zambezia: Alto Molocue Niassa: Cuamba, Mandimba, Ngauma
Zone 8	The coastal littoral of Zambezia, Nampula and Cabo Delgado consists of a strip of land. The average temperature during the growing season is greater than 25 °C. The annual rainfall ranges is 800-1,200 mm, and the evapo-transpiration rate is 1,400-1,600 mm. Sandy soils, with heaver soils in the lowest areas.	Nampula Province: Monapo, Meconta, Mogovolas Zambezia: Alto Molocue
Zone 10	The high altitude region of Zambezia, Niassa, notably in the planaltic regions of Lichinga, high Zambezia. The annual rainfall is greater than 1,200 mm and average temperature during the period is 15-22.5 °C. The soils are principally ferrasols.	Nampula: Ribaue, Malema Zambezia: Alto Molocue, Gurue Niassa: Ngauma, Lichinga

Source: Mozambique Agricultural Development Strategy, World Bank, February 2006
Arranged by JICA Study Team

3.1.6. Socio-economic Conditions

(1) The Study Area and Population

Nacala Corridor penetrates in the Study Area with length of more than 600 km from east to west in Mozambique. The Study Area is composed of 14 districts with the area approximately 66 thousand km^2 spreading with length of approximately 600 km east to west and width of 30 to 130 km from north to south.

The total population of the Study Area is approximately 3.73 million inhabitants in 2011, and the Monapo district of the Nampula province is the highest population density with 97.2 persons/km^2 and Chimbonila district of the Niassa province is the least densely populated with 20.4 persons/km^2. Population density of 14 districts of the Study Area is 56.2 persons/km2 which is the high population density area compared with about two times of the national average with 29.2 persons/km^2.

Table 3.1.7 Area and Population of the Districts

	Area (km²)	Population (hab., 2011) *1	Population Density (hab./km²)
Nampula Province			
Monapo	3,528	342,946	97.2
Muecate	4,121	105,350	25.6
Meconta	3,690	174,358	47.3
Mogovolas	4,728	330,787	70.0
Nampula City	331	553,703	1,672.8
Rapale (Nampula)	3,675	243,908	66.4
Murrupula	3,104	158,877	51.2
Ribaue	6,271	220,178	35.1
Malema	6,075	182,531	30.0
Total	35,523	2,312,638	65.1
Zambezia Province			
Alto Molocue	6,363	319,867	50.3
Gurue	5,664	350,830	61.9
Total	12,027	670,697	55.8
Niassa Province			
Cuamba	5,363	216,098	40.3
Mandinba	4,698	159,175	33.9
Nguama	3,016	81,314	27.0
Lichinga City	257	177,886	692.2
Chimbonila(Lichinga)	5,438	110,703	20.4
Total	18,772	745,176	814
Grand Total	66,322	3,728,511	56.2

Source: Area, CENACARTA, 1997. Population, INE, 2007. *1: Estimated by the JICA Study Team

(2) Economic Conditions

In the Nacala Corridor areas, industrial activities are mainly concentrated between from the Nampula city to the Nacala city. In addition, the production plants are scattered to the district centers of coastal districts. Nampula city plays an important role as a relay point for distribution to the inland, which is the region that social infrastructures have been most developed in the Nacala Corridor areas. The rest of the area, main industry is agriculture in the inland zone and is fishing in coastal zone; subsistence economic activities have been carried out.

Regarding the economy scale of each province, Gross Regional Domestic Product (GRDP) of Nampula and Zambezia provinces having many populations are large. However, comparing with the large concentration of GRDP to the Maputo city, GRDP of the provinces of the Study Area is less than or equal to one-twentieth of that of the Maputo city.

Comparing the GRDP per capita of each province with the average of whole Mozambique as 439.2 US$ in 2009, in Nampula was 332.0 US$, the highest province in the Study Area, in Niassa was 225.6 US$ and in Zambezia was 222.8 US$. These are level of 51 to 76 percent of the national average, the region's economic activity of the Nacala Corridor area is a low level.

Table 3.1.8 GRDP in the Study Area

Province	1997	2003	2009	GRDP % in the national (2009)
Nampula	585.9	710.0	1,428.1	3.6%
Zambezia	393.8	446.2	914.1	2.3%
Niassa	130.3	147.5	295.2	0.7%
Maputo	566.5	841.3	1,573.8	3.9%
Maputo City	11,676.3	13,383.1	32,248.4	80.5%
Mozambique	14,771.4	17,296.6	40,036.5	100.0%

Source: Detailed Planning Survey Report for the Study on Nacala Economic Corridor Development in Mozambique, JICA, 2011.

Table 3.1.9 GRDP per Capita in the Study Area (US$)

Province	1997	2003	2009
Niassa	161.2	156.7	225.6
Nampula	191.3	203.7	332.0
Zambezia	127.2	125.3	222.8
Maputo	681.8	809.5	1,183.8
Maputo City	773.9	766.4	1,561.1
National Average	240.1	256.9	439.2

Source: Detailed Planning Survey Report for the Study on Nacala Economic Corridor Development in Mozambique, JICA, 2011.

(3) Poverty

Poverty incidence of Mozambique, between 1996 and 2003, was improved falling to 54.1% from 69.4%. However, between 2003 and 2009, the poverty incidence was nearly unchanged. Poverty incidence of Zambezia province, increased from 44.6% in 2003 to 70.5% in 2009 which was the worst province in 10 provinces and one city. Nampula province became also slightly worse. On the other hand, the poverty incidence of Niassa province has improved significantly. Deterioration in the poverty incidence in 2008, to fall in the agricultural sector due to unseasonable weather is the cause. In this manner, the region where main industry is agriculture, the stability of agricultural production to contribute significantly to the improvement of the poverty incidence is understood.

Table 3.1.10 Trends of Poverty Incidence

Province	1996/97	2002/03	2008/09
Nampula	68.9	52.6	54.7
Zambezia	68.1	44.6	70.5
Niassa	70.6	52.1	31.9
National average	69.4	54.1	54.7

Source: PARPA 2011-2014, 2011.

(4) Education

Illiteracy rates of the three provinces are high; women's illiteracy rates were over 70% in particular. This situation has not been much improvement in 2009.

Table 3.1.11 Trends of Illiteracy Rate in the Three Provinces (%)

Year / Province	1997			2003			2009		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Nampula	56.7	85.9	71.7	56.7	85.9	71.7	41.4	76.1	58.8
Zambezia	53.2	85.2	70.3	53.2	85.2	70.3	36.1	77.7	58.4
Niassa	52.2	84.2	69.0	52.2	84.2	69.0	42.9	77.2	60.8

Source: Statistic Yearbook 2010, INE.

Comparing the enrollment rate of primary education in 2002 and 2008, it can be seen that has improved. Enrollment rates of nearly 70 percent have been achieved in rural areas of the northern region where poverty incidence was high. This background is considered that primary education is free and also the result of the Government of Mozambique was tackled as priority development sector as the expansion of primary education. On the other hand, as with the quality of primary education, low enrollment rate of secondary education is also has become an issue. Enrollment rate of secondary education in rural areas of the northern region is very low as 6.4%. Reason for the gap between primary education and secondary education, that secondary education is not free of charge and there is access problem due to few secondary schools.

Table 3.1.12 Enrolment Rate of Primary School and Secondary School (%)

Year / Area	20002/2003		2008/2009	
	Primary School	Secondary School	Primary School	Secondary School
Urban Areas in the North Region	63.9	12.5	73.7	33.3
Rural Areas in the North Region	52.2	0.2	67.5	6.4
National Average	66.8	8.2	76.5	22.0

Source: Understanding Poverty and Well-being Mozambique: Third National Poverty Assessment, MPD, 2010.

In rural areas, it can be seen primary schools in small villages. Schoolhouses are from which is built by only thatched roof and put logs as chairs on dirt floor, up to which is built by roof of galvanized iron and brick outer wall with glass windows. There are large differences by region. Early elementary school (1st level up 5 grades) has been established even in a small settlement, the late elementary school (2nd level up to 7 grades) has been established only in a large village. In addition, there is only secondary school in the city such as the district center. Tuition fees in primary education are free of charge, but for the household having a lot of children of school age, expenditure such as stationery and school transportation costs will be a burden.

(5) Health

In rural areas, health facilities such as health center (Centro de Saúde) and health post (Posto de Saúde) have been established, but number of medical personnel and equipment are insufficient. Access to the health facilities are progressing improvements in recent years, in rural areas of the northern region, from 31.5 percent in 2002 to 69.7 percent in 2008 and was significantly improved (Analysis of Poverty in Mozambique, JICA, 2011.). Major diseases are malaria, diarrhea, dysentery, cholera and venereal disease, in particular, incidence of malaria is many (in the Nampula province in 2011, cases suffering from malaria was 684 thousand, diarrhea was 154 thousand, dysentery was 29 thousand and cholera was 379, Provincial Government of Nampula, 2012 / 7).

In Mozambique, health care costs is a free and national treasury burden, in this sense, the poor class people has not burden of medical expenses. In addition to medical expenses the examination fee and basic cost of purchasing drugs are also included. Also, which is distributed free anti-retroviral drugs (ARV) for persons with HIV infection. Funding by the national treasury burden of medical expenses, are financed by the general budget support from donors.

In the Study Area, other social indicators are as follows:

Table 3.1.13 Social Indicators in the Study Area (2008)

Province	Nampula	Zambezia	Niassa	National Average
Under-five mortality rate per (average in 10 years prior to the survey, per 1,000), [1)]	140	205	123	138
Percentage distribution by province of the prevalence of chronic malnutrition in under-fives, [2)]	51	46	45	44
Access Rate to Safe Water (%) [3)]	43	24	44	44

Source: 1) Multiple Indicator Cluster Survey, MICS, 2008. 2) Report on the Millennium Development Goals, UNDP, 2010. 3) Multiple Indicator Cluster Survey, UNICEF, 2008.

(6) Rural Social Conditions

1) Ethnic and language groups

The main tribe in the Study Area is Makwa-Lomwe. Yao tribe is resident in the Niassa province, in the western part of the Study Area. Makwa-Lomwe tribe occupy in the northern part of Mozambique, is the largest number of ethnic group in country, accounting for 40% of the total population. They follow a system of matrilineal descent including inheritance of land. Their language belongs to the Bantu-group and Yao language also belongs to the same group. Makwa language is still the primary language of the inhabitants in the region; many inhabitants cannot understand the official language of Portuguese in rural areas.

2) Settlement

In the Study Area, except for the people living in urban areas, most people are living in settlements of rural areas. Village settlements are located mainly along roads (primary, secondary and tertiary roads). Many people live along roads and cultivate fields as far as 10 km away from their residence. In many cases, about 10 to 30 families/residences have been solidified to form a settlement, settlements are splendid widely. Along the main road, many settlements have been formed. People enjoy living along roads, where public facilities such as schools and health facilities, as well as grinding mills are available. On the other hand, the western part of the Nampula province (Ribaue and Malema districts), residences are scattered in rural areas and there is an area which group of residences is hardly seen.

3) Residence

Widespread small-scale farmer's family in rural areas is living in residence with thatched roofs, and exterior walls of brick, sun-dried brick or soil. There is the exterior walls of some braided bamboo and hey. In the house is a dirt floor. Size and quality of each residence are not observed large difference. Standard of living is presumed the same level. It should be noted, even in remote areas there is an enclosure of the rest room in the corner of the garden where it left a residence. Number of family members of an average family is five or six.

4) Drinking water:

Drinking water in rural areas, the shallow well of about 3 to 5 m deep (wells pumping in the bucket), locating in such as the center of garden of residence, forming of small embankment. In the village of a certain size, there is hand pump well (deep boreholes, it is assumed that was established with the international assistance) in the center of the village as in school, it is available throughout the village. In addition, residents living in a location away from wells and other water sources, carrying water from distant water sources every day, mainly work of women and girls. In addition, also be used digging the trench on the side of the creek and use seepage water as drinking water. Water bath and laundry are done in the vicinity streams and ponds. Because there are a lot of relatively shallow wells, pollution is a concern from the outside, from where it is difficult to secure safe drinking water, diseases such as diarrhea are commonly encountered.

5) Fuel

Cooking fuel is mainly firewood; women and girls are collecting firewood from the surrounding area every day. It is said that use of firewood indoor is a role of light, and the smoke is also useful for controlling the mosquitoes that transmit malaria and

other pests. Firewood for home consumption is taken anywhere without permission, and logging and collection of wood as materials for charcoal requires the consent of the community (by extensionista). However, it is seen situations where firewood and charcoal bringing and selling to the city, it may ignore such case in the community. For residents living in urban areas, the main fuel is also firewood, generally collecting in their land (machamba). It is also to purchase the charcoal as necessary. In city areas such as Nampula city, as a heat source for cooking, charcoal is used in addition to the firewood in many households. Therefore, the production of charcoal in the surrounding area of city is thriving, with direct sales along the main roads and being transported by mainly bicycle to the city areas.

6) Construction materials

Materials of thatched roof, woods required for working hut and farming, and as well as materials of a simple shop established along the roads, are collected from the cultivated lands (machamba) and the surrounding forests (secondary forest / shrubs). Local inhabitant has relationship with the Miombo forest (evergreen broad-leaved tropical dry forest) is traditionally deep, for harvesting of firewood and timber using in life, such as hunting of wild animals. In particular, the Mionbo forests are widely distributed in the western part of the Study Area (western part of Nampula, Zambezia and Niassa provinces).

7) Means of transport

Means of transport in rural areas, walking is fundamental in the short or medium distance (at a considerable distance). Transport of luggage, put on the head, carry on foot is common. Recently, the spread of bicycle is remarkable and round-trip every day to the arable land in the distance, being used in a range of several tens kilometers, such as transportation of production to the markets of the neighboring village. It is use of many men, women are also using. Bicycles are the most important transport modes in rural areas. It can also be seen motorcycles, transportation of materials and customers for commercial purposes.

The movements of the long-distance pickup trucks are frequently used. In the periphery of the urban area, small minibuses play the role bus. However also to long distance services large / medium-sized bus (depending on region) appear, to be a significant impact on the situation of the road, the duration of the rainy season has to be out of service.

8) Food in daily life

The main diet of a widespread small-scale farmer's family in rural areas, is maize or cassava porridge- or dough-like food (chima/sima). Maize, grain skin is removed by

mortar and pestle after threshing and brought to mill in the village for milling, is common. Each village has a mill, owns about one to three the mill, which provides services for a fee. Dry cassava is made to powder with mortar and pestle in each household. Chima is eating some meat or vegetable broth. Sometimes, small deep-fried fish is served. In addition, beans, ground nuts and other cereals (sorghum, millet), banana, sweet potato, taro, yam, amaranth, etc. such as alternative crops of cereals are often seen in the circumference area of the residence.

As vegetables, cassava leaves are common, and also to eat leaves of sweet potato and pumpkin. Tomato is cultivating in many areas, but, because fruits of tomato are small self-consumption is general and is sold in the front of garden and in the village market to get a little income. It may also build liquor by sugar cane. Cultivation form of common farmers, the basis of a small amount of production in many species in terms of life, to sell the surplus of major crops is observed. Numbers of meal, many families in the rural areas answer two times of mid-day and night. In general, it is observed the scenes that residents are eating drying cassava, boiled maize and sugar cane frequently, regardless of the time. Serious lack of food would not be considered in the Study Area,

3.1.7. Land Use

(1) Definition and Classification of Land Cover and Land Use

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). Land use is defined as "the type of human activity taking place at or near the surface" (Cihlar and Jansen, 2001). The Study Team collected two land cover and land use map, such as the one provided by National Center for Cartography and Remote Sensing (CENACARTA) and the other one provided by the Ministry of Agriculture (MINAG). The former one was based on mainly LANDSAT image acquired in 1997. The latter one was made based on mainly LANDSAT image acquired in 2004 and 2005. And the Study of "Integrated Assessment in Mozambique Forest" (AIFM) in 2006 was prepared by using mainly LANSAT images acquired in 2004. Both of them follow the classification of LCCS, and contain "land cover" and "land use". In this report, both of them are not clearly discriminated and "land use" in the following sentence means "land cover and land use".

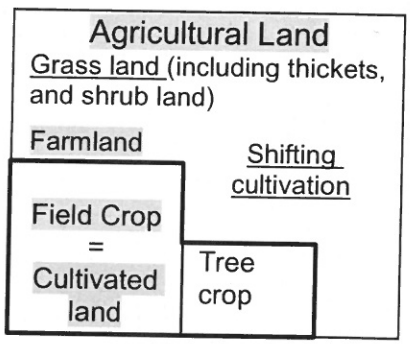


Figure 3.1.6 Classification of Agriculture Land

The classification of agricultural land is shown in Figure 3.1.6. Cultivated land in this report means the area cultivated by field crops. The area of farmland includes the area of field crop and tree crop. Agriculture land includes farmland, grass land and shifting cultivation area. The Shifting cultivation is common farming style in the Study Area and the figure of the area is hard to be estimated. The area of shifting cultivation and tree crops is sometimes hard to be distinguished.

(2) Agricultural Land

The area of total land and agricultural land between latitude south 13° and 17° is estimated to be 23.9 million and 12.5 million ha, respectively, according to the land use map by CENACARTA, as shown in Table 3.1.14.

Table 3.1.14 Land use in the Zone between Latitude South 13° and 17°

Classification of land use	Area (000ha)	Share
Agriculture land*	12,508	52
Forest	10,794	45
Others	625	3
Total	23,927	100

*Agriculture land: Agriculture includes farmland, glass land, shrub land, thickets land, and bush land
Source: CENACARTA

The situation of land use in the Study Area is shown in the Table 3.1.15 and Figure 3.1.7, estimated by land use map by AIFM at the scale of 1 : 1,000,000. The MINAG also provided the land use map at the scale of 1 : 250,000. Table 3.1.15 should be revised based on the land use map at the scale of 1 : 250,000, when the map will become available.

The whole Study Area is about 30 % of the zone between latitude south 13° and 17° in Mozambique. Agricultural area is estimated to be 3,616 thousand ha and it shares 55 % of the whole Study Area.

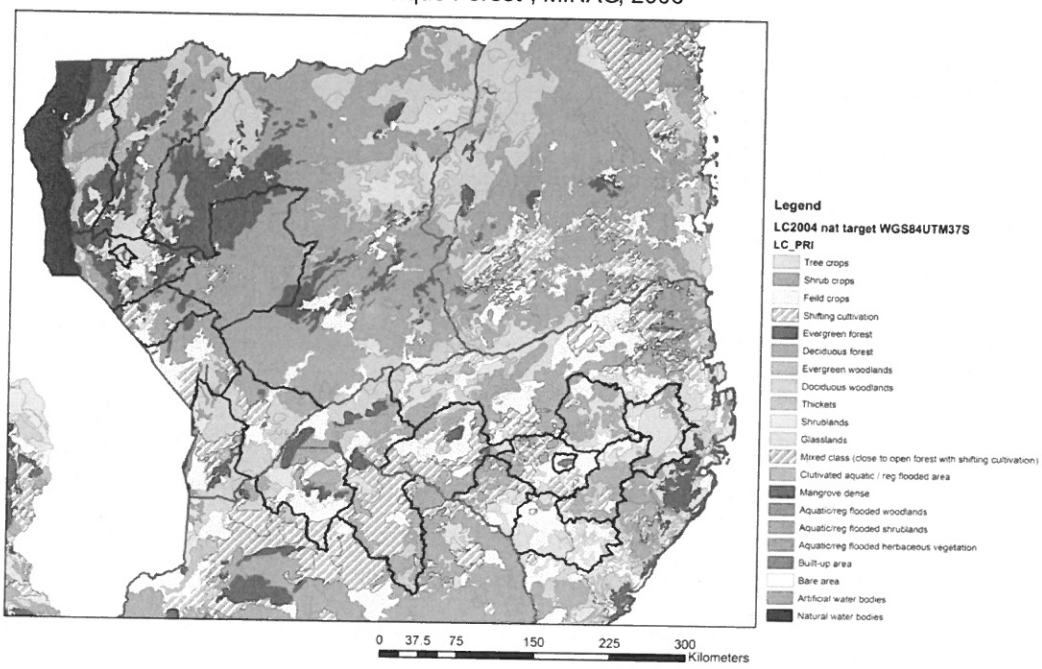
Table 3.1.15 Land Use in the Study Area

Classification of land use		Area (000ha)	Share (%)
Agriculture land	Farmland*1	1,831	28
	Grass land and shifting cultivation area*2	1,785	27
	Total of agricultural land	3,616	55
Forest		2,925	44
Others		71	1
Total area[1]		6,612	100

*1 Farmland: This classification includes field crop area, shifting cultivation area, and tree crop area in AIFM land use map.
*2Grassland and shifting cultivation area:
This classification includes the land use classification of "Grass land", "Shrub lands",

[1] The total area covers the district of Monapo, Muecate, Meconta, Mogovolas, Namupula City, Nampula, Murrupula, Ribaue, Malema, Alto Molocue, Gurue, Cuamba, Mandimba, Ngauma, Lichinga City, and Lichinga.

"Thickets land", and "Shifting cultivation" in AIFM land use map.
Source: Estimated by the JICA Study Team based on the land use map in "Integrated Assessment in Mozambique Forest", MINAG, 2006



Source: Land use map at the scale of 1 : 1,000,000 from Integrated Assessment in Mozambique Forest

Figure 3.1.7 Land Use in the Study Area

(3) Population Pressure to Land Use

The cultivated land in the Study Area is estimated to be 783 thousand ha by the number of farm households, the average farm size in 3 provinces, as shown in Table 3.1.16. The farmland without cultivation by local people is estimated to be 2,833 thousand ha in the Study Area by deducting 783 thousand in Table 3.1.16 from 3,616 thousand ha as farm land in Table 3.1.15. This 2,833 thousand ha includes the area of grass land and shifting cultivation. The shifting cultivation area is presumed to be several times of cultivated land area. Considerable area is also occupied by registered (DUAT) land. The cultivated land by local people, shifting cultivation area, and the area occupied by DUAT is scattering in the "farmland" and it is not easy to find large consecutive area. The figure of potential area for large scale development is not estimated in this report, caused by difficulty of estimating shifting cultivation area and DUAT area. The location of potential area for large scale development will be shown in 4.9 in this report.

Table 3.1.16 Population Density and Estimated Cultivated Area

Provinces	Districts	Area (km^2)	Population (2011)	Population Density (No/km^2)	Farm household number (000 nos)	Average farm size (ha)	Estimated cultivated area (000ha)*2
Nampula	Monapo, Muecate, Meconta, Mogovolas, Nampula City, Nampula, Murrupula, Ribaue, Malema	35,524	2,312,637	65	346	1.25	433
Zambezia	Alto Molocue, Gurue	12,026	670,697	56	93	1.29	120
Niassa	Cuamba, Mandinba, Nguama, Lichinga City, Lichinga,	18,773	745,176	40	126	1.82	230
Total		90,209	3,826,673	42	585		783

Source Area: CENACARTA (1997), Population: INE (2007),
Farm household number: DPA of Nampula, Zambezia, Niassa, except of Lichinga City,
*1: Estimated by the JICA Study Team
*2: Estimated with 1.25 ha/household (hd) in Nampula, 1.29 ha / hd in Zambezia, 1.82 ha/hd in Niassa .

The green dot in Figure 3.1.8[2] shows the location of local villages and the cultivated area by local people. Considerable areas in Monapo, Nampula, and Mogovolas district are cultivated by local people, while few local villages are located and few area are cultivated by local people in Niassa province.

The distribution of population density in the Study Area overlay on the balance of supply and demand of woods in Figure 3.1.9. The red area, which consumption of wood surpasses its supply, located in the district whose population density is over 40 / km^2. Especially in Nampula, Mogovolas, and Gurue District, whose population density is over 60 / km^2, almost all of area is covered by red area. In those areas, shifting cultivation is limited. In Nampula, Ribaue, and Alto Molocue districts, large area is covered by shifting cultivation, while those districts have high population density. Shifting cultivation in those three districts will reach the limitation in the near future, caused by high population density and limitation of woods supply.

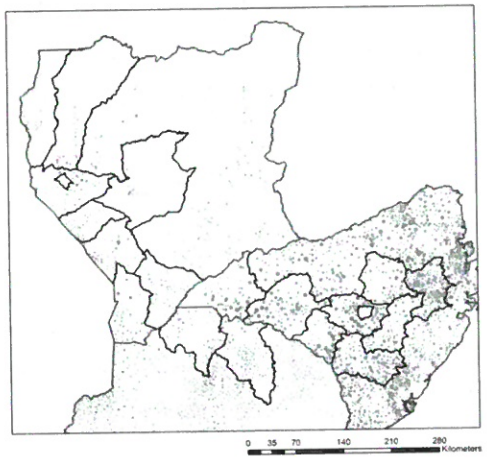


Figure 3.1.8 Location of Local Villages and Farm Land of Local People
Source: Location of villages and its population data source are ANE.

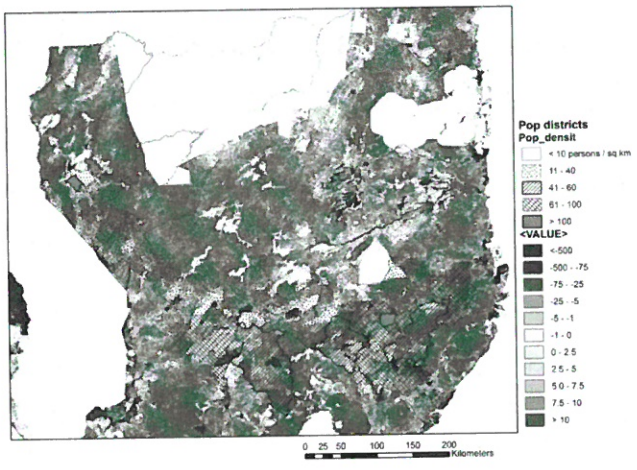


Figure 3.1.9 Population Density and Wood Energy Consumption
Source of the forest biomass figure:
WISDOM Mozambique Final Report, DNTF, 2008

[2] The cultivated area is estimated by using average land hold size by province as shown in Table 3.1.16.

(4) Deforestation

Deforestation is one of the principal concerns in the Study Area. Rapid population growth means increasing demand for farmland, fuel wood, charcoal and timber, as well as shortening of fallow period in shifting cultivation. Expansion of forestry activities, associated sometimes with excessive or illegal logging and insufficient reforestation, also contribute to deforestation. As shown in Table 3.1.17, Nampula Province has the smallest forest area and the highest deforestation rate among the three provinces.

Table 3.1.17 Forest Area and Deforestation Rate by Province

	Nampula	Niassa	Zambezia	Total Mozambique
Territorial Area (ha)	7,817,100	12,240,000	10,307,600	77,991,000
Forest Area* (ha)	2,771,400	9,429,100	5,063,600	40,068,000
Percentage of Forest Area (%)	35.5	77.0	49.1	51.4
Non-productive Forest Area** (ha)	454,600	3,379,200	951,100	13,160,900
Productive Forest Area (ha)	2,316,800	6,049,900	4,112,500	26,907,100
Annual deforestation rate*** (%)	1.18	0.22	0.71	0.58

* Definition = tree coverage > 10%, height > 5m

** National parks, national reserves, wetland forests, mangroves and other inaccessible forests.

***A mathematical estimation based on 1990-2002 population trend and its correlation with forest area.

Source: Adapted from "AIFM Final Report, MINAG 2007"

3.1.8. Road and Social Infrastructure

(1) Road

The road network of Nacala Corridor consists of National Road No.1 (hereinafter called N1 road), N12, N13 and N14 mainly. The N1 road starts from Maputo to the north up to Tanzania. It passes Quelimane of Zambezia Province, Nampula of Nampula Province and reaches to Pemba of Carbo Delgado Province.

As the Nacala Corridor, N12 come from Nacala port to west and it connects to N1 at Nametil and the N1 reach to Nampula city. This part of road had been rehabilitated for two lane road with 7m wide. Connect to it, N13 runs from Nampula city to Lichinga. At the present, N13 is a dirt road and the road between Nampula and Cuamba is under rehabilitation to make two-lane paved road to be completed by February 2015.

In north of Nacala Corridor, the road N14 connects between Lichinga and Pemba and it will be paved by 2015. The Gurue of Zambezia is connecting to N1 at Nampevo by N103, which had been renovated to paved road.

Most of the other roads connect between district centers, administration posts and localities are dirt road in the Study Area. These major roads are maintained by ANE, National Authority of Road.

Community road and feeder road is categorized as Non-classified road in national classification. And development of the Non-classified road is responsible by district government. Its finance is provided by the Road Fund and technical support is provided by ANE. The district government make plan and implement the works. However, it budget is not used fully due to low number and capacity of staff in district, delay of budget delivery and delay of works. The fund is used manly for maintenance of the existing feeder road.

The road network density in Mozambique is 37 km/ 1000 km^2 (African Infrastructure Country Diagnostic (AICD) Study in 2011). As shown in the table 3.1.18 below, the density in Niassa Province is lower than other two provinces.

Table 3.1.18 Density of Road

Province	Area (km 2)	Road Type	Category of Road						Density(km / 1000km^2)
			Primary	Secondary	Tertiary	Vicinal	N/C	Total	
Nampula	81,606	Paved	422.0		3.0		20.0	445.0	54.77
		Dirt Road	495.0	166.0	1,927.0	935.0	501.8	4,024.8	
Niassa	129,061	Paved	252.0	92.0	42.0			386.0	26.53
		Dirt Road	489.0	240.0	1810.0		499.0	3,038.0	
Zambezia	103,127	Paved	692.0		26.0			718.0	43.59
		Dirt Road	288.5	645.2	1552.4	737.0	554.4	3777.5	

Source: ANE in Nampula, Quelimane and Lichinga
Note: Paved road data is in 2011, others are 2010.

(2) Transportation Infrastructure

1) Northern Railway (Nacala Railway)

Nacala Railway (Northern Railway Line) connects Nacala, Nampula, Cuamba and finally Central Africa Railway in Malawi at Entre Lagos. At Cuamba, one branch line goes to north to Lichinga. A pairs of passenger train is operating between Nampula and Cuamba everyday excluding Monday, and a train goes to Lichinga per a month. There is no regular service for cargo, but the cargo train between Nacala port and Malawi is dominant as 75% of total operation of the railway.

In 2011, total number of passenger is about 864,000 and total operation quantity of cargo is 241,000 ton.

2) Nacala Port

Nacala Port consists of container terminal (south terminal), bulk terminal (north terminal) and liquid bulk terminal. North terminal has length 631m and its depth

-7.5m to -10m (average -9.7m), the south terminal length is about 372 m and its depth is -14m.

Because of its natural depth, Nacala Port allows operation with large vessel. Due to its location closed to the Asia, regular lines are operating to India and Singapore in 2011, and it reaches to there within 12 days and 13 days respectively.

Handling of Nacala Port in 2010 is about 600,000 ton of bulk transportation and 70,000 TEU of Container.

The Nacala Railway and Nacala Port are operated by CDN (Corredor de Desenvolvimento do Norte: Northern Development Corridor) company since 2005 under concession agreement.

3) Airport

Major airports for air transportation in the area are Nampula airport and Lichinga airport. An air force airport is located in Nacala but it is under construction to be commercial airport by Brazilian Government's support.

(3) Social Infrastructure

1) Power Supply

Major source of national power network in Mozambique is Hydro Power Plant of Cahora Bassa (hereinafter called HCB). All district centers in the Study Area connected to national power supply exclude Ngauma in Niassa Province. The Ngauma district has a generator but it was broken down in 2010. Regarding electrification of the administration posts in the Study Area, 70% of it in Nampula Province connected to national network. However, no administration post exclude district centre connects to national network in Niassa. Even electricity is reached in the district or administration post, its service area is limited. Moreover, even no electricity come in administration post, some health centre and/or school has individual solar power system.

Table 3.1.19 Electrification of Administration Post in the Study Area

Province	Number of A/P	connect to Network	Generator	Solar Power	No Electricity
Nampula	34	25	1	4	3
Niassa	11	3	3	1	4
Zambezia	5	3	2	0	0

Source: based on the interview Study team prepared

2) Communication

Dissemination rate of fixed telephone line is similar to the one of electricity. Every district center has fixed line but no administration post excludes Nampula and its surroundings. On the other hand, mobile phone is developed well in Mozambique by three companies. Movitel, last company started service in 2010, is expanding rapidly in rural area.

3) Water Supply

City water systems are developed in Nampula city, Cuamba city, Lichinga city and Gurue city. Only the Nampula city has treated water and the others are the water with clone injection. In district center, they have small water supply systems called PSAA (Small Water Supply System).

Major water source in rural area is wells with hand pump. Calculated "Average Cover rate of population water served" in the Study Area is 53.2%. In the Study Area, Cuamba, Malema, and Rebaue mark high covering rate caused by rich groundwater potential.

Table 3.1.20 Rate of Population Served for Water Supply

District	Population in 2011	Number of wells	Cover Ratio (%)
Monapo	285,816	247	40.4%
Mecuenta	105,350	104	40.8%
Meconta	129,895	178	52.3%
Mogovolas	242,768	175	36.1%
Nampula	243,908	135	23.4%
Murrupula	140,685	200	60.0%
Ribaue	156,754	291	79.9%
Malema	126,408	236	96.7%
Sub Total/Ave	1,431,584	1,566	49.1%
Alto Molocue	247,614	280	56.7%
Gurue	171,265	190	55.5%
Sub Total/Ave	418,879.0	470.0	56.1%
1) Cuamba	123,638	250	91.0%
2) Mandinba	138,673	161	48.8%
3) Ngauma	81,314	99	45.4%
4) Lichinga	110,703	171	68.2%
Total/Ave	454,327	681	64.4%
Grand Total / Average	2,315,745	2,247	53.2%

Source: Directorate of Public Works in 3provinces

4) Education

Regarding the Education Infrastructure, as shown in Table 3.1.21 below, Number of student for 1 early elementary school (EP1, grade 1 to 5) in Zambezia is smaller than others. It means, Zambezia has enough number of the teacher and schools. In the attendance rate, early elementary school (EP1) is over 100% but late primary school (EP2) for grade 6 to 7 years, it becomes small.

Table 3.1.21 Present Situation of the Education

		Number in 1 School		Attendance Rate	
		Teacher	Student	for EP1	for EP 2
Nampula	Province	7.0	467	124%	54%
	Study Area	8.4	503	144%	55%
Niassa	Province	4.9	328	200%	51%
	Study Area	7.0	477	171%	44%
Zambezia	Province	6.2	105	187%	61%
	Study Area	5.7	117	211%	77%
National Average (2010)		6.3	420	130%	-

Source: Directorate of Education and Culture in 3 provinces

3.2. Outline of Provincial and District Development Directions

The government of Mozambique has gradually promoted decentralization with the assistances of donors; administration and political organization are still centralized. Policies and development plans have been determined by central government. To understand the problems of poverty in rural areas and to be carried out measures effectively, there is a limit only from the central government. For the implementation of an effective development policy, accelerate further decentralization is required.

3.2.1. Local Government Administration

(1) Decentralization Policy

Decentralization of Mozambique has been promoting gradually since 2004, through legislations such as the followings:

- Law No. 8 on the State's administrative bodies decentralized at the local level of May 19, 2003 (LOLE: Law of Local Organs of the state)
- The Constitution of the Republic of Mozambique of 2004
- Decree No. 11 on the Regulation of the Law on the State's administrative bodies decentralized at the local level of June 10, 2005
- Decree No. 6 on the Organic Statute on District Governments of April 12, 2006; and
- Local Authority Package (Pacote Autárquico) consisting of Laws No. 2 on the Legal Framework for Municipalities of February 18, 1997, No. 11 on Finances and Assets of Municipalities, and No. 8 on the Organization and Functioning of the City of Maputo, all dated May 31, 1997.

The Law of Local Organs of the state (Law 8/2003; Lei dos Órgãos do Estado: LOLE) defined the district as a budgetary unit, having power to prepare district development plans and define priorities. With the Law and followed Decrees, districts became centers of planning and implementation, though the methodological/technical guidance is provided by line ministries through provincial government.

In 2006, the government began a scheme to give directly the development fund of an annual fixed amount to the district. From that amount per district was a 7 million MT and it has been referred to as "7 million". However, because district-level administrative capacity is not sufficient with lack of human resources, technology and experience; the districts do not fulfill the role that is expected.

(2) Administrative Organization

Mozambique is divided into ten provinces (Províncias) and one capital city (Cidade capital) with provincial status. The provinces are subdivided into 128 districts (Distritos). The districts are further divided in 405 administrative posts (Postos Administrativos), the main subdivisions of districts. Then the administrative posts are divided into localities (Localidades), the lowest geographical level of the central state administration. Since 1998, 43 municipalities (Municípios) have been created, 10 of them in April 2008 and are same administrative level of the district.

The provinces are ruled by a governor (Governador) appointed by the central government, instead of being elected by the residents of the province. Authorities who have the privileges of budgets of each sector are the provincial directors (Directores Provinciais) of the state agencies from the central government; the provincial government is limited budget and authority. This is similar to the lower local governments such as districts, administrative officials are appointed by provincial government, and are only the local agencies of central government.

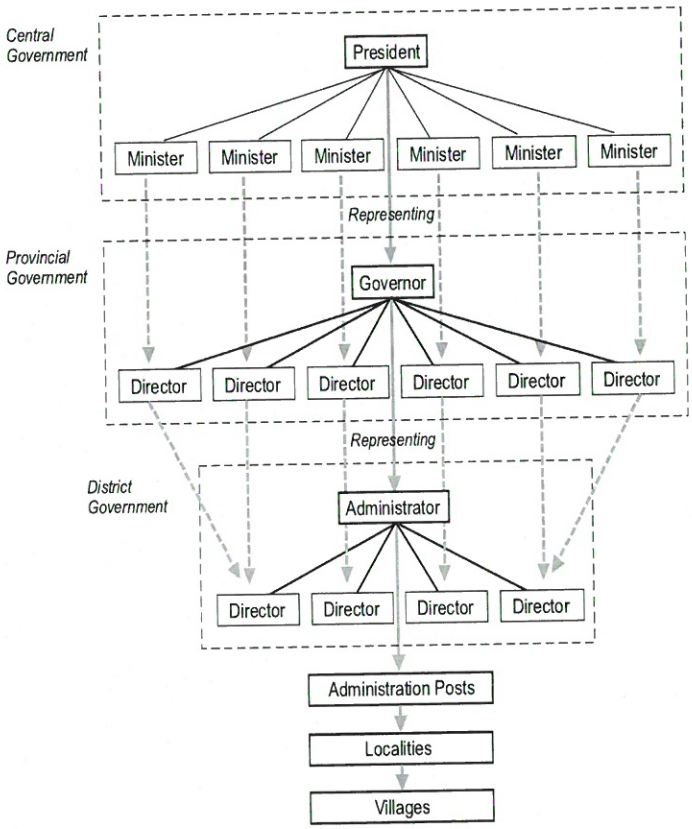


Figure 3.2.1 Administration Structure of Local Government

The districts are directed by administrators (Administradores). Administrative posts are headed by administrative secretaries (Secretários), which before independence were called post chief (Chefe de Posto), and localities are also headed by secretaries. The secretaries of administrative posts and localities are appointed by the administrator of the district to which they belong. In Mozambique, the localities are the lowest level of representation of the state in the rural level. When a town is urbanized it is called the village (povoação). In the districts may still be other ways to top-level urban villages, towns and cities.

In the decentralization policy, the sector departments of provincial-level are under the guidance of the Governor in the administrative political, but are technically under the supervision of the sector ministries. And in terms of sectors at each ministry, there are economic activity services at district level regarding agriculture, commerce and industry, fishery, environment, and tourism.

(3) Administrative Division of the Study Area

The Study Area, three provinces are composed of 14 districts. Administrative divisions of under the district-level are as shown in table 3.2.1.

Table 3.2.1 Administrative Division of the Study Area

District *1(No. of Admin. Post)	administrative posts*2 (No. of Locality)
Nampula Province	
1) Monapo (3)	Itoculo(2), Monapo(2), Netia* Monapo Municipality (vila) (1)
2) Muecate (3)	Imala(1),Mucoluone(1), Muecate(2)
3) Meconta (4)	7 de Abril(1), Corrane(3), Meconta(1), Namialo(1)
4) Mogovolas (5)	Calipo(1), Ilute(1), Muatua(1), Nametil(1), Nanhupo Rio(1)
5) Rapale (Nampula) (4)	Anchilo(5), Mutivaze (1), Namaita (1), Rapale (3)
6) Murrupula (3)	Chinga (1), Murrupula (3), Nehessine (1)
7) Ribaue (3)	Chinga (1), Iapala (1), Ribaué (2), * Ribaué Municipality (vila)
8) Malema (3)	Chihulo (1), Malema (4), Mutuali (2)
Total (28)	(46)
Zambezia Province	
1) Alto Molocue (2)	Alto Molócue (9), Nauela (2)
2) Gurue (2)	Lioma (5), Mepuagiua (5) * Gurue Municipality (cidade)
Total (4)	(21)
Niassa Province	
1) Cuamba (2)	Etarara(2), Lúrio (3)
2) Mandinba (2)	Mandimba (2), Mitande (1)
3) Nguama (2)	Itepela(1), Massangulo(2)
4) Chimbonila (Lichinga) (3)	Chimbonila(4), Lione(1), Meponda(1)
Total (9)	(17)
Grand Total (41)	(84)

(4) Community Participation and Traditional Leaders

Heads of administrative post and localities are government-appointed administrative officers, and members of the council (Conselho Consultivos) established for each level are elected by habitants. The council is composed of community leaders, religious leaders, etc. conduct a consultation with respect to residents in rural development projects such as school buildings and wells maintenance, have sucked up the local needs.

The Traditional Chief (Régulo, Mueune on the local language) is the leader of the community, according to the tradition. A position perpetrated by heredity within the family. (In Rapale, for example, where field research was conducted, Mr. Muithoo, the local Régulo, has the same name of the mountain of the region and his community or REGULADO). The social figure of the Régulo has been preserved with all his hierarchical authority. He is the spiritual leader, leading traditional rituals, and authorizes land work (Maquea) in his area of influence (can be more than one community). The Régulo must also be consulted in matters affecting the life, land, well-being and harmony of his communities.

The Leaders of hierarchy 1st, 2nd, and 3rd LEVELS are elected by the local population, following a criteria defined by the community, and always counts with the presence of state administrative authorities. Their duty is to keep the communities informed about administrative guidelines, and explain about state programs and actions, besides guiding and mitigating conflicts over land tenure. The Decree 15/2000 has legalized

the role of these leaders formerly known as Corporal, head Corporal, land Corporal, and Secretary of the neighborhood or village, a hierarchy that used to hold the community and localities leadership, by the choice of the population and by other legitimate social leaders, people recognized for their religious, cultural and healing tradition roles. A monthly subsidy for each leader such as leader of first grad is 400 MT, second grad is 250 MT and third grad is 150 MT (2012).

However in reality, because of not been a one-to-one correspondence with the area managed by Regulo (Regulado, the size is different depend upon Regulo) and locality or administrative post areas, it is difficult to understand exactly. Because the political system of immediately after independence denied these traditional authorities once, even on the awareness of residents, the following classification of the social structure underlying of the locality is often obscure. Furthermore, designations of leaders vary by region, for example, instead of Regulo called Mwene, and the social structures of communities are different also by region.

As an example:

According to the government of Rapale district of the Nampula province, Rapale district comprises four administrative positions and 16 localities (although it is different with the information of INE). The clan structure of clusters noted that the 16 regulated directed (Regulado) by the respective agents of the community authority. In the district of 244 thousand populations (2011), there are 172 leaders of first grade, 186 leaders of second grade and 194 leader of third grade (2012).

3.2.2. Strategic Plan for Development of Provinces and Districts

(1) Development Policy at Provincial Level

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

The latest development plans of provinces have been established based on several following documents. Country's development strategy (Agenda 2025, Action plan for the reduction of poverty: PARPA, Strategies for marketing agricultural and rural development, etc.), regional (New Partnership for Africa's Development: NEPAD, etc.) and global (Millennium Development Goals, etc.). District development plans were also consulted.

1) Development Plan of the Nampula province

In the Nampula province, the Strategic Provincial Plan Nampula 2010-2020 (PEP), was established in October 2009 by the Coordination Unit of the Integrated Development of Nampula (UCODIN). The pillars of the development strategy are following four, which basically continue to give the previous strategic plan:

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

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

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

In this plan, the goal of real GDP growth rate of the province is 7.5% by 2010, 8.5% by 2015, and 8.3% by 2020

2) Development Plan of the Zambezia province

In the Zambezia province, the Strategic Plan of Development of Zambezia 2011-2020 (PEDZ), for 10 years from 2011 to 2020 was established in May 2011. The four pillars of the development are as follows:

1. Development of human and social capital;
2. Economic growth and development;
3. Good governance, decentralization, anti-corruption and promoting the culture of accountability; and
4. Cross-cutting issues.

The pillar of 2: Economic growth and development constitutes the backbone of the plan's objectives are to:

(i) Relaunching production and improve the productivity of the agricultural sector on the basis of the strategic focal points of development;

(ii) Promoting local entrepreneurship, attraction of investment and expansion of the financial system; and

(iii) Improve the planning and management of public finances at the provincial level.

This pillar incorporates the areas of agriculture, livestock, forestry and fauna; industry; fisheries; mineral resources; trade, tourism; transport and communications; public works; energy; and employment, work, hygiene and safety. PEDZ sets out guiding principles on the development of the province with a view to inducing the annual production growth of around 7% per year by 2020.

3) Development Plan of the Niassa province

In the Niassa province, the Strategic Provincial Plan Niassa 2017 (PEP 2017), for 10 years from 2008 to 2020 was established in December 2007. In the development of this plan, the Office for Strategic Studies and Development (GED) established by the Niassa government has suffered a central role. This plan, continuing the previous plan, aiming to "sustainable development" as the goal, accelerate and integrate the economic, social and cultural development of the province, to reduce the poverty rate by 15% by 2017.

In order to achieve this goal, the three development pillars are as follows:

1. In the agriculture and forestry sector, to promote investment of 240,000 ha of commercial forestry;
2. To promote private investment to the agriculture and agro-processing (especially near the Lichinga city); and
3. To promote investment to the ecotourism of the Niassa nature reserve area.

(2) Development Policy at District Level

The Strategic Plan of Development of District (Plano Estratégico de Desenvolvimento Distrital: PEDD) is medium term of five years, is a guidance and strategic management of the district, and is jointly developed in a participatory manner involving the district government and civil society at the district level, and is aligned with the Government's Five Year Program 2010-2014 and the Strategic Development Plan of the Province (PEDP). In addition, they are based on current laws and decrees of local administration (Decreto 15/2000: Estabelece as formas de articulação dos órgãos locais do Estado com as autoridades comunitárias; Lei 8/2003: Lei dos Órgãos do Estado; Lei 11/2012: Procede a revisão pontual da Lei 8/2003). And this indicates the main strategic directions that the district must follow to achieve the economic well-being and social development of its population.

Currently, PEDD III as the third period (the target year are different by district, such as 2010 to 2014, 2009 to 2013 or 2010 to 2015) is being created under the guidance of the provincial government, but a district has been completed is slightly. Therefore,

PEDD II as the second period has been continued actually. PEDD II covered the period 2006 to 2010, but according to the district, the plan period varied slightly. However, they are basically prepared in accordance with the Provincial Development Strategic Plan and the contents are similarly targeting the eradication of poverty and economic development. The annual budget plan is prepared as the District Economic and Social Plan (Plano Económico e Social do Distrito: PES or Plano Económico e Social e Orçamento Distrital: PESOD), this is annual implementation plan.

(3) District Fund of Development (Fundo Distrital de Desenvolvimento: FDD)

In 2006 the government launched a scheme of directly providing districts with annual discretionary development funds, namely OIIL (Local Initiative Investment Budget). This scheme is so called "7 million" because the amount of the fund made available to each district is about 7 million MT. Priority projects are selected in consultation with District Consultative Councils District formed by local representatives including traditional chiefs, religious leaders and civil servants. The budget has been used mostly for agriculture and small-scale industries, aimed at producing food and creating jobs. Based on these resources are running projects such as buying tractors and financing services to small farmers in districts.

In addition, the district governments receive 2 million MT per year as Fund for Investment Development (FID), which covers small-scale infrastructure investment including feeder roads, maintenance of schools, etc. Provincial Directorate of Planning and Finance, together with other Provincial Directorates, guides and supports the District Government in the process of planning and budgeting. However the administrative capacity of Districts is still not developed enough to fulfil the expected roles, due to the limitation of human resources, technical capacity, and experiences.

3.3. Production of Crops and Animal Husbandry

Agricultural production in the Study Area analyzed by districts has shown similar characteristics to those seen in the rest of the country, except for some specific locations. These similarities are expressed in both aspects of cultivated area of farm-households and farm management and production technologies, as described below.

3.3.1. Land Scale of Farm- households

According to Agricultural Census 2009-10, the average cultivated area of farm-household in Mozambique is 1.47 ha. Niassa province has a slightly higher average of 1.82 ha, while the area in Nampula of 1.25 ha and Zambezia of 1.29 ha are below the national level (see Table 3.3.1). In Niassa, 99.7% of farm-households

are classified as small-scale, while the rate in Zambezia and Nampula are the same of 99.9%, according to criteria of the National Statistics Institute (INE) shown in Table 3.3.2.

Table 3.3.1 Cultivated Area and Farm-households in Concerned Districts

Province	Cultivated area		Farm-households		Average farming size (ha)
	(ha)	(%)	(number)	(%)	
Niassa	409,473	7.3	225,151	5.9	1.82
Nampula	1,037,748	18.4	829,642	21.7	1.25
Zambezia	1,071,170	19.0	828,801	21.7	1.29
Mozambique	**5,633,850**	**100.0**	**3,827,797**	**100.0**	**1.47**

Source: Agriculture Census in 2009-2010, INE

Table 3.3.2 Criteria of Farm Scale

Small scale farmer	Meet all of the following criteria: - Non-irrigated area : less than 10ha, - Area of irrigation/ orchard/ plantation/ floriculture :less than 5ha, - less than 10 cattle, 50 goats, sheep or pigs or 2,000 poultry.
Medium scale farmer	Exceed any of above criteria, but meet all of those below: - Non-irrigated area : less than 50ha, - Area of irrigation/ orchard/ plantation/ floriculture :less than 10ha, - less than 100 cattle, 100 goats, sheep or pigs or 10,000 poultry.
Large scale farmer	Exceed any of above criteria

Source: Agriculture Census in 2009-2010, INE

Table 3.3.3 Summary of Farm-households in Target Districts

Province/District	Number of Farm households	Area (ha)	
		Total	Average
NAMPULA	**346,218**	**401,795**	**1.16**
Monapo	55,898	79,058	1.41
Muecate	20,529	18,037	0.88
Meconta	33,968	44,401	1.31
Mogovolas	61,712	61,758	1.00
Nampula	73,914	51,669	0.70
Murrupula	30,582	23,548	0.77
Ribáuè	36,028	53,065	1.47
Malema	33,587	70,259	2.09
ZAMBÉZIA	**93,000**	**194,514**	**2.09**
Alto Molócuè	35,000	121,059	3.46
Gurué	58,000	73,455	1.27
NIASSA	**111,948**	**159,143**	**1.42**
Cuamba	42,079	64,184	1.53
Mandimba	30,165	42,771	1.42
Ngauma	15,537	11,128	0.72
Lichinga	24,167	41,060	1.70
TOTAL	**551,166**	**755,452**	**1.37**

Source: Corresponding DPAs (number) and CENACARTA, 1997 (area)

In target districts in the Study Area, the total number of farm-households accounts 551,166 according to corresponding DPAs. They cultivate the total of 755,452 ha (CENACARTA, 1997), with an average of 1.37 ha per household (see Table 3.3.3)

3.3.2. Farm Management and Marketing

The farming activities, by those farm-households classified as small- and medium-scale, are basically conducted with the use of family labors, and occasionally supplemented by temporary hired workers in the system called "ganho-ganho" (win-win) in which the payment is commonly made based on an allocated farmland size to the workers. Most of the farmers manage subsistence agriculture, with production of food crops, such as cassava, maize, sorghum, millet, rice and beans (haricot beans, cowpea, mungbean and pigeon pea).

A part of the farmers, those who mostly manage more than several ha of farmland also manage farming for commercial purposes, with cultivation of cash crops such as cotton, tobacco, soybean, sesame and some vegetables. Planting of cotton and tobacco are performed by contract farming in which the buyer provides out growers some inputs for a price such as seeds, fertilizers and pesticides, as an incentive to the production. In the case of cotton, corresponding companies usually provide basic inputs, mainly seeds and pesticide to the contract growers with subsequent payment after the harvest. The companies also lent out equipment for spraying pesticide.

Farmers usually determine the production of cash crops on the condition that a reliable buyer of the crops is available in the area. In fact, the production of cash crops in the Study Area is concentrated in several particular districts where commercial or industrial companies specialized in such crops promote the production. In Gurue district, international NGOs such as CLUSA work to promote the cultivation of soybean by distributing seeds to interested farmers without payment, however, CLUSA doesn't concern to the marketing of their production.

Less income generation opportunities cause prevalence of poverty in rural area in the Study Area. Available cash income sources of general farmers are limited to farm-labor works, construction labor works and sales of their products according to the Study team's field survey. Many farmers are, however, not able to have surplus of their products due to their limited farming-scale. Only less than 10 % of farm-households sell their surplus in the country (PEDSA 2011-19, MINAG).

The Study team's field survey and other information sources confirmed that crops marketed by farmers were mainly their staple food crops. This implies that many farmers only sell their produced crops when they luckily have surplus or they suddenly need cash for unexpected occasions. Marketing of the surplus production is usually made through middlemen, who buy directly from producers at farmgate or at local market for reselling the products in near cities. It is commonly considered that a profit margin of the middlemen is relatively high. The following crops are the marketed crops declared by the interviewee farmers.

<Marketed Crops>

Cassava, Maize, Beans, Groundnut, Sorghum, Sweet potato, Potato, Soybean, Paddy, Vegetables (tomato, onion, cabbage, carrot, garlic, green sweet pepper, pumpkin, kale, etc.), Sesame, Cotton, Tobacco, Cashew nut, Banana

3.3.3. Cultivations Technology and Cropping Pattern

The cropping system of the farm-households in the target districts are characterized by low use of technology and inputs, with traditional system of crop management and land use, such as mixed cropping and shifting cultivation.

In Mozambique, the cropping calendar is divided into two seasons, called the First Season and the Second Season. In the First Season, seeding is done at the beginning of the rainy season (November-January) taking advantages of the rainy season (November-April) for agricultural production, while planting in the Second Season is done after the rainy season in the area where water sources are available. Manual irrigation is common practice while some farmers use a small irrigation pump.

It was observed by the Study team through its field surveys that most of subsistence farm households had only family labor power to work in the land by using basic tools like hoe, machete and ax. Seeds used for planting were usually produced in the last harvest. The seeds were harvested from the own land or acquired from neighborhoods. The application of inputs like improved seeds, fertilizers and pesticides is practically negligible, as shown in Table 3.3.4.

Table 3.3.4 % of Farm-households using Farm Inputs in 2007

Province	Inputs (%)		
	Maize seeds	Fertilizers	Pesticide
Nampula	6	2	3
Zambazia	11	1	1
Niassa	5	7	3
National	**10**	**4**	**5**

Source: TIA 2007, MINAG

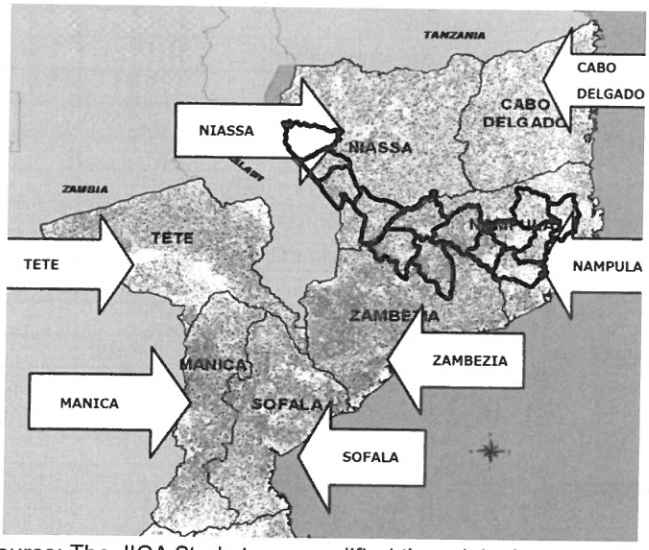
Most of farmers don't buy chemical fertilizers, which are the basic inputs, because they have no financial resources needed, or they could not see due return from the use of chemical fertilizers. Farmers, in general, have knowledge about a benefit of fertilizers that they can bring high productivity of crops. Among limited farmers who use fertilizers, few of them use fertilizers correctly, because they haven't proper knowledge or no technical orientation from agricultural extension agents.

In case of cash crop cultivation, the situation is different. Many farmers use inputs, even at a minimum level, for vegetables, cashew nut, etc. In case of cotton and tobacco, a commercial or industrial company is often behind the production, and

provides necessary inputs for a price. Farmers are also able to expect technical orientations from the company's staff.

Farmland use in the Study Area still obeys traditional practices which are characterized by low use of technology and inputs. These traditional practices consist of non-systematic mixed cropping, slash and burning farming and shifting cultivation. Slash and burning cum shifting cultivation is popular in the Central and Northern regions, where is also the center of agricultural production in the country. Farmers in those areas have enjoyed relatively favorable annual rainfall and vast arable land for long time. It is assumed that the practices are deeply rooted in the area, including the Study Area.

Figure 3.3.1 shows occurrence of fire in most affected area in Mozambique in 2008. According to UN-REDD program material in September 2011, the peak incidence of the fire was observed between August and September when is the typical period of land preparation for agriculture. This means the figure almost represents an occurrence of fire for agricultural land preparation. The fire occurrence points (red-colored) thoroughly scattered over the area except for the eastern part, where the shifting cultivation farming has been outdated due to the high pressure of population increase. Figure 3.3.1 implies that slash and burning cum shifting cultivation is a dominant farming practice in the Study are, and there are very limited free lands which are not used for farming, as well as for fallow land reserved in the shifting cultivation cycle.



Source: The JICA Study team modified the original map of DNTF/MINAG

Figure 3.3.1 Occurrence of Fire in 2008 in Most Affected Area

Farmers in the Study Area usually have several cultivated lands in different places. The reason may be that each of husband and wife has own inherited land (or rights to use a certain acreage of land) individually in their original communities even after

get a marriage. Then, they should keep cultivating the land if they don't want to lose the land rights.

3.3.4. Agricultural Production by Districts

Agricultural production in the Study Area varies with the locations. Both of food crops and cash crops are planted according to favorable climatic conditions for each crop. Table 3.3.5 shows the 5 years (2006/07–10/11) average of planted area of major cops in the Study Area, based on statistic data collected from DPAs in Nampula, Zambezia and Niassa provinces. Maize, cassava, sorghum, beans, ground nut, cotton are very popular crops among them.

The planted area and production of major crops by target districts are also shown in Table 3.3.6. While 5-years averaged data from 2006/07 to 2010/11 are calculated for the planted area and the production, based on statistics from respective DPAs and INCAJU (only for cashew nut), some data calculations are still provisional or incomplete due to unavailability of the statistic data at present.

Table 3.3.5 Planted Area of Major Crops in the Study Area (Average: 2006/07- 2010/11)

CROPS	Planted Area (ha)
Cassava (Mandioca)	336,304.7
Maize (Milho)	262,669.1
Sorghum (Mapira/Sorgo)	110,103.5
Millet (Mexoeira/Milheto)	7,154.6
Paddy (Arroz)	26,317.7
Beans (Feijões)	110,061.3
Ground Nut (Amendoim)	90,036.5
Sunflower (Girassol)	5,425.0
Sesame (Gergelim)	19,351.4
Soybean (Soja)	2,650.2
Sweet Potato (Batata doce)	10,093.7
Potato (Batata reno/Batata inglesa)	1,264.3
Vegetables (Hortícolas)	5,583.0
Cotton (Algodão)	49,856.8
Tobacco (Tabaco/Fumo)	6,143.7
Total	1,043,015.3

Source: DPAs of respective provinces

(1) Food Crops

1) Maize

The average of planted area and production of maize in the Study Area were 262.7 thousand ha and 366.4 thousand ton, respectively, with a yield of 1.39 t/ha. Maize was grown much in the target districts in Zambezia and Niassa provinces, with the planted area of 162.4 thousand ha (61.8% of the Study Area) and production of 244.1thousand ton (66.6% of the Study Area).

2) Cassava

The average of planted area and production of cassava in the Study Area were 336.3 thousand ha and 2.03 million ton, respectively, with a yield of 6.03 t/ha. Cassava was grown much in the target districts in Nampula province, with 267.1 thousand ha (84.8% of the Study Area) and production of 1.67 million ton (82.6% of the Study Area). The production in the districts in Niassa province was very small and contributes with 103.0 thousand ton or only 5.1% of the Study Area.

3) Sorghum

The average of planted area and production of sorghum in the Study Area were 101.1 thousand ha and 92.4 thousand ton, respectively, with a yield of 0.84 t/ha. The production was concentrated in the districts of Nampula province, cultivating 72.1 thousand ha (65.5% of the Study Area) and producing 67.8 thousand ton (73.3% of the Study Area), beside the largest planted area was in Cuamba in Niassa province, with18.5 thousand ha (16.8% of the Study Area). But Cuamba produced only 11.7 thousand ton (12.7% of the Study Area), less than Ribaue which recorded much smaller planted area than that of Cuamba.

4) Millet

The average of planted area and production of millet in the Study Area were 7.2 thousand ha and 6.4 thousand ton, respectively, with a yield of 0.88 t/ha. Millet was grown much in the target districts in Nampula province, with 5.5 thousand ha (77.1% of the Study Area) and production of 5.6 thousand ton (86.9% of the Study Area).

5) Paddy

The average of planted area and production of paddy in the Study Area were 26.3 thousand ha and 43.9 thousand ton, respectively, with a yield of 1.67 t/ha. The major production districts were located in Nampula province, while there was a certain production in Niassa province. The productivity is much higher in Niassa province than that of in Nampula. The data of Lichinga district is doubtful, since there are fewer areas suitable for paddy cultivation in Lichinga district according to the collected information.

6) Beans

Several kind of beans (Haricot beans, Cowpea, Mungbean and Pigeon pea) were widely cultivated in all target districts, with the average planted area of 110.1 thousand ha and the production of 71.8 thousand ton. The average productivity was 0.65 t/ha. Though the production center of each kind of beans is different as described in sub-chapter 3.3.5, detailed production data by the beans are not available.

7) Ground nut

The average of planted area and production (in terms of with shell) of ground nut in the Study Area were 90.0 thousand ha and 64.4 thousand ton, respectively, with a yield of 0.72 t/ha. Ground nut was grown much in the target districts in Nampula province, with 77.7 thousand ha (86.3% of the Study Area) and production of 55.8 thousand ton (86.7% of the Study Area). The main production districts are Meconta and Mogovolas in Niassa province. The two (2) districts produced 39.1% of the total production in the Study Area.

8) Sweet potato

Production of sweet potato was quite concentrated in Alto-Molocue and Gurue in Zambezia province and Mandimba in Niassa province, with 72.3% of the total production in the Study Area. The average of planted area and production in the Study Area were 10.1 thousand ha and 35.2 thousand ton, respectively, with a yield of 3.49 t/ha.

9) Potato

Potato production was much concentrated in Gurue in Zambezia province, followed by a limited number of production districts, such as Lichinga in Niassa province and Alto -Molocue in Zambezia province. The average of planted area and production in the Study Area were 1.2 thousand ha and 9.1 thousand ton, respectively, with a yield of 7.2 t/ha.

10) Vegetables

Mandimba in Niassa province produced 35.1% of the total production in the Study Area, followed by Gurue and Alto-Molocue in Zambezia province that produced 29.2% of the total production together with. The average of planted area and production in the Study Area were 5.6 thousand ha and 45.0 thousand ton, respectively, with a yield of 8.06 t/ha. While tomato, onion, cabbage, carrot and garlic are popular vegetables in the Study Area, detailed production data by vegetable crops are not available. The vegetables are actually rather cash crops than food crops for producing farmers.

(2) Cash Crops

1) Cotton

The production centers were in the eastern-side and the western-side districts in Nampula province. Since data in Niassa province are missing, total figure in the Study Area is unclear at present. There was a substantial production of cotton in Niassa province according to an observation and collected information.

2) Tobacco

According to the available information of DPAs, tobacco production in the Study Area was concentrated in the western-side districts of Nampula province. As same as cotton data, total figure in the Study Area is unclear at present, since data in Niassa province are missing. Considering that Niassa province is a production center of tobacco in the country and an observation by the Study team, there must be a substantial tobacco production in the target districts in Niassa province.

3) Cashew nut

The commercial production of cashew nut is centralized in the eastern-side districts in Nampula. According to the INCAJU, those districts in the Study Area produced at the average of 21.0 thousand tons/year (with shell) in last nine years, and Mogovolas and Nampula districts produced 65.7% of the total production.

4) Sunflower

The sunflower production in the region is relatively concentrated in the targeted districts located in the middle zone of the Study Area, according to the available data. Total figure in the Study Area is, however, unclear at present, since data in Niassa province are missing.

5) Soybean

The Soybean production is centralized in the targeted districts located in the middle zone of the Study Area, according to the available data. Though total figure in the Study Area is unclear, as same as other cash crops due to the same reason, the production center of soybean could be in the middle zone in the Study Area according to an observation of the field survey and collected information. It is noted that the productivity in Gurue in Zambezia province is still lower than that of the neighbor districts, even though the district is expected to have a big potential of soybean production.

6) Sesame

The production of sesame in the region is concentrated in the target districts in Nampula province. Monapo and Meconta districts stand out from other districts in the production. The production center could be in those districts, even after total figure in the Study Area becomes to be clear, according to an observation of the field survey and collected information. The production center may change to other districts in the future depending on an expansion of pest damage.

(3) Crop Calendar.

Crop calendar of the both type of crops in the Study Area is shown in Figure 3.3.2 below.

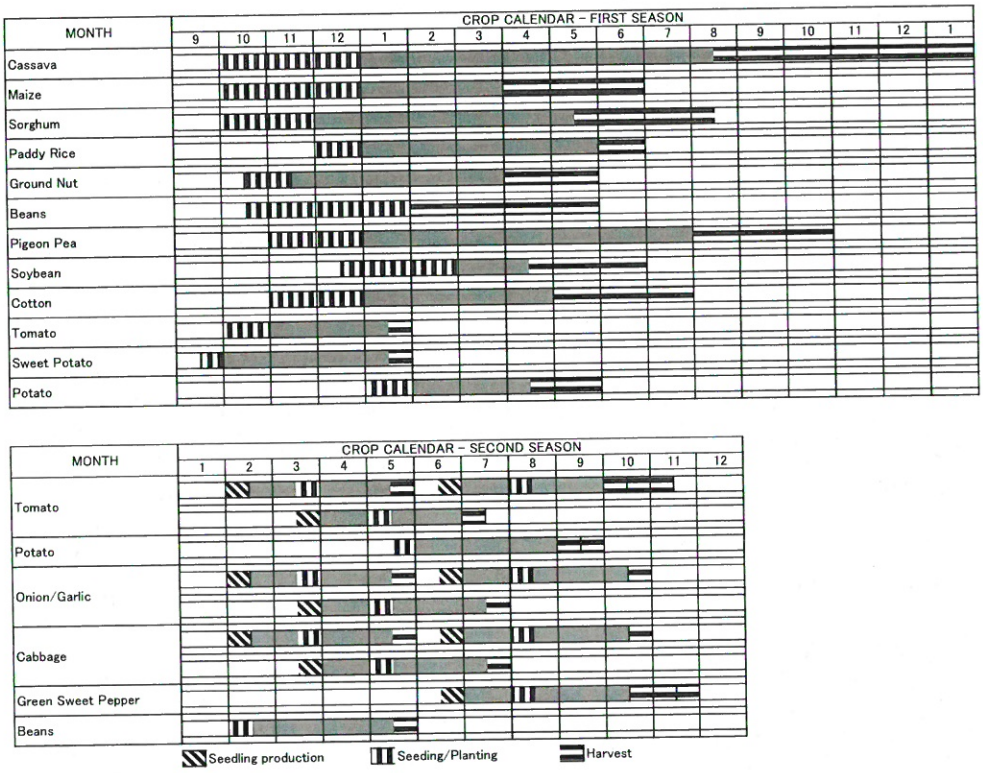


Figure 3.3.2 Crop Calendar in the Study Area

Table 3.3.6 Planted Area and Production by Crops in the Target Districts of the Study Area

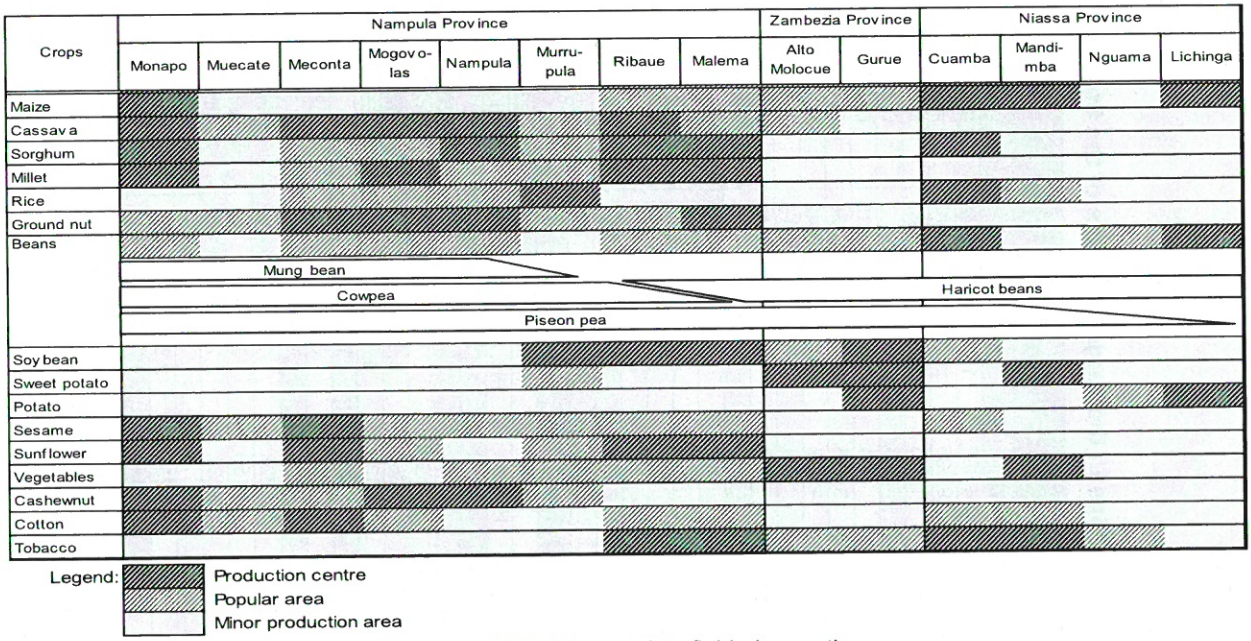
Crops	Monapo	Muecate	Meconta	Mogovolas	Nampula	Murrupula	Ribáuè	Malema	Alto Molócuè	Gurué	Cuamba	Mandimba	Ngaúma	Lichinga
Planted AREA(ha)														
Maize	15,573	6,237	13,090	9,951	12,047	7,539	16,692	19,173	**33,760**	**26,833**	**51,012**	21,409	9,280	20,072
Cassava	**47,360**	24,646	30,709	**44,033**	**37,785**	28,820	29,098	24,666	31,083	22,461	7,287	5,830	1,570	955
Sorghum	**13,912**	1,975	7,670	6,058	**12,118**	7,540	11,563	11,271	8,683	6,893	**18,477**	3,299	645	-
Millet	**1,523**	125	360	852	307	566	**848**	**935**	-	600	57	778	203	-
Paddy*2	2,344	1,239	2,473	**4,291**	**3,280**	**4,786**	805	840	1,215	620	2,447	1,364	614	-
Beans	6,052	3,428	6,991	5,642	7,328	5,303	8,398	**10,937**	8,428	9,783	**13,940**	6,653	5,445	**11,733**
Ground Nut	6,363	7,976	**16,986**	**16,172**	**11,779**	5,596	4,338	8,521	5,642	4,100	1,181	709	345	328
Sunflower*3	504	-	656	471	-	421	**844**	**854**	**1,675**	-	-	-	-	-
Sesame*3	**5,520**	813	**7,021**	1,320	1,060	1,256	963	984	140	275	-	-	-	-
Soybean*3	-	-	-	-	-	185	**625**	**605**	210	**1,025**	-	-	-	-
Sweet Potato	523	73	126	366	515	781	316	450	**2,500**	**3,333**	228	568	132	183
Potato	-	-	-	-	-	-	7	13	50	**510**	-	-	113	**571**
Vegetables	98	14	298	34	310	332	271	285	**540**	**920**	108	**2,083**	177	114
Cashew nut with shell*4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cotton*3	**28,229**	3,776	**6,208**	2,010	275	4	2,145	**5,535**	1,675	-	-	-	-	-
Tobacco	-	-	-	-	24	150	**2,669**	**2,058**	723	520	-	-	-	-
PRODUÇÃO (t)														
Maize	21,222	5,873	14,548	8,307	14,017	8,965	22,471	26,867	**50,825**	39,583	**61,629**	33,107	15,000	**43,976**
Cassava	**291,665**	152,660	196,606	**253,497**	**242,316**	180,345	194,971	166,139	163,743	86,000	36,970	42,795	11,519	11,700
Sorghum	**12,254**	2,134	5,928	5,151	10,745	6,916	**12,492**	**12,144**	5,850	4,153	11,757	2,573	151	188
Millet	**1,538**	122	340	781	319	546	**931**	**977**	-	120	254	272	194	-
Paddy*2	2,143	1,158	2,784	4,004	2,612	**4,324**	722	713	873	782	**9,048**	2,841	1,459	**10,452**
Beans	4,522	1,850	4,946	3,319	4,021	2,878	5,665	6,574	6,333	**6,902**	**9,357**	2,841	3,270	**9,312**
Ground Nut	4,570	5,407	**12,774**	**12,400**	6,442	4,200	3,130	6,913	3,402	3,455	911	371	177	241
Sunflower*3	572	-	**639**	292	-	220	**667**	**728**	208	-	-	-	-	-
Sesame*3	**2,706**	537	**4,331**	745	670	715	714	688	62	138	-	-	-	-
Soybean*3	-	-	-	-	-	390	**1,105**	**1,105**	300	513	-	-	-	-
Sweet Potato	,233	178	322	929	1,108	2,093	829	1,199	**8,787**	**8,744**	1,001	7,918	336	514
Potato	-	-	-	-	-	-	150	150	750	**6,793**	-	-	367	892
Vegetables	829	198	2,558	345	3,099	2,670	2,137	2,228	**6,197**	**6,980**	538	**15,795**	338	1,115
Cashew nut with shell*4	2,691	1,191	2,003	**8,963**	**4,841**	1,317	-	-	-	-	-	-	-	-
Cotton*3	**15,623**	1,838	3,583	1,153	211	-	1,234	2,346	208	-	-	-	-	-
Tobacco	-	-	-	-	12	75	**1,642**	**1,226**	580	423	-	-	-	-

*1 - Averages among 2006/11 / (Souce; DPAs of respective provinces), *2 - Data of Lichinga district is missing; *3 - Data of Niassa province is missing;

*4 - Production Average among 2003/11 Only in Nampula province (Source: INCAJU)

3.3.5. Localities of Crops

Familiar crops in the Study Area vary with the locations. The crops gradually changes from the eastern part to the western part, mainly in accordance with climate and altitude conditions in the area. Figure 3.3.3 shows the popularity of crops by districts. They are also illustrated in sub-chapter 4.2.2.



Source: The JICA stud team made based on DPAs' data and its field observation.

Figure 3.3.3 Localities of Crops in the Study Area

The Study Area are broadly divided into 3 types of zones in terms of staple food crops production and consumption, i.e. maize, cassava, sorghum, millet and rice, while maize and cassava are major staples in the area. The eastern part of the area is characterized by much consumption of cassava, while the other crops are placed in the supplementary position (Cassava dominant zone). On the contrary, the western part is characterized by much maize consumption (Maize dominant zone). Then, the middle area in between is characterized by mixed consumption of several staple crops, not only maize and cassava, but also sorghum, rice (paddy), etc. (Mixed zone). There are actually transition zones in between the 3 zones.

In addition, several kinds of beans and pulses are also important crops in the area. Haricot beans, cowpea, mungbean and ground nut are popular among farmers. As same as the staple crops, popularity of those crops varies with the locations (see Figure 3.3.3). Ground nut, which is also one of important crops, is grown mainly in the eastern part of the area. While soybean is attracted considerable attention in recent years in accordance with growth of chicken industry, the production is still limited mainly within the middle area.

Among traditional popular cash crops, cashew nut is concentrated in the eastern part of the area, while tobacco is just opposite. Cotton production areas are evenly scattered in the area. Sesame has been popular among farmers, mainly in the eastern part of the area.

3.3.6. Production Costs and Farmgate Prices of Agricultural Products

(1) Production Costs

A calculation of actual agricultural production costs in the Study Area is simple, since most of farmers inject a minimal capital into agricultural activities even for commercial purposes. Farmers fully depend on manual works, and limited farmers use inputs and paid labors for growing their basic crops. It is considered that the costs can be calculated based on a total man-day of the labor inputs and a common daily wage of farm labors.

Table 3.3.7 shows production costs of major crops in the Study Area, calculated in accordance with the above understanding. Farmers actually don't bear the calculated costs fully in terms of cash, since most of farmers much depend on family labor forces for their farming. The daily cost of labor forces in the calculation, 40MT/man-day, was determined by collected information through a field survey conducted in the targeted districts. The amounts paid to workers in the system of "win-win" practice (paid on ha basis) were mainly referred for the calculation, even though the amount varied with locations and kind of works. Though information of farm-labor wedge on daily or monthly basis was also collected by the survey, many interviewees tended to declare the wedge amount based on the government minimum wage instead of an actual wage. Then, total working man-days for each crop in the table were calculated based on collected information from DPA of Nampula province and TechnoServe.

Table 3.3.7 Estimated Production Costs of Major Crops

Works	Crops (unit: man-day/ha)						
	Mize	Cassava	Sorghum	Rice	Haricot Beans	Ground nut	Soybean
1 Land preparation	15	15	15	25	25	15	15
2 Crop management	20	16	36	36	32	22	53
3 Harvesting & P/H	19	20	11	11	11	16	20
Total man-day	54	51	62	72	58	53	88
Total Costs (MT/ha)	2,160	2,040	2,480	2,880	2,720	2,120	3,520

Note: 40MT/man-day is the base of cost calculation.
Source (man-day/ha): DPA, Nampula Province and TechnoServe (for soybean only)

(2) Farmgate Prices

The JICA study team made the following 3 kinds of surveys concerning farmers' selling price of major crops in the Study Area till August 2012.

1) Agricultural Field Survey (March – April, 2012)
2) Trade Inventory Survey (April – May, 2012)
3) Agricultural Market Survey in Nampula (July, 2012)

Table 3.3.8 shows an integrated result of the surveys. The prices actually varied with the locations and the seasons.

Table 3.3.8 Farmers' Selling Price of Major Crops (March – July, 2012)

No	Crop	Price (MT/kg)		No	Crop	Price (MT/kg)	
		Average	Range			Average	Range
1	Maize (grain)	4.2	3.0 - 5.0	14	Sweet potato	2.9	2.5 - 3.5
2	Cassava (dry)	2.4	2.0 - 3.5	15	Potato	4.8	4.5 - 6.0
3	Sorghum (grain)	4.9	4.0 - 6.5	16	Onion	15	10.0 - 20.0
4	Millet (grain)	14.9	14.5 - 15.0	17	Tomato	7.1	5.0 - 7.5
5	Rice (paddy grain)	4.2	3.5 - 5.0	18	Cabbage	8.8	8.0 - 10.0
6	Wheat	-	-	19	Sesame seed	23.0	20.0 - 25.0
7	Ground nut (shelled)	21.5	17.5 - 25.0	20	Sunflower seed	5.0	5.0
8	Ground nut (w-shell)	5.9	5.0 - 7.0	21	Cashew-nut	12.8	10.0 - 17.5
9	Haricot beans	19.5	18.0 - 25.0	22	Banana	6.7	6.0 - 7.0
10	Cowpea	5.6	5.0 - 7.5	23	Sugarcane (plant)	1.5	1.5
11	Mungbean	10.6	7.0 - 13.0	24	Cotton	15.0	15.0
12	Pigeon pea	12.8	10.0 - 18.0	25	Tobacco (high-quality)	60.0	60.0
13	Soybean	12.1	10.0 - 15.0				

Source: The JICA study team

3.3.7. Animal Husbandry

Animal husbandry in the target districts of the Study Area, as well as the rest of the areas in the country, is characterized by a large predominance of extensive breeding except for a commercial production of broiler. The broiler industry has introduced an intensive breeding system using high inputs and technology. The following describes animal husbandry in the Study Area, according to collected data from the respective DPAs for the year 2011.

(1) Cattle

Total number of cattle in target districts was 42.1 thousand heads. Those districts in Nampula province grew 36,002 heads, representing 85.4% of the Study Area. The total number of the whole herds in three concerned provinces, 114.5 thousand heads, is less than 10% of the national total.

Table 3.3.9 Number of Cattle in the Study Area

CATTLE	Target Districts (Study Area)			Province	
	Head	% of Province	% of Country	Head	% of Country
Nampula	36,002	57.9	2.9	62,213	5.0
Zambezia	3,778	9.1	0.3	41,345	3.3
Niassa	2,365	21.5	0.2	10,987	0.9
Total	**42,145**	**-**	**3.4**	**114,545**	**9.2**

Note: National total number is 1,250,000. (FAO 2010), Source: DPAs of respective provinces (2011)

(2) Goats

The three provinces grew 982.4 thousand heads, representing 20.5% of the national total. Only in the target districts, there were 294.4 thousand heads in total and the total number of the Study Area were divided by 86.6%, 3.9% and 9.5% by Nampula province, Zambezia province and Niassa province, respectively.

Table 3.3.10 Number of Goats in the Study Area

GOATS	Target Districts (Study Area)			Province	
	Head	% of Province	% of Country	Head	% of Country
Nampula	254,928	38.7	5.3	658,603	13.7
Zambezia	11,429	4.5	0.2	254,375	5.3
Niassa	28,024	39.1	0.6	71,669	1.5
Total	**294,381**	**-**	**6.1**	**984,647**	**20.5**

Note: National total number is 4,800,000. (FAO 2010)
Source: DPAs of respective provinces (2011)

(3) Sheep

The data of DPAs in 2011 indicates that the target districts had 59.7 thousand heads of sheep, representing 25.0% of the total number of sheep of 238.4 thousand heads in the three provinces. However, these figures need to be confirmed, because the FAO statistics for 2010 indicates that the total number in of Mozambique was only 200 thousand heads, and the similar data of the Agricultural Census 2009-10, INE, counts the total of 220 thousand heads.

Table 3.3.11 Number of Sheep in the Study Area

SHEEP	Target Districts (Study Area)			Province	
	Head	% of Province	% of Country	Head	% of Country
Nampula	46,204	26.5	-	174,093	-
Zambezia	6,372	11.5	-	55,395	-
Niassa	7,114	79.8	-	8,917	-
Total	**59,690**	**-**	**-**	**238,405**	**-**

Source: DPAs of respective provinces (2011)

(4) Swine (Pig)

The total number of swine in the three provinces was 243.2 thousand heads, representing 18% of the national total, and the target district grew only 78 thousand heads. The target districts in Nampula represent 89.6% of the Study Area.

Table 3.3.12 Number of Swine in the Study Area

SWINE	Target Districts (Study Area)			Province	
	Head	% of Province	% of Country	Head	% of Country
Nampula	69,929	59.4	5.2	117,788	8.7
Zambezia	6,575	5.6	0.5	117,498	8.7
Niassa	1,544	19.5	0.1	7,900	0.6
Total	**78,048**	**-**	**5.8**	**243,186**	**18.0**

Note: National total number is 1,350,000. (FAO 2010)
Source: DPAs of respective provinces (2011)

(5) Chickens

The provinces of Namibia, Zambezia and Niassa had a total of 6.6 million chicken heads, representing 34.7% of the national total of 19 million (FAO). The target districts in the provinces of Nampula and Niassa contributed with 14.9% of the national total, and chicken breeding is an important agribusiness activity in those provinces.

Table 3.3.13 Number of Chicken in the Study Area

CHICKENS	Target Districts (Study Area)			Province	
	Head	% of Province	% of Country	Head	% of Country
Nampula	1,181,188	53.0	6.2	2,227,000	11.7
Zambezia	-	-	-	1,204,104	6.3
Niassa	1,648,749	52.3	8.7	3,152,612	16.6
Total	**2,829,937**	-	**14.9**	**6,583,716**	**34.7**

Note: National total number is 19,000,000. (FAO 2010)
Source: DPAs of respective provinces (2011)

While aviculture in the Study Area is mainly shouldered by small-scale producers, a broiler chicken breeding by intensive system is realized mainly by agribusiness companies based in or in the suburbs of major cities. There are two (2) such companies in Nampula province. They manage a vertical production system from feed production, production of chicks, broiler breeding and slaughter until the marketing of the products. The increased demand for chicken feed in parallel with the demand for chicken meat impels the expansion of feed crops cultivation, mainly soybean in the east of Nampula province and in Gurue in Zambezia province. According to information from a poultry company, the company estimates that a market demand for chicken meat in the Study Area is from 30 to 50 ton/month and shows a very positive trend, and the local production is still insufficient to meet that demand. A considerable part of the marketed chicken in the Study Area is, therefore, supplemented by the imported chicken.

3.4. Agricultural Infrastructure and Irrigation

3.4.1. Present Condition and Issues of Irrigation Systems

(1) Inventory of Irrigation System

The development of irrigation systems had been proceeded and peaked in 1980's in the Study Area, as same with the remaining part of the country. After that, most of systems face the aging and malfunctioning of the facilities due to lack of adequate maintenance during and after the civil war period. As a result, the actual irrigated area had reduced significantly. The national inventory survey of the existing irrigation system was implemented in 2001 by the Irrigation Development Fund (Fundo para o Desenvolvimento da Hidráulica Agrícola : FDHA), and the provinces of the Study Area, Nampula, Zambezia and Niassa, were also included in the survey. The developed

inventory has been maintained and updated by DPAs with big effort, even though frequency is not sufficient due to lack of financial source. In addition, the inventory does not cover all of the systems and many of scattered small systems are not included. Thus, it is necessary to note that the inventory does not show the accurate area of irrigation farming. Furthermore, the inventory is not sufficient for appropriate management of irrigation systems, because of the insufficient accuracy of information as well as lack of location data in the inventory. Even though above problems, the inventory still has a considerable value because that is the only one information source which covers existing irrigation systems exactly.

(2) Present Condition and Use of Existing Irrigation Systems

Table 3.4.1 shows the number, area equipped and in-use[3] and distribution of size of existing irrigation systems. According to the inventory of irrigation systems updated by DPAs, the irrigation equipped area in Nampula Province is 41,459 ha. Among that, the area in-use actually is 3,575 ha and it is less than 10% of the equipped area. This ratio is significantly lower than that of Zambezia Province, 26.7%. The reason of this difference is assumed that the data of Nampula includes some large scale developments for paddy by private investor in the coastal area, which are in quite preliminary stage. On the other hand, Niassa shows high ratio of in-use such as 81.3%. It is considered that irrigation had not been developed in Niassa and the area is still small.

In the Study Area, the irrigation area in-use is 3,022 ha, which is equivalent to 44.8% of the area equipped, 6,746 ha. The irrigation area not in-use at present, which is approximately 3,700 ha, is considered as the area which has a potential of recovery of the irrigation farming by rehabilitation of the existing facilities. In the most systems, small family farmers are doing their farming in the beneficiary area of the irrigation system regardless using irrigation or not. By rehabilitating and recovering the function of the system, it is expected to introduce new users in small and medium scale as well as to expand the irrigation use of the existing farmers with increased capacity of irrigation water supply. However, due to existence of scattered irrigation users, it is difficult to invite a large scale irrigation user to the rehabilitation of existing irrigation system.

The shares of small scale irrigation system less than 50 ha of equipped area are55.6%, 59.5% and 90.6% for Nampula, Zambezia and Niassa Province respectively, which is higher than the national average of 51%. These provinces have a character that small scale system occupies larger part and the large scale system more than 500 ha is rare. This tendency is significant in the districts of the Study Area, where the system less

[3] The area equipped irrigation system means the area where irrigation system had been developed once regardless in-use or not in-use at present, while the area in-use shows the area actually used for irrigation at present.

than 50 ha occupies 70.2% and only 1 large irrigation system more than 500 ha exists in Monapo District of Nampula Province. Furthermore, the irrigation system of which the area in-use is less than 10 ha occupies extremely high portion of 85.4% in the Study Area. That shows that only small irrigation systems are available in the Study Area.

Table 3.4.1 Number, Area, Operation and Size of Irrigation Systems in Nacala Corridor

Province	Number of Systems	Irrigation Area (ha)		Area equipped (No.)			Area in-operation (No.)		
		In operation	Area equipped	<50 ha	50-500 ha	>500 ha	<10 ha	10-100 ha	>100 ha
1. Nampula	128	3,575 8.6%	41,459 100%	69 55.6%	50 40.3%	5 4.0%	108 90.0%	11 9.2%	1 0.8%
Within Study Area	64	2,318 40.8%	5,685 100%	38 61.3%	23 37.1%	1 1.6%	58 95.1%	2 3.3%	1 1.6%
2. Zambezia	74	3,427 26.7%	12,850 100%	44 59.5%	27 36.5%	3 4.1%	44 59.5%	23 31.1%	7 9.5%
Within Study Area	20	226 49.5%	456 100%	15 75.0%	5 25.0%	0 0.0%	13 65.0%	7 35.0%	0 0.0%
3. Niassa	64	634 81.3%	780 100%	29 90.6%	3 9.4%	0 0.0%	25 78.1%	6 18.8%	1 3.1%
Within Study Area	22	478 79.0%	605 100%	20 90.9%	2 9.1%	0 0.0%	17 77.3%	4 18.2%	1 4.5%
Study Area Total	106	3,022 44.8%	6,746 100%	73 70.2%	30 28.8%	1 1.0%	88 85.4%	13 12.6%	2 1.9%

*1: Including Matanuska Banana Farm of 1,300/2,000 ha in Nampula Province
*2: Area data is not available for 3 systems in Nampula Province.
Source: DPA Nampula, DPA Zambezia, DPA Niassa

(3) Development of Irrigation System

In Nampula Province, 13 systems were completed the construction or rehabilitation till 2012 among 59 systems requiring construction or rehabilitation. These construction or rehabilitation work are conducted by the provincial government budget as a part of the improvement of productivity of the Action Plan for Food Production (PAPA). Some systems are implemented under the District Development Funds (FDD). The irrigation development implemented by those lines consists of construction or rehabilitation of dam and canal facilities, procurement of pump and related equipment, installing plastic or concrete tank, and delivering watering can.

As for the project implemented by DPAs, after the appraisal of request of farmers, all costs are covered by the government budgets for survey/design to construction, applicant farmers provide their labor during the construction without payment, and responsible to operation and maintenance after construction. In the case of FDD, districts approve the application of farmers/ associations and decide the project. FDD is operated as a revolving fund and farmers/ association shall return the cost. In general, the project cost of each project done by FDD is 300,000 to 400,000 MT for irrigation project.

In parallel with government support on irrigation schemes, many NGO and Funds support the farmers to install irrigation as a part of agricultural or rural development programs.

The DPA Nampula formulated the Strategic Plan of Development of Irrigation in Nampula (PEDHAN), which includes 5 years development plan, even though it has not yet approved officially at present. DPAs of Zambezia and Niassa Province have not yet formulated such plan at present.

3.4.2. Present Condition and Issues of Irrigation Farming

(1) General Situation

In the Study Area, the large scale irrigation farming can be observed in entreprise farm producing cash crop but the number is very limited. Most of irrigation is carried in small size farmland with small scale irrigation system. The small scale irrigation takes water for irrigation by direct withdrawal from rivers or ponds with man-power or pump, small dam constructed in small rivers/streams, or small reservoir excavated in the farmland. After collapse of state farms, the irrigation area distributed to small scale farmers. Additionally, the small scale irrigation is becoming popular in the area along the river or nearby the lake and marshes recently for cultivating valuable vegetables, where the manual irrigation with watering can or using small mobile pump. Not only the valuable vegetables but also grains such as maize are irrigated as supplemental irrigation in some area. Because the majority of irrigation in the Study Area is scattered small scale irrigation, the actual area of irrigation farming is difficult to clarify.

(2) Large Scale Irrigation

As mentioned above, large scale irrigation farm is very few in the Study Area as shown in Table 3.4.2. Enterprise farm with large scale irrigation is observed 1 in Nampula Province and 3 in Niassa Province. Large scale irrigation farms operated by enterprise adopt the modern irrigation technology and produce cash crop for export. Matanuska Company, which located in Monapo District of Nampula Province, operates 1,300 ha of irrigation area with water source of the Monapo River and its tributery and produces banana for export. It has a plan to expand irrigation are to 3,000 ha in near future. Micro sprinkler system is introduced for irrigation. Luambala Jatrofa Company is located in Majune District of Niassa Province. It produces soybean in 145 ha of irrigation area with center pivot sprinkler system, besides producing Jatrofa in 200 ha. Tenga Comapy in Majune District operates farmland with irrigation and produces Macadamia nuts for export. The Matama Irrigation System which was operated by the Malonda Foundation is transferred to a private company and cultivates 100 ha of soybeans at present. Those companies are established with foreign capital for

producing export materials, and private or company farm with Mozambican capital using large scale irrigation or adopting modern irrigation technology is not observed.

Table 3.4.2 Large Scale Irrigation Users in the Study Area

Irrigation User	District/ Province	Water sources	Major Crop	Irrigated area / Total area (ha)	Irrigation system
Matanuska	Monapo/ Nampula	Monapo River, Dam in Mikate River	Banana	1,300/ 3,000	Pump, Micro sprinkler
Tenga Ltd.	Majune/ Niassa	Lucheche River	Macadamia		Pump
Luambala Jatrofa	Majune/ Niassa	Luambala RIver	Soybean	145/ 345	Pump, Center pivot sprinkler
Insumos Agricola e Pecuraia (IAP)	Lichinga・ Niassa	Lucheringo River	Soybeans	100/ 300	Canal

Source: Study Team

(3) Small and Medium Scale Irrigation

1) Crop and Farm Management

Even though the medium scale irrigation system occupies 29% besides the small scale does 70% in the Study Area, the 85% of the system has less than 10ha of actual irrigation area. Furthermore, the majority of the irrigation users are small scale farmers whose irrigation area is less than 1 ha. In Nampula Province, most small users cultivate vegetables, such as onion, tomato, carrot, cabbage, spinach, kale, garlic, pepper, etc., with irrigation in a part of farm land where major part is used for food crop such as cassava and maize and cash crop such as tobacco and cotton by rain-fed cultivation. The produced vegetables are brought to local market by farmers and some of farmers bring to town market in Nampula. Most small irrigation farmers point out the transportation of product to market as one of the challenges on irrigation farming.

It is also observed that farmers cultivate paddy in the rainy season in the low and swampy land and cultivate vegetables in the same land just after harvesting paddy. Manual irrigation using watering can is used for supplemental irrigation for the vegetables in those area. This cropping pattern is considered as the one which fully uses of soil water effectively. The situation of mixed farming of rain-fed and irrigation farming is common in Zambezia and Niassa Province as well. In the Study Area of those provinces, supplemental irrigation for maize and beans are also observed widely. In Niassa Province, it is observed supplement irrigation is applied for potato as well.

2) Irrigation Practice and Management

It is general that farmers take and uplift water from streams or reservoirs by watering can manually or using small mobile pump. Gravity canal system is used where it is available, however, it is limited due to lack or abandon of system. Farmers apply water

to crops by furrow irrigation with gravity or localized basin irrigation manually. The number of farmers possessing own pump is still few and most farmers use watering can for conveying and applying water. Because the major part of labor work of irrigation is occupied by manual water conveyance, the demand of mobile pump is high among the small irrigation farmers. However, the cost of fuel is constraints for pump users due to lack of electric power in the rural area. Furthermore, the heavy labor work of manual irrigation of vegetables limits the irrigation area of each farm household and causes difficulty to expand their irrigation area.

As for the management of farm land in the small irrigation, three types are observed:

- Cooperative development, use and operation and maintenance (O/M) of irrigation facilities among the individual farm management
- Collaboration in specific farming practice among individual farm management
- Cooperative farming in the irrigation area

Collaboration in farming practice is observed in irrigation and transplanting of vegetable crops which take concentrative labor work. Cooperative farming is limited to the farming in the irrigation area and each farmer cultivates rain-fed farm land individually besides the cooperative irrigation land. Those cooperative work or collaboration works are carried out by farmers groups or associations. Irrigation system is also operated and maintained by farmers group or association which using the system. It is sometimes observed that community takes part into development and operation of small irrigation system.

In general, irrigation fee is not charged to users in small irrigation system, besides associations collect membership fee. The necessary activity for operation and maintenance work is implemented by labor participation of users, while users pay fuel cost in case pump is applied. When some amount of budget is necessary for repairing facilities or equipment, ad-hoc charge is collected from users, however, it is difficult to collect enough budget due to economic condition of small farmers. This causes the limitation of maintenance work by farmer's group or association and causes malfunctioning or abandon of irrigation system.

3) Irrigation System and Facility

The water source of small irrigation system is i) direct withdrawal from natural rivers by manual or small mobile pump, ii) small dams constructed in small rivers or streams, and iii) farm pond dug in a part of farmland. The irrigation area which developed in the former state farms divided among small farmers after collapse. Due to lack of knowledge, experience and finance source of small farmers, those irrigation systems are not maintained appropriately and the damage of dam and canal causes malfunction and abandon of the system.

Small dams in small rivers are usually constructed with concrete and reservoir using swamp and stream is built by earth dam in most case. The water stored in the dam or reservoir is delivered to farm lots through gravity canal, by manual or by pump. Because most small system has limited capacity of storing water, the available period of irrigation depends on the seasonal river flow. The systems rely the water source upon seasonal stream in Nampula Province, that is majority of small irrigation, can provide irrigation only 2 to 3 months after the dry period started, that is up to June or July. Even in the rivers which have relatively abundant flow, the water level decreases significantly in October and November so that farmers face difficulty to take water. Thus, the cultivation in the small irrigation system is limited to vegetable crops, of which cultivation period is short, or supplement irrigation of rain-fed crops.

In general, the structure of small scale irrigation facility is simple and there are many cases that inadequate treatment of foundation or lack of stability of dam body is observed. In Nampula Province, some concrete dams built by DPA/MINAG are damaged and collapsed by water leaking and scoring under the foundation. It can be considered that there are problems in the investigation and design of dam body and foundation as well as quality management during the construction stage.

(4) Issues in Irrigation Development

Issues in irrigation development found in the Study are summarized as below:

1) Technical level of construction of hydraulic facilities
   - Lack of construction company which has adequate technical skill and experience of hydraulic structure.
   - Lack of knowledge and experience of administrations for supervising the construction work from technical aspects.
2) Investment for irrigation development
   - Lack of financial source of farmers for procuring pump, repair and re-construction of irrigation facilities.
3) Target crop and market
   - Development of market, shipping and distribution of products
4) Operation and maintenance of irrigation system
   - Lack of knowledge and experience of farmer, farmer's group and association
   - Lack of finance for maintaining facilities,
5) Irrigation practice and water management in the field
   - Labor intensive irrigation and cultivation management of vegetables limit the expansion of irrigation area of each household.
6) Capability of administration for managing irrigation development

- Inventory and database of irrigation systems is necessary to be developed and updated for adequate management by administrations.

7) Collection and organizing agricultural climate and hydrological data

- Lack of basic data for planning and designing irrigation such as agricultural climate and hydrological data.

3.4.3. Use and Management of Water Resources

(1) Water License[4] and Water Fee Collection

ARA is responsible for development and management of water resources. In the Study Area, the districts of Niassa Province except for Cuamba are under the jurisdiction of ARA Norte (ARA-N), while the remaining districts are under the jurisdiction of ARA Centro Norte (ARA-CN). ARA controls use of water resources such as rivers, lake and marshes and dams by registration of users and issuing the water license. ARA is required to manage its activity by financial autonomy through collecting water fee from users under its jurisdiction. At present, water fee is charged only to large scale users such as FIPAG, water authority to supply city water, industrial users and irrigation users more than 500 ha. Small irrigation users or small consumers are neither registered nor charged water fee.

(2) Water License in the Study Area

The present issued water license in the Study Area is summarized as shown in Table 3.4.3. In the jurisdiction of ARA-CN, 6 licenses, of which total amount is 60.8 million m^3/year, are concluded and issued in the Study Area. 3 licenses are for the purpose of public water supply in Nampula, Cuamba, Gurue, 1 license is for irrigation, and 1 license is for forestry use. The license for irrigation purpose occupies 84.6% of the amount of water, of which is prior user is Matanuska Banana Farm of 3,000 ha (Monapo River). Besides this, the water users in forestry sector uses irrigation of nursery trees in Gurue District (Licungo River). By the water source, the Monapo River including the Nampula Dam consists of half of licenses issued and the total amount of water occupies 94.5% among whole licenses. The River is considered as one of the most developed water resources in the Study Area.

In ARA-N jurisdiction, 7 licenses with total amount of 3.9 million m^3/year are concluded and issued, of which 1 is for public water supply in Lichinga, 3 for irrigation purpose (2 in Majune and 1 in Lichinga District), 3 for forestry purpose (2 in Lichinga and 1 in Sanga District). The forestry purpose is standing out comparing with ARA-CN. For the amount of water, irrigation purpose occupies 55.6% and forestry purpose occupies 20.7%. The licenses for irrigation purpose are issued to Luamba Jatrofa Farm which

[4] Water license includes License and Concession as described in 2.5.1.

produces jatrofa and soybean in Majune District, Tenga Farm which produces macadamia nuts in Majune District, and IAP Farm which produces soybean in Lichinga District. The licenses are concentrated in the Lichinga and Majune District and it shows the water resource in those districts is well developed. All license issued by ARA-N in the study Area at moment are provisional license which shall be renewal every year. These licenses are in the transition period for inspecting actual usage and are planned to be switched to the regular license in near future.

Table 3.4.3 Registered License/ Concession for Water Use in the Study Area

a) By Purpose of Water Use

ARA	Purpose	Number of License	Amount of water	
			(m^3/year)	(%)
Centro-Norte	Public water supply	3	6,963,600	11.4%
	Irrigation	1	51,500,000	84.6%
	Forestry	1	2,400,000	3.9%
	Total	6	60,863,600	100%
Norte	Public water supply	1	924,840	23.7%
	Irrigation	3	2,174,454	55.6%
	Forestry	3	810,720	20.7%
	Total	7	3,910,014	100%

b) By River Basin / District

ARA	River / District	Amount of water	
		(m^3/year)	(%)
Centro-Norte	Monapo River	57,500,000	94.5%
	Licungo River	3,360,000	5.5%
	Metucue River	3,600	0.0%
	Total	60,863,600	100%
Norte	Lichinga District	1,633,374	41.8%
	Majune District	2,160,000	55.2%
	Sanga District	116,640	3.0%
	Total	3,910,014	100%

Source: ARA Norte, ARA Centro-Norte, as of 2012

(3) Small and Medium Scale Irrigation Users in the Water Resources Management

According to the concept of the Water Law, common use including small scale farming is free and except from license. Besides that, only large irrigation user more than 500 ha is considered in the water resources management through water license system at present. It is necessary to take account of small and medium irrigation users in order to implement appropriate and effective water resources management. In consideration with the economic situation of small and medium irrigation farmers and the fact that irrigation farming is still in developing stage, it is necessary that all users shall be registered their water use, even though charged or not.

3.5. Agricultural Supporting System

3.5.1. Agricultural Research

(1) IIAM's Zonal Research Centers

IIAM has 2 zonal research centers covering the Study Area, i.e. the North East Center (IIAM CZnd) in Nampula and the North West Center (IIAM CZnw) in Lichinga. Among

districts in the area, the IIAM CZnd covers all districts in Nampula province except for Malema district, while the IIAM CZnw covers Malema district and all districts in Zambezia and Niassa provinces. The both centers have experimental units as shows in Table 3.5.1.

Table 3.5.1 Experimental Units of IIAM CZnd and CZnw

Research Center	Experimental Unit	Province/ District	Area (ha)	Agro-ecological Region	Notes
IIAM CZnd*a	Nampula agriculture station	Nampula	330	R7	
	Namialo cotton seed multiplication and research center	Nampula/ Maconta	347	R7	
	Mapupulo research center	C. Delgado/ Montepuez	40	R7	
	Nacaca agriculture sub-station	C. Delgado/ Namuno	50	R7	
	Napaha agriculture sub-station	C. Delgado/ Namuno	8,000	R7	No functioning
	Nametil agriculture sub-station	Nampula/ Mogovolas	1,014	R8	
	Ribaue agriculture sub-station	Nampula/ Ribaue	2,572	R7	
	Namapa agriculture sub-station	Nampula /Namapa	1,000	R7	
	Caju research sub-station	Nampula/ Meconta	12,394	R7/R8	
	Veterinary regional laboratory	Nampula	-	R7	
IIAM CZnw*b	Lichinga agriculture station	Niassa/Lichinga City	NA	R10	
	Mutequelese (Gurue) agriculture sub-station	Zambezia/Gurue	NA	R10	
	Mutuari agriculture sub-station	Nampula/Malema	3,000	R7	

Source: *a. Plano Estratégico do Centro Zonal Nordeste para o período 2011-2015, 2011, IIAMCZnd
*b. The Preparation Survey on Triangular Cooperation for Tropical Savannah Agricultural Development in Mozambique

(2) Research Strategy

Each of the IIAM CZnd and the IIAM CZnw has strategic crops for their R&D activities in 2011 to 15 as shown in Table 3.5.2. The IIAM CZnd defined the high influence and medium to high influence crops in their research jurisdiction area.

Table 3.5.2 Strategic Crops and Commodities of the IIAM CZnd and CZnw

Zonal Center	High influence crops/commodities	Medium to high influence crops/commodities
CZnd	Cassava, Maize, Beans (cowpea, mung-beans), Ground nut, Cotton, Cashew nut, Poultry	Sorghum, Paddy, Sesame, Pigeon pea, Eggs, Meat (cattle, pigs, goats), Woods
CZnw	Cereals (Maize and Sorghum), Legumes, Cassava, Sweet potato, Vegetables, Ground nut, Wheat, Sesame, Potato, Soybean, Tobacco, Cotton, Tea, Chicken	

Source: Plano Estratégico do Centro Zonal Nordeste para o período 2011-2015, 2011, IIAMCZnd

The IIAM CZnd and CZnw set the practical strategic targets based on the following IIAM 5 strategic targets, as well as their strategic crops.

1) High productivity, stable yield, basic sustainability of supply chains
2) Establishing competitive cash crop supply chain
3) Food security, nutrition and health
4) Sustainable use of ecosystem

5) Interaction and integration for IIAM's sustainability

(3) Human Resources

The IIAM CZnd has 32 researchers (PhD, Masters and Graduates) and 33 technical support agricultural researchers, in addition to 22 basic level and 71 elemental level technicians. The IIAM CZnw has 12 researchers (Masters and Graduates). Some experts play a leading role in the national research in the field of grains, legumes, roots and tubers, cashew nuts, sesame and cotton, and in multidisciplinary subjects (soils, entomology, plant pathology, and socio-economics). While few specialized researchers exist in the both centers, they are concentrated to headquarters of the centers.

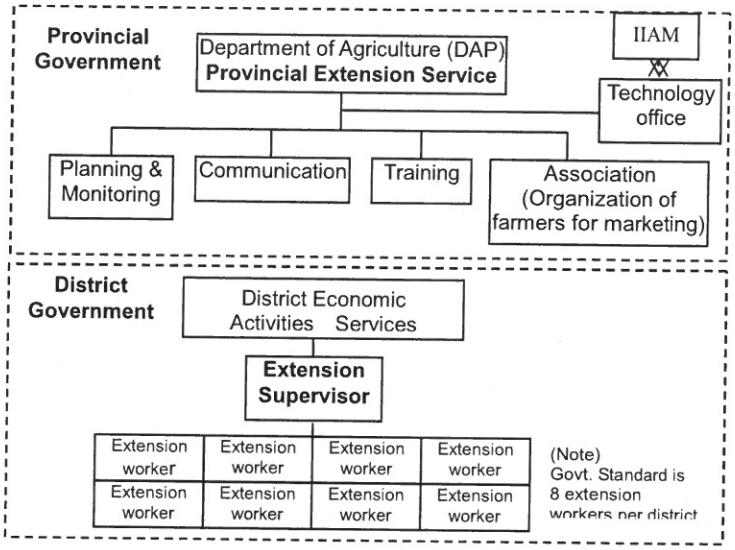
(4) Partners

In addition to research partners mentioned in 2.4.1, IIAM has launched joint research activities with JICA and EMBRAPA in Brazil through the Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development, Mozambique. This project is based on the tropical savannah agricultural development framework by Japan and Brazil cooperation (ProSAVANA), and aim to develop appropriate agriculture technologies to the Nacala Corridor area and to encourage research capacity of the IIAM CZnd and CZnw.

3.5.2. Agricultural Extension

The District Economic Activities Services (SDAE) is responsible for agricultural extension service at field level after decentralization of the extension governance. Before the year of 2000/01, an extension supervisor who supervises the activities of extension workers was allocated to each post which is the lower administrative unit after district. A district consists of several posts in general. There were 8 extension workers under an Extension Supervisor or in each Post according to the government standard at that time.

After 2000/01, only one extension supervisor has been allocated to each district (SDAE). Simultaneously, the number of extension workers in each district has been reduced. Only 8 extension workers are working in a district according to the present government standard. The actual number of the extension workers is, however, below the government standards, 5 to 6 workers per district in average. Consequently, the total number of extension workers has been drastically reduced since 2000/01.



Source: JICA Study Team (Interview from DAP, Nampula Province)

Figure 3.5.1 Concerned Government Organizations to Agricultural Extension Service

The extension workers are providing technical support mainly to small-scale farmers in their jurisdiction area. The following services are covered by their regular activities. The extension workers are expected to provide a technical service under close linkage with other institutions, such as research, agricultural services and marketing institutions, according to SUE (the United Extension System) of MINAG

1) Providing a technical support to 8 farmers groups
2) Facilitating farmers to organize farmers associations (2-3 associations)
3) Managing of a demonstration field through entrusting to a contact farmer
4) Managing a demonstration field (1 ha) under supervision of IIAM/IITA (PITA)

Beside the above regular works, they are working for many government or donor funded programs to distribute farming inputs to farmers.

Agricultural extension service has largely been undertaken by private sector, such as NGOs and service providers in the country. The extension service has historically been carried out or associated with specific commercial activities, such as cotton and tobacco production. Many farmers were given technical information on the use of chemical fertilizers and pesticides through their experience as an out grower of cotton or tobacco industry under contract.

Considering the situation, the SUE seeks functional partnerships between public and private extension services, including the development of public contract with non-government service providers. The following NGOs and cotton companies are

recognized by Nampula DAP as agricultural extension service providers. Nampula DPA organizes an annual coordination meeting with major NGOs.

1) NGOs
   Save the Children, CLUSA, Care/Proj Sementes, Adap/SF, Essor, OIKOS, V.Mundial, Actined, Olipa Odes, Ophavela, Kulima, Africare
2) Cotton companies
   Sanam, OLAM, CANAM, SAM, PLEXUS

3.5.3. Farmers Organization

(1) Present Status of Farmers' Organization

In the Study Area, there are many farmers' associations at the village level. Complex of two or more farmers' association is a forum (Foro) (referred to as the Union (União) by province), and there are rural forum (Faro rural) and district forum (Faro detrital). DPA is promoting that the farmers' association will be formed to the forum. In addition, there is a federation (Federação) of provincial level in some province (referred to as the Union (União provincial) by province).

The role and object of each organization are as follows:

Association: a group of people who get together to pursue a common objective. In Mozambique, the legislation states that the minimum number of people to constitute an association is 10. Their objects are as follows:

- To defend the interests of members (farmers and pastoralists);
- To hear the wishes and desires of the residents of the area;
- To promote the socio-economic development of the area, proposing business ideas or alternative projects;
- To sell the agricultural and livestock productions in the area; and
- To strengthen the spirit of solidarity and mutual aid.

Forum: a group of legal associations of the same geographical area facing the similar constraints who get together to facilitate problem solving. **Regional Union**: is equivalent to forum. This concept is used in the Niassa province. **District Union**: a group of forums based in the same district. Their objects are as follows:

- To defend the interests of members;
- To assist members in preparing projects for the development of the associations;
- To find markets to assist in marketing products of members;
- To help solve the existing problems within the association;
- To sensitizes and morality association so that does not dissolve.

Federation: a group of district unions which is open for forum and association to join directly. Their objects are as follows:

- To mobilize the assist and organize agricultural cooperatives and associations affiliated;
- To promote the development of activities of cooperatives or associations affiliated to them;
- To provide technical assistance in agricultural machinery and equipment and livestock to its members;
- To provide appropriate mechanisms for commercialization of the production with a view to realizing a profit;
- To provide facilities together credits from banks or other;
- To promote programs, training courses and charities for members of affiliated associations and cooperatives and their families to foster the spirit of saving.

Regarding the relationships with the Association and the Forum is as follows: 1) The forum is the home of associations; 2) The forum outlines policies and implementation strategies within their states that are members; and 3) The associations are accountable to the forum which they belonging. If the association of two or more gathered is considered to be the forum. The number of average, about 15 associations is the principle. The quota set for the associations by each forum usually would be 100.00 to 200.00 MT annually.

(2) Inventory Survey

1) Methodology

In this Study, Inventory Survey of farmers' organizations was conducted. The objective of the Inventory Survey was to identify the present conditions and the problems on management as well as the development of each farmers' organization. In order to achieve this objective, following activities were carried out. Primary and secondary data have been collected from the Provincial Directorate of Agriculture (DPAs) of the 3 provinces, District Services of Economic Activities (SDAEs) and Districts Government of the 14 districts. In every district 10 farmers' associations were selected as sample to fill in the questionnaire, and data collection was done through direct contact with each farmers' organization in sample of 10 organization in each district for an exhaustive assessment of the information about the structure, functioning, legal and financial situation. There were four workshops to be run with representatives of farmers' organizations at forum and district levels.

2) Result of Survey

Results of the inventory survey on farmers' organizations are as follows.

Table 3.5.3 Number of Farmers' Associations

Province	District	Total No of Ass.	Legal Ass.	Number of Members			Non Legal Ass.	Number of Members			Total Members
				M	W	Total		M	W	Total	
Nampula	1) Monapo	108	77	1,108	513	1,621	31	258	129	387	2,008
	2) Muecate	44	23	303	136	439	21	183	115	298	737
	3) Meconta	114	93	1,508	760	2,268	21	217	168	385	2,653
	4) Mogovolas	92	52	582	290	872	40	447	166	613	1,485
	5) Rapale (Nampula)	151	61	707	583	1,290	90	927	500	1,427	2,717
	6) Murrupula	90	50	499	452	951	40	456	422	878	1,829
	7) Ribaue	70	23	396	142	538	47	654	272	926	1,464
	8) Malema	114	94	1,822	559	2,381	20	196	89	285	2,666
	Total	***783***	***473***	***6,925***	***3,435***	***10,360***	***310***	***3,338***	***1,861***	***5,199***	***15,559***
Zambebe	1) Alto Molocue	65	31	364	381	745	34	517	349	866	1,611
	2) Gurue	279	107	2,932	1,413	4,345	172	3,737	2,256	5,993	10,338
	Total	***344***	***138***	***3,296***	***1,794***	***5,090***	***206***	***4,254***	***2,605***	***6,859***	***11,949***
Niassa	1) Cuamba	102	11	156	99	255	91	1,589	716	2,305	2,560
	2) Mandimba	72	34	488	519	1,007	38	399	731	1,130	2,137
	3) Ngauma	27	9	62	67	129	18	124	91	215	344
	4) Lichinga	49	20	215	143	358	29	223	168	391	749
	Total	***250***	***74***	***921***	***828***	***1,749***	***176***	***2,335***	***1,706***	***4,041***	***5,790***
Grand Total		***1,377***	***685***	***11,142***	***6,057***	***17,199***	***692***	***9,927***	***6,172***	***16,099***	***33,298***

Source: JICA Study Team

In the Study Area, a total number of 1,377 farmers' associations is existing. Half of the total is legal organization. There are 783 associations in the Nampula province, 344 associations in the Zambezia province and 250 associations in the Niassa province. The average number of association members, is 19.9 members in Nampula, 34.7 members in Zambezia and 23.2 members in Niassa, a very large number of members is observed in Zambezia. The overall average is 24.2 members per association. Configuration of the ratio of male to female is 66:34 in Nampula, 63:37 in Zambezia and 56:44 in Niassa, and the proportion of women in the Niassa province is relatively high. The overall average is 63:37. Unionization rates for the whole farm household are lower 2 to 8%. However, only in the Gurue district is high as 17.8%. In the Nampula province is 5.0%, 12.8% in Zambezia province, 5.2% in Niassa province, and the overall average is 6.4%.

In addition, the results of a survey on federation and forums are shown in Table 3.5.4:

Table 3.5.4 Number of Federations and Forums

Province	District	Total Number	Number of Legal Organization	Number of Member's Forum/Union or Association	Number of Members		Number of Non Legal Organization	Number of Member's Forum/Union or Association	Number of Members	
					Men	Women			Men	Women
Nampula	Number of Federation/Union at Provincial Level	1	1							
	Number of Forum/Union at District Level	7	7							
	1) Monapo	5	5	2,008	1366	642	0			
	2) Muecate	4	4	737	486	251	0	0	0	0
	3) Meconta	3	4	2653	1,725	928	0	0	0	0
	4) Mogovolas	5	5	1485	1029	456	0	0	0	0
	5) Nampula Dist (Rapale)	7	7	2717	1634	1083	0	0	0	0
	6) Murrupula	10	6	919	485	434	4	910	470	440
	7) Ribaue	8	7	1464	1050	414		0	0	0
	8) Malema	16	16	2666	2018	648	0	0	0	0
	Total	***66***	***62***	***14,649***	***9,793***	***4,856***	***4***	***910***	***470***	***440***
Zambezia	Number of Federation/Union at Provincial Level	-	-							
	Number of Forum/Union at District Level	2	2							
	1) Alto Molocue	6	6	1,611	881	730				
	2) Gurue	21	21	10,338	6,669	3,669	0	0	0	0
	Total	***29***	***29***	***11,949***	***7,550***	***4,399***	***0***	***0***	***0***	***0***
Niass	Number of Federation/Union at Provincial Level	1	1							
	Number of Forum/Union at District Level	3	3							
	1) Cuamba	9	9	2,560	1,745	815	0	0	0	0
	2) Mandinba	8	8	2,137	887	1,250	0	0	0	0
	3) Nguama	4	2	155	74	81	2	189	112	77
	4) Lichinga	7	7	749	438	311	0	0	0	0
	Total	***32***	***30***	***5,601***	***3,144***	***2,457***	***2***	***189***	***112***	***77***
Grand Total		***127***	***121***	***32,199***	***20,487***	***11,712***	***6***	***1,099***	***582***	***517***

Source: JICA Study Team

In the Zambezia province, a federation of provincial level does not exist. There is also district has no forum of district level. Each district has local forums of 2 to 16, with a total of 127 local forums in the Study Area. Forums are mostly legal organizations.

However, it is considerable a part of the survey results is problematic. The data provided by DPAs and SDAEs are not consistent if compared with the real number of associations provided by NGOs that operate in the same district. And most of cases there are no detailed data regarding the number of associations, its legal situation and number of members. For example, in Monapo SDAE provided 44 as total number of associations and AFRICARE is assisting more than 200 associations. The data collected from SDAE in Gurue gives a number of 145 associations and CLUSA assists around 177 associations and local federation has 127 members associations. It clearly shows that SDAE does not have the updated data about existing farmers' organizations in the district.

3) Case Analysis

Best practice of the organization activity and its success factors

Some of the best practices that farmers have reported during the workshops are use of grain storage for conservation of agricultural products, such as maize, beans, and other grains. Another good practice is the use of some plants leaves and animal excrements as fertilizers. And also the use of some plant leaves as pesticides to combat some pests. Apart from these practices a good collaboration between the unions, negotiating and managing contracts for market intermediation, and training associations in access to information are practices to be incentivized.

Case of failure of the organization activity and its failure factors

- Failure of Fulfillment of contract due to low production quantity of each member;
- Low credit repayment due to lack of management skills and viability of agriculture; and
- Lack of member ownership due to internal governance.

3.5.4 Agricultural Inputs

(1) Seeds

Only a few farmers use quality seeds in Mozambique. Table 3.5.5 shows that 6-10 % of farm-households used improved seeds for maize, which is the most popular crop among farmers in Mozambique, in 2005-2007. The JICA study team confirmed through its field survey in 2012 that most interviewee farmers use their own seeds or exchanged/purchased seeds from neighbors, except for vegetables, cotton and tobacco. Seeds of cotton and tobacco are provided for a price from a contracted company together with other necessary inputs, e.g. fertilizers and pesticides.

Table 3.5.5 % of Farm-households using Improved Maize Seeds

Province	2005	2006	2007
Niassa	6	9	5
Cabo Delgado	1	2	3
Nampula	6	7	6
Zambezia	5	9	11
Tete	11	17	24
Manica	10	18	20
Sofala	5	9	8
Inhambane	4	3	5
Gaza	2	10	5
Maputo	10	13	14
National	**6**	**9**	**10**

Source: TIA 2007, MINAG

Basic seeds are only produced by USEBA (Basic Seed Production Unit) of IIAM, while USEBA sometimes contracts to produce the seeds to a private seed grower. The basic seeds are, then, multiplied to certified seeds by seed growing companies. There are only 18 companies producing the seeds, while there are 35 registered seed companies according to Business Indicators Mozambique, World Bank, April 2012. They produced around 6,000 to 7,000 ton of certified seeds per year in 2007/08-09/10 as shown in Table 3.5.6 The seeds produced were mainly cereals and

beans seeds. There was no production of certified seeds of vegetables in Mozambique.

A legal and regulatory framework of seed quality control and registration has already been established in Mozambique. But the framework is not functioning well at field level due to lack of field inspectors, seed testing laboratories, etc.

There are several small-scale seed companies newly started their business within recent years at district level. While they have already registered to MINAG through DPA, no information is available whether they are included in

Table 3.5.6 Certified Seed Production in Mozambique

Crop	Year (unit: ton)		
	2007/08	2008/09	2009/10
Maize	3,388.6	793.1	1,739.7
Rice	1,070.2	3,379.4	4,143.0
Millet	479.6	100.4	36.0
Sorghum	30.0	6.0	4.0
Wheat	150.0	-	-
Beans	221.8	5.5	7.1
Cowpea	458.6	520.9	60.9
Pigeon-pea	2.0	-	-
Soybean	112.4	17.5	18.0
Sunflower	53.6	-	-
Groundnut	346.9	342.5	13.3
Sesame	34.5	191.4	-
Potato	774.0	400.0	115.0
Total	7,122.2	5,756.7	6,137.0

Source: Seed Department/DNSA, MINAG

the 35 companies mentioned above or not. Most of them get a financial assistance from NGO or donor agency. They have following problems for running the seeds business.

1) Heavy government intervention to seed business (SEMOC) and distribution
2) Lack of working fund (difficult to get a bank loan)
3) Low quality of basic seeds distributed by IIAM
4) Difficult to access to seed processing plants

The government program, through the Seed Department of MINAG and PDAs, has been promoting seed production by individual farmers and farmer groups in cooperation with NGOs. The seeds of maize, rice, groundnut, sesame and beans are produced under the program. About 6,000 ton of seeds were produced per year in 2005/06-2009/10, according to the Seed Department of MINAG. Though the produced seeds are not certified seeds, they are distributed to local farmers through farmer groups, cooperatives, private traders and even government support programs.

Table 3.5.7 shows that around 10,000 ton of certified seeds were sold in 2011. The table also implies that only three companies, SEMOC, MozFoods and PANNER dominate the local seeds market. They are also major seed growing companies in the country.

Table 3.5.7 Estimates of Certified Seed Sales in Mozambique in 2011

Company	Type of Seeds	Quantity (ton)
1 SEMOC	maize(OPV), beans, rice, sorghum, peanuts	5,000
2 MozFoods (MIA)	rice, maize (OPV & Hybrid), wheat, beans	2,050
3 PANNAR	maize (OPV & Hybrid), sorghum, peanuts	1,500-2,000
4 Dengo Comercial	maize (OPV & Hybrid), beans, sorghum, etc.	555
5 Morais Comercial	maize (OPV & Hybrid), beans, peanuts, horticulture crops	270
6 IkURU	maize (OPV & Hybrid), soybeans, peanuts, beans, sesame	250
7 Lozane Farms	maize (OPV & Hybrid), beans, sorghum, soybeans	168
8 others	maize (OPV & Hybrid), beans, horticulture crops, sesame, etc.	136.5-141.5
Total		10,182

Source: SDC (Swiss Development Corporation) Seed Study, 2011

A gap between the seeds produced and sold must be complemented by the import, while PANNAR exports its products to neighboring countries 2,500-3,000 ton/year. The amount of imported seeds is unknown. It is estimated that the seeds of maize, wheat, horticultural crops (vegetables) and potato might be major imported one.

The government is the main supply source of seeds to farmers through PAPA as shown in Table 3.5.8. The PAPA seeds are procured from local companies through public tenders, and SDAEs are responsible for the distribution. The PAPA seeds distributed to farmers at about 50% of the actual costs. SEMOC must be a major supplier of PAPA seeds, since it sells about 90 % of its seeds to MINAG programs.

SEMOC has been fully owned by the government after withdrawal of a partner shareholder, who had a majority of the share.

IFDC (International Fertilizer Development Centre) also implemented a subsidized inputs distribution of program in cooperation with EU and FAO in 2009/10 and 2010/11. Packaged inputs (seeds and fertilizers) for maize and rice were distributed through voucher system in Sofala, Zambezia, Manica, Nampula and Tete provinces. Figure 3.5.2 shows seed distribution flow to farmers in Mozambique.

Table 3.5.8 PAPA Seed Distribution

Crop	Unit	Year	
		2008/09	2009/10
Maize	ton	1,679.0	2,127.0
Rice	ton	697.8	2,000.0
Wheat	ton	1,152.0	1,350.0
Beans	ton	-	107.0
Soybean	ton	300.0	100.0
Sunflower	ton	75.0	-
Potato	ton	1,265.0	1,995.0
Horticulture crops	kg	-	2,204.0
Total		5,168.8	7,681.2

Source: Seed Department/DNSA, MINAG

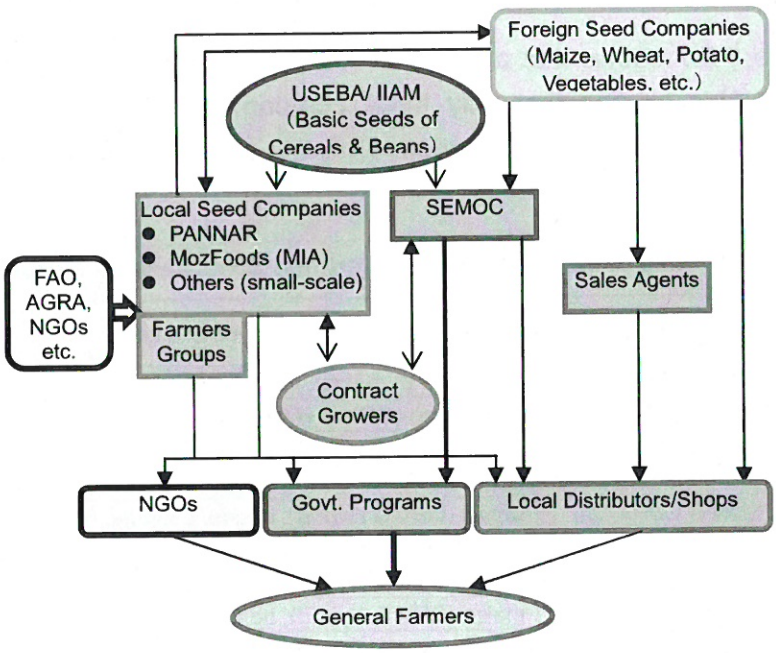


Figure 3.5.2 Seed Production and Distribution in Mozambique

(2) Fertilizers

As same as quality seeds, only a limited number of farmers use chemical fertilizers in Mozambique as shown in Table 3.5.9. While the % in Niassa, Tete and Maputo provinces is higher than the other provinces, the high % represents a larger planted are of crops, tobacco, sugarcane and vegetables on which fertilizers are manly used.

It is estimated that only around 30–50 thousand ton of chemical fertilizers were used per year in 2006 - 2010 as shown in Table 3.5.10. They were mainly applied to

tobacco and sugarcane. Few fertilizers were used on cotton while it is also an important cash crop in the country. The fertilizers popular among farmers in the country are, NPK (12-12-12 & 12-24-12), Urea, DAP and CAN.

Table 3.5.9 % of Farm-households using Chemical Fertilizers

Province	2002	2003	2005	2006	2007
Niassa	8	12	18	15	7
Cabo Delgado	3	-	2	5	1
Nampula	3	0.3	3	3	2
Zambezia	1	1	0	2	1
Tete	15	12	17	18	21
Manica	3	3	2	1	1
Sofala	1	2	1	2	1
Inhambane	2	2	1	2	4
Gaza	5	2	4	2	2
Maputo	4	3	7	7	12
National	**4**	**3**	**4**	**5**	**4**

Source: TIA 2007, MINAG

Several sources suggest that the fewer farmers' demand on fertilizers is because of limited access to input credit and high price of fertilizers in Mozambique. There is no government program to distribute subsidized fertilizers, while the government has provided seeds and farm machinery through PAPA. Subsidized fertilizers are distributed together with other inputs only by NGOs and donor's supporting projects.

Table 3.5.10 Estimated Fertilizer Consumption in Mozambique

Year	Tobacco	Sugarcane	other crops	Total
2006	13,000	10,000	5,500	28,500
2007	13,000	10,000	5,000	28,000
2008	15,000	12,000	5,000	32,000
2009	16,000	12,000	5,000	33,000
2010	31,400	15,000	5,000	51,400

Source: DNSA/MINAG

In contrast to the seed business, fertilizer business in Mozambique is totally operated by private sector. All fertilizers used in the country are imported from other countries. Only a fertilizer blending company, MFC (the Mozambique Fertilizer Company), is in operation in Chimoio. MFC even exports modest amount of its products to neighboring countries, mainly to Malawi. MFC's market share is expected to be about 50% in Mozambique. While Agri-focus is the next largest importer after MFC, there are also small-scale fertilizer importers who handle other agricultural inputs as well as various commodities.

The imported fertilizers are distributed through about 250 agro-inputs dealers who are scattered over the country. Table 3.5.11 implies that their high profit margin causes high retail price of fertilizers in Mozambique.

Table 3.5.11 Price Structure of Urea in 2011

Kind of prices	Price (US$/ton)	% at Retail price
FOB (at Saudi Arabia)	449.0	43.9
CIF (at Beira)	623.8	61.0
Ex-factory (at Chimoiyo)	720.0	70.4
Delivery price at retailer	748.0	73.1
Retail price	1,023.0	100.0

Source: Agribusiness Indictors Mozambique, World Bank, April

According to several agro-input dealers, the reasons of the high profit margin are "low handling amount due to low demand" and "high financial burden for keeping the stock".

Figure 3.5.3 shows fertilizer distribution flow to farmers in Mozambique. The flow may change drastically after several years, since several projects to construct fertilizer plant are in the planning stage in Mozambique.

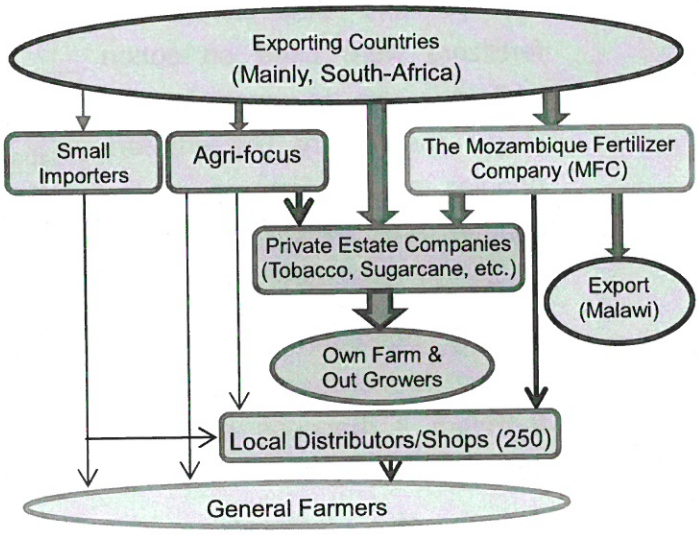


Figure 3.5.3 Fertilizer Processing and Distribution in Mozambique

(3) Agricultural Chemicals (Pesticide)

As same as seeds and chemical fertilizers, very few farmers use pesticide, i.e. insecticides, fungicides and herbicides, in Mozambique as shown in Table 3.5.12.

Table 3.5.12 % of Farm-households using Pesticide

Province	2002	2003	2005	2006	2007
Niassa	5	7	7	11	3
Cabo Delgado	11	9	11	17	10
Nampula	15	10	10	4	3
Zambezia	1	1	1	2	1
Tete	9	5	7	9	13
Manica	3	2	2	1	1
Sofala	3	8	8	9	6
Inhambane	4	2	1	1	1
Gaza	6	2	3	1	3
Maputo	5	2	6	7	8
National	**7**	**5**	**5**	**5**	**5**

Source: TIA 2007, MINAG

According to FAOSTAT, the annual pesticide use was around 900-1,000 ton in 2006-2010, except for the year 2007 (see Table 3.5.13). Since there is no production of pesticide in the country, all pesticide used were imported. Agri-focus is the only major pesticide importer in the country. While the company is also a major fertilizer importer, pesticide is its main business commodity.

Table 3.5.13 Pesticide Use in Mozambique (unit: ton)

Year	Insecticides	Herbicides	Fungicides	Total
2006	439.24	378.15	74.13	891.52
2007	172.34	320.37	54.6	547.31
2008	437.12	391.17	60.22	888.51
2009	180.23	617.29	115.35	912.87
2010	398.46	648.42	139.88	1,186.76

Source: FAOSTAT

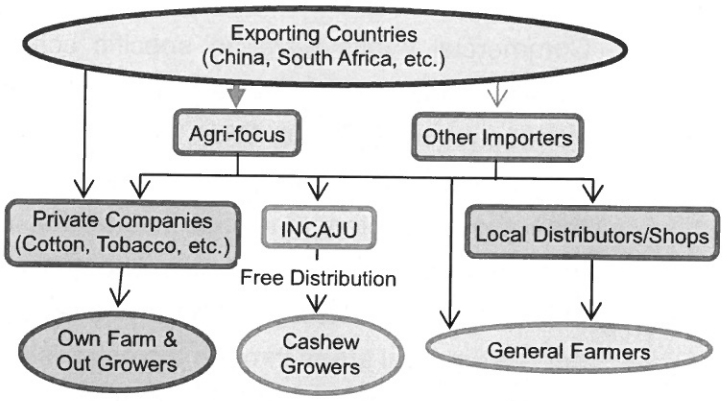
No detailed information available about the use of pesticide. According to collected information by the JICA Study team, the pesticide for agriculture use is mainly used for cash crops, e.g. cotton, tobacco, cashew, etc. and vegetables. INCAJU

distributes a free pesticide for an incentive to cashew growers. However, the beneficial growers are charged for the spraying service, according to the growers in Nampula province.

The government stated pesticide regulation in March 2002. It regulates registration, packing and labeling.

Figure 3.5.4 shows pesticide distribution flow to farmers in Mozambique.

Figure 3.5.4 Pesticide Distribution in Mozambique



(4) Agricultural Machinery

The information about number of tractors in use in Mozambique varies between the sources. While the Agriculture Census in 2009-2010 (INE) says there are 59,467 tractors, FAO data say there were only 6,540 tractors in 2006. Considering the number of imported tractors that was 524 units per year in 2008-10 according to a customs data and economic life of tractors (around 10 years), it is assumed that FAO data would be more reliable. In any case, the number is too small to meet the 5,633,850 ha of total cultivated area in the country.

Tractor hire service is not well developed in Mozambique. Some large scaled farmers provide custom land preparation service after they have finished all land preparation works in their own fields. Farmers associations and cooperatives also provide the tractor hire service. They have got a tractor through donor or government supporting programs including the District Development Fund.

Tractors are imported by individuals and private companies who are mainly sales agents/dealers of major international tractor makers, i.e. John Deere, Massey Ferguson and New Holland. Since the demand from private sector has been still low and some regular user import tractors by their own, a substantial part of imported tractor by the major distributors in 2008-11 went to public sector (see Table 3.5.14).

Government plays a significant role in distributing agricultural tractors as shown in Table 3.5.15. There are discrepancy between the numbers in Table 3.5.14 and 3.5.15,

because the government didn't necessarily procure the tractors only through the major dealers.

Table 3.5.14 Imported Tractors by the Major Distributors (2008-11)

Year	Number	% distributed	
		Private	Public
2008	38	0	100
2009	77	26	74
2010	284	21	79
2011	70	86	14
Total	469	-	-

Source: Agribusiness Indictors Mozambique, World Bank, April 2012

Table 3.5.15 Government Distributed Tractors (2008-2010)

Year	Number	Original/ Program
2008	50	FDA
2009	50	PAPA
2009/10	110	Commodity Aid
2009/10	220	GPZ
Total	430	-

Source: NDSA/MINAG

3.5.5 Agricultural Finance

(1) Agriculture Finance for Agribusiness Operators

Commercial banks have no specific conditions for agriculture/agribusiness loans, except for the special mechanisms applied through the development program[5]. Apart from commercial banks, GAPI[6] also provides financial services to rural agribusiness enterprises and farmer organizations by offering loans with slightly lower interest rates than those of other financial institutions, conducting training for entrepreneurs in business management, and providing advisory services for business planning through branch offices located in each province.[7] GAPI also has a plan for providing financial services in rural areas through the establishing of micro-banks. Table 3.5.16 shows the specific conditions for GAPI's operations.

Table 3.5.16 Details on the Operational System of GAPI

Items	Conditions
Credit line	- 10,000 to 400,000 US$ (for small/medium enterprises)
Interest rate	- 6 to 8 % lower than that of commercial banks - A specific interest rate is decided upon based on the nature of the business and quality of collateral
Approval of loan applications	- Amount of loan is less than 25,000 US$: by the branch manager - Amount of loan is greater than 25,000:US$ by the GAPI headquarter or the regional manager
Default rate	- Approximately 20% to 25% (for loans to small/medium enterprises)
Proportions of loans	- 70 % for small/medium enterprises; 30% for farmers organizations
Others	- GAPI does not receive deposits and only provides loans

Source: Interview from GAPI, JICA Study Team

[5] Many donor funded programs include access to finance for agriculture/agribusiness development using different financing tools, such as subsidized credit lines, guarantee funds, catalytic funds, and technical support.
[6] GAPI (Sociedade de Investimentas) was originally set up as a government financial institution to support small-scale industries, and thereafter evolved into a private company though the government still retains a 30% ownership share.
[7] In the Nacala Corridorr, GAPI has branch offices in Nampula and Cuamba.

(2) Agriculture Finance to Small-scale Farmers by Microfinance Institutions

Microfinance institutions (MFIs) have limited experience in agricultural lending, which form a small share of MFI portfolios.[8] The conditions for agriculture lending to small-scale farmers differ from those of commercial banks, particularly in collateral requirements. Since the value of the loan is much lower than commercial banks, MFIs require collateral adapted to rural contexts, such as domestic goods, savings, third-party guarantors, solidarity groups, and animals.[9] The interest rate of loans for agriculture activities is usually lower than that of other activities, ranging from 3% to 4% per month, while the normal rate is from 4.5% to 6% per month; a rate with which most small-scale farmers would be reluctant to accept as they perceive it to be too high to repay with their earnings.[10]

Looking at a specific example in Ribaue district in Nampula province, the local microfinance institution, Modelo Microcredit established in 2009, has worked with CEPAGRI and a private agribusiness in planning a contract farming project involving over 300 small-scale farmers. The role of Modelo Microcredit is to provide loans to contract farming members with which the members may purchase agriculture inputs such as quality seed and fertilizer from a private business partner. Though a normal interest rate for agriculture lending, 4% per month, is applied for this loan arrangement, the members may be granted a 6-month grace period, which allows the members to repay the loan after the harvest when a private business partner purchases the crops from the members with cash. As explained above, Modelo Microcredit accepts collateral that adapted to rural context for the loans, specifically screening the recipient's attitude toward work as well as personal reputation with neighbors so as to establish their credibility as a borrower. Table 3.5.17 summarizes Modelo Microcredit's operational system.

It is expected that this effort, involving 3 parties (the government, a microfinance institution and a private agribusiness), would seek to overcome the critical barrier of access to finance, which small-scale farmers encounter, in order to improve productivity and market access. The collaborative project will commence in October 2012.

Table 3.5.17 Details on the Operational System of Modelo Microcredit

Items	Conditions
Credit line	- 20,000 MT to 200,000 MT (agriculture activities) - 10,000 MT to 150,000 MT (commercial activities)
Interest rate	- 4 % per month with a 6-month grace period (agriculture activities) - 5% per month (without a grace period) (commercial activities)
Collateral	- Domestic goods, third-party/family guarantor, personal interview, etc.

[8] Economic and Sector Work: Agribusiness Indicator : Mozambique, World Bank 2012
[9] Ditto,
[10] Ditto

Default rate	-	Approximately 17%
Proportions of loans	-	17 % for agriculture activities; 83 % for commercial activities
Offices	-	Ribaue (main office), Malema, Cuamba, Mecuburi

Source: Interview from Modelo Microcredit, JICA Study Team
lands available for large investments at local level, IIAM 2008"

3.6. Agricultural Logistics

3.6.1. Agricultural Logistic System

(1) Agriculture Products on Market Flow

1) Staple food crops

Table 3.6.1 shows volume and percentage of produces. For staple foods like cassava and maize, the larger the volume, more sales volume, because volume of self-consumption is limited. Cassava losses are relatively high in Monapo, Cuamba and Mandimba accounting for 4.7%, 5.6%, and 4.2% respectively. Maize losses in Ribaue and Malema is very high accounting for 12.8% and 10.6% respectively. In general, 66% of cassava and maize in the Study Area are sold, 30% are for self-consumption, and loss accounts for 4%.

Table 3.6.1 Output Structure of Produce from Producer of Staple Food

Products	Province	District	Sales		Self-consuption		Losses		Total	
			(tons)	(%)	(tons)	(%)	(tons)	(%)	(tons)	(%)
Cassava	Nampula	Monapo	99	20.2%	367	75.1%	23	4.7%	489	100.0%
		Muecate	1007	47.3%	1102	51.8%	18	0.8%	2127	100.0%
		Meconta	367	43.6%	450	53.5%	24	2.9%	841	100.0%
		Mogovolas	339	41.6%	450	55.3%	25	3.1%	814	100.0%
		Nampula	785	45.7%	902	52.5%	30	1.7%	1717	100.0%
		Murrupula	300	30.9%	651	67.0%	20	2.1%	971	100.0%
		Ribaue	5500	74.0%	1800	24.2%	130	1.7%	7430	100.0%
		Malema	3800	92.2%	200	4.9%	120	2.9%	4120	100.0%
	Niassa	Cuamba	2500	66.5%	1050	27.9%	210	5.6%	3760	100.0%
		Mandimba	2300	76.8%	570	19.0%	125	4.2%	2995	100.0%
		Ngauma	1220	63.8%	680	35.5%	13	0.7%	1913	100.0%
		Lichinga	1560	67.0%	700	30.1%	67	2.9%	2327	100.0%
	Zambezia	Alto Molocue	850	64.8%	450	34.3%	12	0.9%	1312	100.0%
		Gurue	880	78.4%	208	18.5%	34	3.0%	1122	100.0%
Total			**21507**	**67.3%**	**9580**	**30.0%**	**851**	**2.7%**	**31938**	**100.0%**
Maize	Nampula	Monapo	300	52.2%	250	43.5%	25	4.3%	575	100.0%
		Muecate	145	42.9%	178	52.7%	15	4.4%	338	100.0%
		Meconta	89	31.9%	175	62.7%	15	5.4%	279	100.0%
		Mogovolas	130	42.6%	150	49.2%	25	8.2%	305	100.0%
		Nampula	331	46.8%	343	48.5%	33	4.7%	707	100.0%
		Murrupula	307	38.4%	477	59.7%	14.6	1.8%	798.6	100.0%
		Ribaue	1460	58.0%	660	26.2%	312	12.4%	2519	100.0%
		Malema	2400	63.6%	975	25.8%	400	10.6%	3775	100.0%
	Niassa	Cuamba	1600	66.1%	702	29.0%	120	5.0%	2422	100.0%
		Mandimba	2000	72.1%	760	27.4%	13	0.5%	2773	100.0%
		Ngauma	1769	72.2%	560	22.9%	120	4.9%	2449	100.0%
		Lichinga	1450	68.3%	550	25.9%	123	5.8%	2123	100.0%
	Zambezia	Alto Molocue	1560	76.3%	479	23.4%	6	0.3%	2045	100.0%
		Gurue	1543	69.8%	655	29.6%	12	0.5%	2210	100.0%
Total			15084	64.7%	6914	29.7%	1233.6	5.3%	23318.6	100.0%

Source: Trade inventory survey, JICA study team, 2012

2) Beans

For beans (Table 3.6.2), more volume than its of staple foods are sold outside the production areas, because of strong price competitiveness comparing with staple

foods. Percentage of sales in cowpea, mung bean and haricot bean account for 61.3%, 89.9% and 74.5% respectively.

Table 3.6.2 Output Structure of Produce from Producer of Beans

Products	Province	District	Sales		Self-consuption		Losses		Total	
			(tons)	(%)	(tons)	(%)	(tons)	(%)	(tons)	(%)
Cowpea	Nampula	Ribaue	994	57.0%	540	30.9%	211	12.1%	1745	100.0%
		Monapo	275	59.5%	175	37.9%	12	2.6%	462	100.0%
		Muecate	275	52.2%	230	43.6%	22	4.2%	527	100.0%
		Meconta	201	41.9%	254	52.9%	25	5.2%	480	100.0%
		Mogovolas	450	53.8%	375	44.8%	12	1.4%	837	100.0%
		Nampula	585	51.4%	530	46.5%	24	2.1%	1139	100.0%
		Murrupula	272	56.7%	200	41.7%	8	1.7%	480	100.0%
		Malema	986	58.1%	433	25.5%	278	16.4%	1697	100.0%
	Niassa	Cuamba	780	63.4%	440	35.8%	10	0.8%	1230	100.0%
		Mandimba	860	75.4%	220	19.3%	60	5.3%	1140	100.0%
		Ngauma	660	74.3%	188	21.2%	40	4.5%	888	100.0%
	Zambezia	Alto Molocue	780	70.4%	320	28.9%	8	0.7%	1108	100.0%
		Gurue	1232	65.4%	430	22.8%	223	11.8%	1885	100.0%
Total			8350	61.3%	4335	31.8%	933	6.9%	13618	100.0%
Mung bean	Nampula	Nampula	15	85.7%	1	5.7%	1.5	8.6%	17.5	100.0%
		Malema	152	83.5%	20	11.0%	10	5.5%	182	100.0%
	Niassa	Cuamba	230	95.0%	10	4.1%	2	0.8%	242	100.0%
Total			397	89.9%	31	7.0%	13.5	3.1%	441.5	100.0%
Haricot bean	Nampula	Malema	220	69.2%	89	28.0%	9	2.8%	318	100.0%
	Niassa	Ngauma	1600	84.4%	280	14.8%	15	0.8%	1895	100.0%
		Lichinga	654	56.2%	430	36.9%	80	6.9%	1164	100.0%
	Zambezia	Alto Molocue	340	86.7%	37	9.4%	15	3.8%	392	100.0%
		Gurue	470	74.5%	127	20.1%	34	5.4%	631	100.0%
Total			3284	74.6%	963	21.9%	153	3.5%	4400	100.0%

Source: Trade inventory survey, JICA study team, 2012

3) Commercial Crops

For other crops showed in table below, self-consumption of sesame, cashew nut and peanut account for 4.2%, 9.7% and 27.6% respectively. Loss in sesame is relatively high accounting for 9.5%. For soybean, no self-consumption appears and loss is quite high rate accounting for 15.0%.

Table 3.6.3 Output Structure of Produce from Producer of Others

Products	Province	District	Sales		Self-consuption		Losses		Total	
			(tons)	(%)	(tons)	(%)	(tons)	(%)	(tons)	(%)
Sesame	Nampula	Monapo	150	80.2%	2	1.1%	35	18.7%	187	100.0%
		Muecate	45	64.3%	10	14.3%	15	21.4%	70	100.0%
		Meconta	85	72.0%	18	15.3%	15	12.7%	118	100.0%
		Mogovolas	85	69.1%	15	12.2%	23	18.7%	123	100.0%
		Nampula	50	76.3%	3	4.6%	12.5	19.1%	65.5	100.0%
		Murrupula	45.5	81.3%	7	12.5%	3.5	6.3%	56	100.0%
		Ribaue	111	92.5%	1	0.8%	8	6.7%	120	100.0%
		Malema	129	90.2%	3	2.1%	11	7.7%	143	100.0%
	Niassa	Cuamba	330	93.2%	9	2.5%	15	4.2%	354	100.0%
	Zambezia	Alto Molocue	460	93.9%	5	1.0%	25	5.1%	490	100.0%
Total			1490.5	86.3%	73	4.2%	163	9.4%	1726.5	100.0%
Cashew nuts	Nampula	Monapo	468	93.0%	17	3.4%	18	3.6%	503	100.0%
		Muecate	200	87.0%	25	10.9%	5	2.2%	230	100.0%
		Nampula	550	82.7%	100	15.0%	15	2.3%	665	100.0%
		Murrupula	630	91.1%	34.25	5.0%	13.7	2.0%	691.65	100.0%
		Mogovolas	650	83.9%	100	12.9%	25	3.2%	775	100.0%
			2498	87.2%	276.25	9.6%	76.7	2.7%	2864.65	100.0%
Peanut	Nampula	Monapo	450	92.8%	11	2.3%	24	4.9%	485	100.0%
		Muecate	375	75.5%	98	19.7%	24	4.8%	497	100.0%
		Meconta	450	60.6%	275	37.0%	18	2.4%	743	100.0%
		Mogovolas	750	71.8%	250	23.9%	45	4.3%	1045	100.0%
		Nampula	235	43.4%	281	51.9%	25	4.6%	541	100.0%
		Murrupula	442	69.7%	173	27.3%	19.5	3.1%	634.5	100.0%
Total			2702	68.5%	1088	27.6%	155.5	3.9%	3945.5	100.0%
Soybean	Zambezia	Alto Molocue	30	90.9%			3	9.1%	33	100.0%
	Nampula	Ribaue	130	59.9%	0		87	40.1%	217	100.0%
		Malema	210	91.3%	0		20	8.7%	230	100.0%
	Niassa	Cuamba	120	93.8%	0		8	6.3%	128	100.0%
	Zambezia	Gurue	250	95.4%	0		12	4.6%	262	100.0%
Total			740	85.1%	0	0.0%	130	14.9%	870	100.0%

Source: Trade inventory survey, JICA study team, 2012

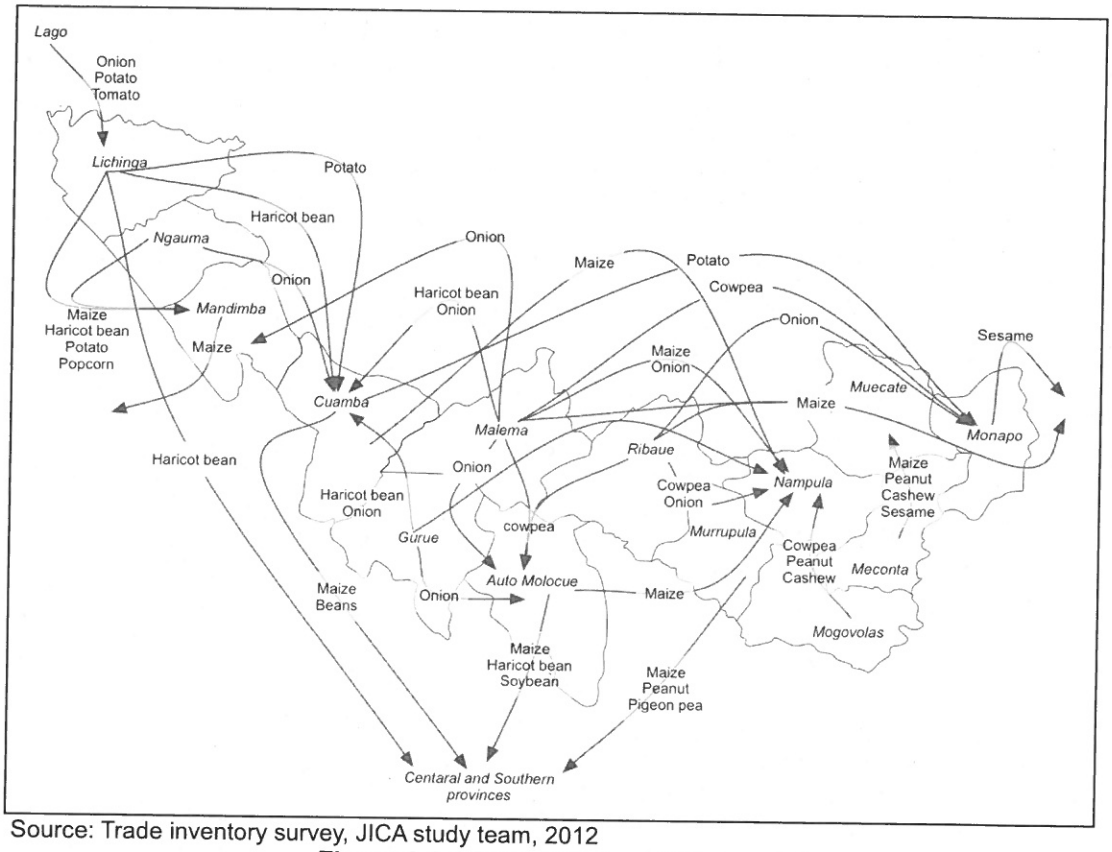
(2) Market Flow

Figure 3.6.1 illustrates movement of agriculture products excluding industrial crops in the Study Area. Agriculture produces are broadly traded inside the Study Area, and to the outside of the area by collector, various size of trader, processor, retailer, and exporter in each product's value chain.

The Study Area rises over 3 provinces, Nampula, Niassa and Zambezia. In Nampula province, other than flows between proximate districts, overall market flow goes towards mainly Nampula city, and flow from districts adjacent to Niassa and Zambezia, such as Malema and Ribaue, goes to districts in these provinces too. Most produces are transported by trucks and pick-up.

In Niassa Province, market flows go to Malawi through Mandimba, to Nampula and Zambezia province through Cuamba, and to central and south region for high value crops. Since, train runs once a month between Cuamba and Lichinga, trucks and pick-up are prevailing for product transportation. For maize in harvest season, railway car is used for transportation from Cuamba to Nampula.

In Zambezia province, which categorized in central region, market flow from Alto Molocue and Gurue goes to Quelimane and other districts in the province, and to central and south region through National road No.1.



Source: Trade inventory survey, JICA study team, 2012

Figure 3.6.1 Production and Movement

(3) Market Flow of Industrial Crops

Industrial crops such as tobacco and cotton are produced in concessional system with contract farming. So, concessionaires' processing factories in general is located in production area.

Primarily processed tobacco in Cuamba and Malema is transported to processing factory in Tete exported to Malawi through traders. Processed cotton is exported to mainly Asian countries.

3.6.2. Infrastructure of Agricultural Logistics

(1) Road Transportation

Most agriculture product is transported by various sizes of trucks. Bigger truck is more used for transportation in latter flow of value chain.

East-west National road No.12 (N12) & N13 and a part of N1 are passed from Nacala to Lichinga. North-south national road N1 from Maputo is passed Alto Molocue and Nampula city to Pemba, and N103 from Mutuali is connected to N1 through Cuamba towards south. These road network is crucial for transportation of agriculture product in Nacala corridor, but road condition of N13 and N103 is not good enough for efficient transportation. Road between Nampula and Cuamba in National road N13 and N103 beween Gurue and Namialo are currently under rehabilitation.

Table 3.6.4 shows comparison of transportation cost by road, railway and ship. For road transportation, it cost 5,600 US$ per a container from Nampula to Maputo, which is equivalent to from Lichinga to Maputo.

Table 3.6.4 Rail, Road and Ship Transport Cost Comparison

	Road				Ship
	Road (tons)		Rail (tons)		
	22	30	14	22	
Maputo to:					
Johannesburg	$625	$950	$393	$620	
Harare	$1,008	$1,344	$960	$1,686	
Blantyre	$1,260	$2,380	na	na	
Lusaka	$1,064	$2,100	na	na	
Lubumbashi	$2,520	$2,940	na	na	
Dares Salam			na	na	$845
Dubai					$2,550
Guangzhou					$2,550
Tilbury/NWC ports					$2,750
Pemba	$7,000		na	na	$1,350
Nampula	$5,600		na	na	
Beira	$1,800		na	na	$1,800
Kilema	$3,000		na	na	
Tete	$3,500		na	na	
Nacala			na	na	$2,500
Beira to:					
Harare	$1,200		$500	$1,000	
Blantyre	$1,700		na	na	
Lusaka	$3,700		$1,033	$2,021	
Nacala to:					
Lilongwe			$896	$1,408	
Blantyre			$840	$1,320	
Lichinga to:					
Nampula	$2,900–$3,200				
Beira	3,600				
Maputo	$5,400–$7,100				

Source: Value Chain Analysis for Strategic Sectors in Mozambique, GDS, 2005
Cost from Lichinga was collected by JICA study team, 2012

According to the transportation association in Lichinga, transportation cost per container costs 150,000 to 200,000 MT (5,357 to 7,143 US$) from Lichinga to Maputo, 100,000 MT (3,571 US$) from Lichinga to Beira, and 80,000 to 90,000 MT (2,857 to 3,214 US$) from Lichinga to Nampula. Lichinga imports commodity goods form Maputo, and trucks load agriculture product in Lichinga on the way back to Maputo. Beans are mainly selected for Maputo, because of high value for resell.

Similarly, given the infrequent service routes and poor quality of shipping service, shipping cargo from Nacala to Maputo costs 2,500 US$, which is nearly 3 times the cost of shipping a container from Maputo to Dar-es-Salam, Tanzania (845 US$), and approximately the same cost as shipping a container from Dubai or Guangzhou to Maputo.

Rehabilitation to paved road of National road N13 connecting between Nampula and Cuamba will be completed in February, 2015, and N14 connecting between Pemba and Lichinga will be finished in 2015. It is expected to reduce transportation cost through these corridors. Sections Cuamba to Mandimba and Mandimba to Lichinga, which connects above corridors is also planned to be rehabilitated. It is expected to decrease transportation cost in this area.

Since a bridge across the Zambezi river rehabilitated, link between north, central and south region has been improved. But, it has still remained high transportation cost between north-south corridor.

(2) Railway Transportation

Cargo transportation by railway is run on irregular basis upon readiness of certain cargo. Railway transport is scarcely utilized for transportation of agriculture product in Nacala corridor. Only in harvest season, maize collected in Cuamba is transported to Nampula and Nacala by cargo train.

(3) Storage Facility

Traditional grain storage, which is built by bamboo with thatched roof, is dominant at producer level. Producers fumigate storing produces by smoke of firewood. Nevertheless, postharvest loss is still high in this type of storage, because no insecticide is applied.

Mozambique Cereal Institute (ICM) has a 2,500 ton public storage facility in Cuamba, and they rent out to private company, Export Marketing. This kind of public storage facilities were spread in production areas, and utilized for store food staples, such as maize, cassava, beans, by ICM. Since the mandate of ICM (buying and selling food staples) was lifted, most ICM storage facilities are being rent out to private sector. Storage facility in the Study Area is all-purpose storage in general, and not specialized for grain or other products. Not only ICM storage facilities, but old storage facility in the Study Area, often causes quality deterioration by insect attack and physical damage. For peanut, inappropriate storage management results losses by aflatoxin as well.

ICM, now has a plan to install a 5,000 ton grain silo, which equips cleaning and drying units in the same property by the end of this year. Similar program is ongoing at Yapara (Ribaue), Nacala, Milange (Zambezia).

Table 3.7.5 shows the result of storage facility in trade inventory survey conducted by the JICA sturdy team. These storage facilities were selected by sampling and not cover all storage facilities in Nacala corridor. These are all private facility, which are owned by producer association, trader, and exporter. Capacity of facility varied from 10 tons to 3,000 tons, and relatively large capacity storages are located at the assemble

point of distribution network, such as Nampula, Cuamba, Namialo, Monapo, and large-scale consumers. These storages are generally used for short-term storage as maximum period of storage one week. Destinations from this kind of storage are markets of cities and district capitals, and other larger storage points. Average capacity of these storages is 374 tons, and average annual turnover is 462%. Assuming storage period is one week, they use their storage for only 4.6 weeks in a year. This is quite low level of utilization of the facility. Shortage of storage facility is sometimes pointed out as a constraint of sector development, but appropriate storage capacity and location are more important for efficient storage management. This is reflected to storage cost/fee in value chain as well.

(4) Market Information

Countrywide market information is collected and published in WEB site by SIMA in MINAG. For producers, however, it is difficult to access this information to date. Ttrial service, which provides market information to producers through SMS has been carried out in Zambezia.

(5) Rural Market Facility

All district capitals in the Study Area have a public market, which opens everyday for selling agriculture products as well as other commodities. Temporary or semi permanent market opens mainly weekends in villages along the national road. Products sold these market are supplies by traders or producers near the market. In the provincial development strategy in Nampula and Niassa, market facility is under development for public market in cities, district capitals, and open market in rural area by Rural Market Program -PROMER.

Table 3.6.5 Storage Facility and Storage Fee

Province	District	Product	Capacity (tons)	Amount handled (tons/yr)	Turnover (%)	Destination of stored goods	Storage Cost
NAMPULA	Monapo	maize, cashew nut	200	500	250	Local	300MT/ton/day
		maize, peanut	100	80	80	Local	300MT/ton/day
		maize, beans, sesame	50	400	800	Nacala	300MT/ton/day
	Muecate	peanut, cassava, cashew nut	300	500	167		150MT/ton/day
		peanut, castanha, cassava, sesame, cowpea	50	1,500	3,000		150MT/ton/day
	Meconta	maize, peanut, sesame, cashew nut	200	90	45	Namialo	
		maize, peanut	1,500	800	53	Local	
	Mogovolas	peanut, cowpea, cashew nut	60	500	833	Nampula	
		peanut, cowpea, cashew nut	45	175	389	Nametil, Nampula	150MT/ton/day
	Nampula	peanut, beans	30	75	250	Nampula	15MT/ton/day
		peanut, cashew nut	80	230	288	Nampula	15MT/ton/day
		cabbage, peanut, sesame, harikot bean, cassava	1,000	22,000	2,200	Nampula	25,00MT/ton/day
		peanut, cashew nut, cowpea, cassava	50	300	600	Nampula	15MT/ton/day
	Murrupula	maize, peanut, pigeon pea	80	400	500	Nacala, Nampula, Beira, Maxixe, Maputo	200MT/ton/day
		peanut, cowpea e castanha	100	160	160	Nampula	150MT/ton/day
	Ribaue	maize, onion, cowpea	700	400	57	Nampula, Nacala	Not estimated
		maize, cowpea	50	80	160	Nampula	Not estimated
		maize, peanut, cowpea	100	150	150	Nampula	Not estimated
	Malema	maize, beans, sesame	500	1,500	300	Nampula	5000MT/month
		maize, cowpea	300	700	233	Nampula, Nacala	Not estimated
		maize, Cebola, harikot bean	700	900	129	Nampula, Nacala	Not estimated
ZAMBEZIA	Alto Molocue	maize, harikot bean	100	130	130	Maputo, Quelimane, Nampula	
		maize, harikot bean, soybean	400	800	200	Maputo, Quelimane, Nampula	
		maize, harikot bean, cowpea	500	3,000	600	Maputo, Quelimane, Chimoio, Nampula	
	Gurue	maize, pigeon pea, sesame	3,000	2,800	93	Nampula	Not estimated
		maize, cowpea, sesame	200	150	75	WFP	Not estimated
		maize, soybean	750	80	11	King Frango	
		maize, soybean	250	300	120	Novos Horizontes	
NIASA	Cuamba	maize, beans	100	400	400	Cuamba, Gurue, Nampula, Quelimane	2500MT/month
		maize, beans	50	250	500	Cuamba, Gurue, Nampula, Quelimane	1500MT/month
	Mandimba	maize, popcorn, harikot bean	350	7,000	2,000	Malawi	700
		maize	50	400	800	Local	40
		Arroz	200	900	450	Local	90
	Ngauma	maize, harikot bean, cowpea, potato	20	60	300		6
		maize, harikot bean, feijão cute	10	52	520	Massangulo	2MT/sack
	Lichinga	maiz, harikot bean	1,500	6,000	400	Nampula	2MT/sack
		maiz, harikot bean	500	800	160	Local	2MT/sack
		harikot bean, potato	20	30	150	Nampula, Beira, Inhambane, Maputo	2MT/sack
Average			374	1,437	462		

Source: Trade inventory survey, JICA study team, 2012

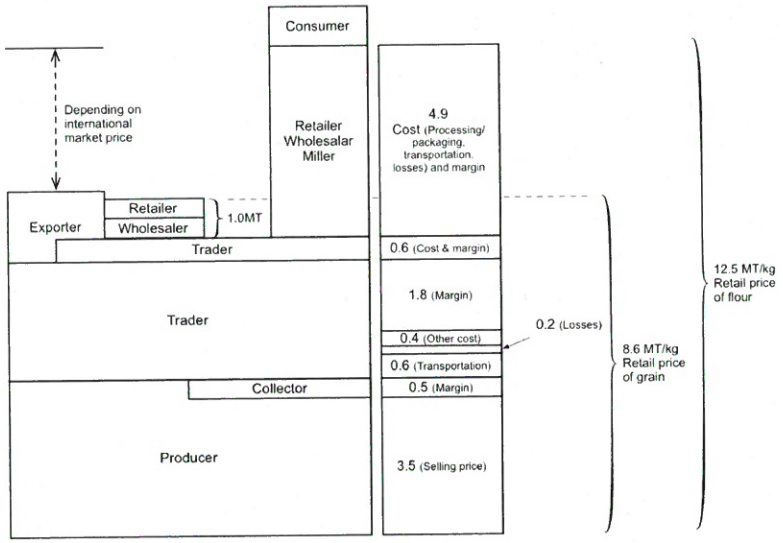
3.6.3. Value Chain of Agriculture Products

Value chain analysis was attempted for some crops. Since data and information from informants are limited, some parts are not clarified yet. Further survey will be carried out to obtain detailed information. These information was collected during April-May in 2012.

(1) Maize

Figure 3.6.2 shows a sample of value chain of maize produced in Cuamba. Buying price a collector, in general, is varied from 3 to 3.5 MT/kg. The collector's margin is 0.5MT/kg including transportation cost to Cuamba city. Once buying price of a trader is

raised to 4MT/kg, some producers, who have transportation method, prefer to sell directly to the trader. The trader weighs and repacks produce into sack, then sells to a trader in Nampula or an exporter in Nacala. In harvest season, the trader in Cuamba uses railway to transport to Nampula. The exporter decides export price depending on international market price. In Nampula, maize received by the trader sells to a maize milling company, which has 50 to 90 tons/day processing capacity. Maize flour is graded and packed after milling, then sold to consumers through wholesalers and retailers. Retail price was 12.5MT/kg in April 2012. Cost and margin of processor, wholesaler and retailer is 4.9 MT/kg, but detailed cost and margin for each are not clarified in this study period.

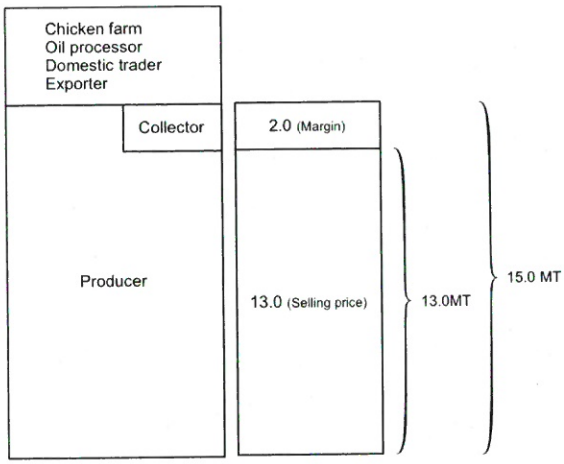


Source: Trade inventory survey, SIMA, interview by JICA survey team

Figure 3.6.3 Value Chain of Maize Grain and Maize Flour in Nampula

(2) Soybean

In Mozambique, people do not cook and eat soybean. All soybeans are consumed by chicken farms, oil processors or exporters. These final consumers purchase soybean directly from producers or through traders. A chicken farm in Nampula buy soybean from producer by contract farming. Farm gate price is high as 15-16 MT/kg. Collectors' cost and margin is 2 MT/kg. Once international market price hike



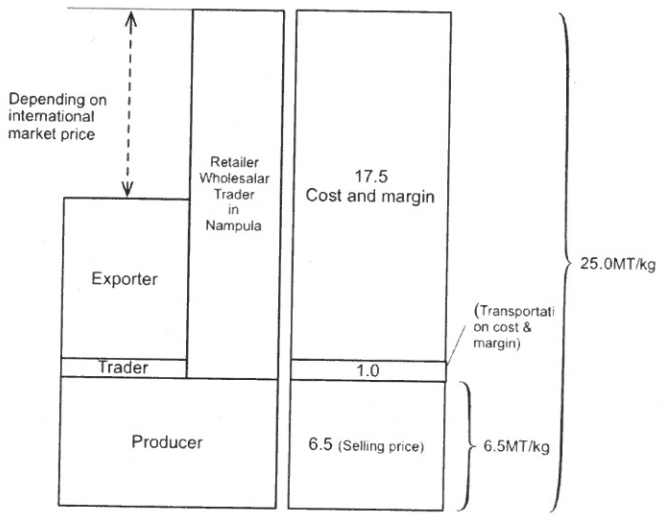
Source: Trade inventory survey, SIMA,

Figure 3.6.2 Value Chain of Soybean in Nampula

appears, demand of domestic soybean become high. Consequently, domestic product is rather consumed in domestic market.

(3) Cowpea

Cowpea is produced for both domestic consumption and export. Farm gate price is 6.5 MT/kg, but retail price is about 4 times of farm gate price. Since cowpea is produced in east area from Malema, it is not considered that transportation cost is very high. Cost and margin for trader, wholesaler, and retailer in Nampula is quite high as 17.5 MT/kg, but detailed cost and margin in each stakeholder are not clarified. Presumably, retail price is leaded by export price or international market price.

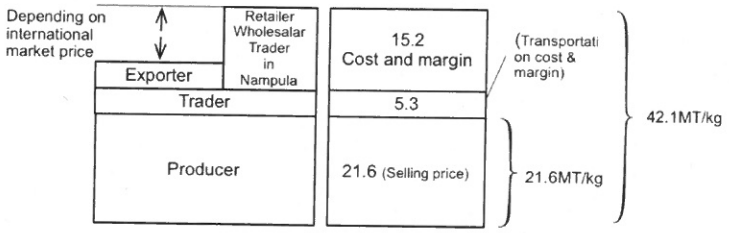


Source: Trade inventory survey, SIMA

Figure 3.6.4 Value Chain of Cowpea in Nampula

(4) Peanut

Peanut is export product as well as domestic production. Farm gate price is very high as 21.6 MT/kg. Retail price is 42.1 MT/kg in Nampula. Retailer, wholesaler and trader in Nampula earn 15.2 MT/kg including transaction cost. This is high level as cowpea. It is also considered that retail price is affected by export price.

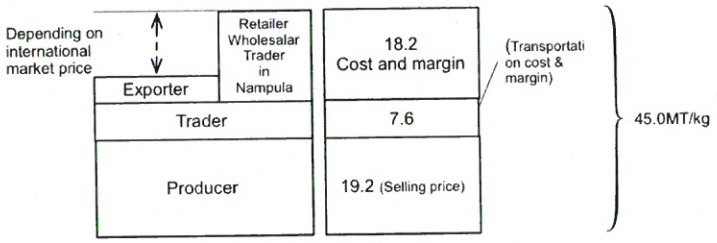


Source: Trade inventory survey, SIMA

Figure 3.6.5 Value Chain of Peanut in Nampula

(5) Haricot Bean

Haricot bean has a similar value structure with peanut, but cost and margin in Nampula is more than its of peanut as 18.2 MT/kg. This crop has strong demand in Maputo market as well as export market. It is also presumed that high price market leads the retail price in Nampula.



Source: Trade inventory survey, SIMA

Figure 3.6.6 Value Chain of Haricot Bean in Nampula

(6) Profit of Intermediate Traders

Gross profit was calculated from buying and selling price of trader. These traders are all deal with producers. So, the buying price is farm gate price. Products are arranged by order of gross profit of trader. Haricot bean earns the highest gross profit for traders followed by peanut and sesame. Vegetables, such as tomato and onion, make also good profit. As mentioned above, beans and peanut are distributed to central and southern provinces, because of high demand and price in the market.

Table 3.6.6 Buying and Selling Price of Trader

Produce	Buying price MT/ton	Selling price (MT/ton)	Gross profit (MT/ton)	Gross profit ratio (%)	No. interviewee
Haricot beans	19,154	26,808	7,654	28.55	13
Peanuts	21,567	26,867	5,300	19.73	15
Sesame	22,556	26,889	4,333	16.12	9
Tomato	8,750	13,000	4,250	32.69	2
Onion	11,000	15,000	4,000	26.67	1
Cashew nut	17,625	21,583	3,958	18.34	12
Pigeon pea	16,167	19,333	3,167	16.38	3
Potato	4,800	7,500	2,700	36.00	1
Soybean	13,000	15,000	2,000	13.33	1
Cabbage	8,250	10,000	1,750	17.50	2
Mung bean	8,750	10,125	1,375	13.58	4
Maize	3,752	5,104	1,351	26.48	22
Popcorn	7,200	8,300	1,100	13.25	1
Cowpea	6,429	7,452	1,024	13.74	21
Feijao cute	7,000	8,000	1,000	12.50	1
Cassava	2,391	3,382	991	29.30	11
Dry cassava	3,000	3,500	500	14.29	1
Sweet potato	2,500	3,000	500	16.67	1

Source: Trade inventory survey, JICA study team, 2012

3.7. Processing Agriculture Products

3.7.1. Agro-processing

The Study Area is major agriculture production area in the country, and there are about 200 processing companies varying from small to large scale operate in Nampula province. Mills for maize and cassava prevails small to medium scale processing factories. Cashew and cotton factories have large scale processing capacity.

(1) Small and Medium Scale Agro-processing

Table 3.7.1 shows a part of small-scale processor in the Study Area. In district capitals and relatively large communities, small-scale mills, processing capacity less than 1 tons/hr, are operated. In the areas, where electricity network is not available, a diesel generator is used for power source. Maize and cassava are milled to flour in these small-scale mills for self-consumption of producers and retail purpose at local market. In rural area, where mechanical flourmills are not available, flour is processed traditional way in pounding by women's hand. In Nampula province, there are rice mills, which mill and packing imported rice as well as rice from outside the province.

Table 3.7.1 Small and Medium Scale Agriculture Processing Factory in the Study Area

Province	District	Lacality	Main product	Processing capacity (tons/yr)	Annual processed (tons)	Operating ratio (%)	Leagal status
Nampula	Ribaue	Pecuaria	Maize, cassava	800	450	56%	Registered
		Ribaue Sede	Maize, cassava	1,200	740	62%	Registered
	Malema	Mutuali	Maize, cassava	2,340	1,250	53%	Registered
		Malema Sede	Maize, cassava	800	750	94%	Registered
		Malema Sede	Maize, cassava	800	800	100%	Registered
	Murrupula	Rovuma 1	Cashew nut	1,500	150	10%	Registered
		Nihessie	Cashew nut	350	20	6%	Registered
		Murrupula sede	Maize, cassava, sorghum	3,590	350	10%	Registered
		Murrupula sede	Maizem cassava, beans	3,500	300	9%	Registered
	Nampula	Anchilo	Maizem cassava, beans	750	480	64%	Registered
		Anchilo	Maizem cassava, beans	3,500	600	17%	Registered
		Naphome	Maizem cassava, beans	6,500	1,290	20%	Registered
	Mogovolas	Km 20	Maize, cassava, sorghum	4,000	2,000	50%	Not registered
		Nametil sede	Maizem cassava, beans	5,000	4,000	80%	Not registered
		Iulute	Maizem cassava, beans	3,500	3,000	86%	Not registered
	Muecate	Imala	Maize, cassava, sorghum	4,500	1,500	33%	Not registered
		Muculuone	Maizem cassava, beans	4,000	2,000	50%	Not registered
		Muecate sede	Maizem cassava, beans	5,500	4,500	82%	Not registered
Zambezia	Gurue	Gurue-Sede	Beans				Registered
		Gurue-Sede	Maize, cassava	3,600	2,500	69%	Registered
		Lioma	Maize, cassava	3,600	2,500	69%	Registered
Niassa	Cuamba	Cuamba Sede	Maize, cassava, sorghum	6,000	4,500	75%	Not registered
		Cuamba Sede	Maize, cassava, sorghum	3,500	2,000	57%	Not registered
		Lurio	Maize, cassava, sorghum	1,250	800	64%	Not registered
	Ngauma	Massangulo	Maize	3,000	1,450	48%	Not registered
		Massangulo	Maize, cassava	2,700	900	33%	Not registered
		Bairro de trabalhadores	Maize, cassava	4,600	1,010	22%	Not registered
	Lichinga	Chiuaula	Maize, sorghum	7,900	5,200	66%	Not registered
		Chiuaula-cerâmica	Maize, cassava	4,500	2,300	51%	Not registered
		Sanjala	Maize, cassava, sorghum	3,600	1,900	53%	Not registered

Source: Trade inventory survey, JICA study team, 2012

In Mandimba, small-scale rice milling plant was provided to one association in 2004. This plant was abandoned, and is no longer operating. Direct reason is the association

could not pay electric bills, but reality was lack of operation and management skills and experience of the association on operation and maintenance of equipment, management of buying and selling of materials and product, and cost and benefit management.

(2) Large Scale Agro-processing

Tobacco, cotton and cashew are mainly processed for exportation. Maize and cassava flours are supplied for domestic market in north region. 50-90 tons/day capacity mills are located in Nampula city.

Tobacco is produced in concessionary system. In the Study Area, two tobacco processing factories, Sonil and Mozmbique Leaf Tobacco (MLT) are located in Malema and Cuamba respectively. Selection and packing are main processes in the tobacco factory.

For cotton, ginning, selection and packing are main processes in the factory. Most cotton factories are located in Nampula province (Figure 3.7.2). District name followed by (F), in which cotton factory is located. After ginning, cottonseed is produced as by-product after ginning process, and utilized for cottonseed oil, as well as seed cotton for next season. SANAM has cottonseed oil extraction plant in their cotton factory. Another cottonseed extraction company in Cuamba, "Cotton Oil Factory from Cuamba", is a Mozambique-Malawi joint company. They established a cotton oil factory closed to cotton ginning factory of S.A.M., by which cottonseeds are supplied. Cottonseed oil from this oil factory is exported to Malawi for refining and selling. Seed cakes, as animal feed, are exported to South Africa, Zambia, and Zimbabwe. Operation rate of this factory is still low as less than 50%, due to lack of materials.

Nampula province is major producer of cashew nut in Mozambique. Many cashew processing factories are allocated in the eastern districts of the province as shown in Figure 3.7.3. Processing of cashew nut in Mozambique is the primary processing only, sometimes referred to as 'shelling' (roasting, cutting, drying and peeling); the international buyer is responsible for the second stage of processing (e.g. roasting and adding flavor and consumer packaging). Based on the interviews with a few of the processing companies, it appears that cashew processing is a fairly profitable (but not excessively profitable) activity, with margins between 15-20%[11]. Cashew processing is labor intensive, and factories contribute job creation in surrounding areas.

[11] Source: Value chain finance assessment of the cashew nuts sector in Nampula, GIZ, 2011

Table 3.7.2 Production Area of Cotton by Concessionaire (ha)

Province	District	Company									
		OLAM	SANAM	SAM	PLEXUS	NOVOS	PALOPIQUE	NOVA	MOCOTEX	SAN/JFS	Total
Nampula	Monapo (F)		18,200								18,200
	Muecate		9,100								9,100
	Meconta (F)		1,100			2,500					3,600
	Mogovolas (F)		2,500								2,500
	Nampula Dist (F)		150								150
	Murrupula	610									610
	Ribaue (F)	4,600									4,600
	Malema (F)			11,925							11,925
	Lalaua	18,500									18,500
	Moma		4,570								4,570
	Nacaroa		1,260								1,260
	Mecuburi		10,000								10,000
	Erati (F)				7,900						7,900
Zambezia	Alto Molocue							500			500
	Lugela						400				400
	Mocuba						1,700		550		2,250
	Gile							1,000			1,000
	Ile							300			300
Niasa	Cuamba (F)									19,900	19,900
	Mandinba									200	200
	Maua									1,200	1,200
	Marrupa									900	900
	Metarica									3,800	3,800
	Mecanhelas									3,850	3,850
	Mecula									20	20
	Majune									80	80
	Nipepe									2,800	2,800
	Millange									40	40
Total		23,710	46,880	11,925	7,900	2,500	2,100	1,800	550	32,790	130,155

Note: (F) Factory
Source: Institute of cotton (IAM), 2012

Constraints of processing companies are; 1) low operation rate of facility due to lac of materials, 2) insufficient volume and quality of materials due to low awareness level of producers, 3) high cost of imported packing and packaging material, 4) unstable or undeveloped infrastructure, such as electricity, water, and road.

In the meantime, in order to attain cost reduction and strong bargaining power ,nine cashew processing companies established a private company, *Agro Industrias Associadas Lda.* (A.I.A.), under the brand name "Zambique" with a guaranteed quality standard. The main activities of AIA are:

- Support for bulked imports for factory production (packing and packaging materials),
- Manage price negotiations with customers
- Complete paperwork and logistics for exporting processed nuts
- Remit sales, net of costs, to member processors
- Promote and manage Zambique™ brand (Technoserve, 2009).

Table 3.7.3 Cashew Processing Factory in Nampula in 2009

Name	Location	Year established	Processing capacity (tons/yr)	Processed capacity (tons/yr)	Operating ratio (%)
Miranda Industrial	Namige	2002	1,500	1,400	93%
	Angoche	2004	3,500	3,000	86%
	Meconta	2004	n.s.	1,000	–
	Napaco	2005	1,000	600	60%
Ilha Caju (GANI Commercial)	Ilha de Mozambique	2004	5,000	1,000	20%
Condor Caju	Nametil	2005	*5,000	4,500	90%
Condor Nuts	Anchilo	2008	7,000	2,500	36%
IPCCM	Murrupula	2003	*1,000	*450	45%
Olam	Monapo	2004	5,000	3,500	70%
Koroxo	Chehure	2006	2,500	1,700	68%
Total			27,000	19,650	73%

* Estimation
Source: Value chain finance assessment of the cashew nuts sector in Nampula, GIZ, 2011

3.7.2. Agro-processing Investment

(1) Agro-processing Investment in Nampula Province

Thirteen investment projects in the agro-processing industry have been approved in Nampula province since 2007,[12] of which 6 are in the Nacala port and the surrounding area, 5 are in Nampula district and 2 are in Meconta district, in aggregate also including 3 large investment projects for which the investment volume exceed 20 million US$. The crop processing industry is the dominant industry, including small to medium scale processing factories for the cleaning and sorting of crops. Cashew nut processing is also a growing industry since 3 new factories have started operations since 2007. Including the fact that 6 cashew nut processing factories have been built in the time period from 2002 to 2006[13], 10 cashew nut factories in Nampula province have begun operation over the past 10 years.

Table 3.7.4 Summary of the Agro-Processing Investment in Nampula Province (2007 – 2011)

Year	Enterprises	Products	District	Investment Value (000 $)	No. of Employment
2007	Caju Ilha	Cashew nut processing	I Mozambique	956	700
	Cister Mozambique	Crop processing (maize, bean)	Nampula	50	24
	Nova Texmoqued	Cotton	Nampula	24,000	450
2008	Proalimentar	Crop processing (soybean)	Cidade Nacala	130	20
	Aviam	Jatropha oil processing	Nacala-a-Velha	20,191	2,500

[12] CPI Nampula office does not have a list of the approved investment projects in Niassa province.
[13] Source: CPI investment data 2002-2006, and "Preparatory Study on Triangular Cooperation Programme for Agricultural Development of the African Tropical Savannah among Japan, Brazil and Mozambique (ProSAVANA-JBM)" 2010, JICA

Year	Enterprises	Products	District	Investment Value (000 $)	No. of Employment
2009	Soc. Aglgodoeria	Cotton	Cidade Nacala	4,500	
	Apel Agro Processing	Crop processing (sesame)	Nacala Port	2,781	115
	Industria de Process Ricino	Castor oil processing	Meconta	4,000	28
	Cervejas de Moc	Beer production (with cassava starch)	Cidade Nacala	55,010	129
	Fabrica de Nampula				
2010	Afro Moagen	Crop processing (maize)	Nampula	1,000	24
	Sunway	Crop processing (maize, bean)	Meconta	500	50
	Condor Nuts	Cashew nuts processing	Nampula	1,789	500
2011	Global View	Cashew nuts processing	Nampula	154	24

Source: CPI

(2) Major Agro-processing Sectors in the Nacala Corridor

The three major agro-processing industry products in the Nacala Corridor are cashew nuts, cotton and tobacco. While the cotton[14] and tobacco production and processing industries have been administered by a large-scale commercial agribusiness in a coordinated manner, the cashew nut industry has been growing diversely, especially in Nampula province[15] where new investment in the cashew processing industry has been concentrated as noted above.[16] The Table 3.7.5 below sets out the location and number of processing factories of the 3 major products in the Nacala Corridor. In addition, Figure 3.7.1 compares the export values of cashew nuts between those "with shells" and "shelled". This shows that the export value of the shelled cashew nuts overtook that of unshelled nuts in 2008, which would imply growth in the cashew nut processing industries. Other agro-processing industries operating in the Nacala Corridor are of a rather small-scale, ranging from the primary to secondary processing level, which includes factories for sesame pre-hulling, rice processing, grain milling, and oil pressing.

Table 3.7.5 Major Agro-Processing Industries in the Nacala Corridor

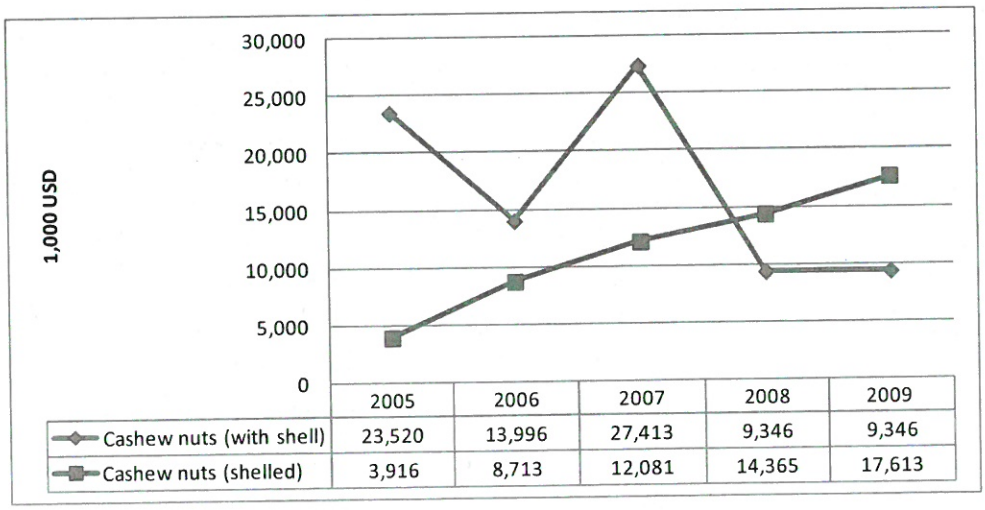
Sector	Location (no. of factories)	Operators
Cashew nuts	Monapo (4), Meconta (1), Mogovolas (2), Murrupula (1)	ADPP, Atija Nuts, Caju-Llha, CC Association, Condor Nuts, IPCCN, Maziotela, OLAM
Cotton	Monapo (1), Mogovolas (1), Ribaue (1), Malema (1), Alto Molocue (1),	OLAM, SANAM, S.A.M, NOVA, SAN (Niassa)
Tobacco	Lichinga	Sonil

(Source: CEPAGRI, and Instituto do Algodao de Mocambique)

[14] Mozambique Cotton Institute (Instituto do Algodao de Mocambique) oversees /manages the cotton production in coordination with the processing industries.

[15] According to INCAJU, around 40% of cashew nut production occurs in Nampula province.

[16] Source "Review of Horticultural Outgrower Schemes in Mozambique", World Bank



	2005	2006	2007	2008	2009
Cashew nuts (with shell)	23,520	13,996	27,413	9,346	9,346
Cashew nuts (shelled)	3,916	8,713	12,081	14,365	17,613

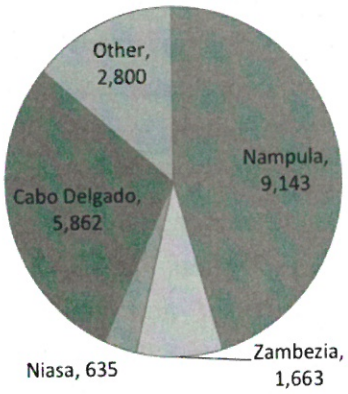
(Source: FAOSTAT)

Figure 3.7.1 Export Value of Cashew Nuts (shelled and unshelled)

3.7.3. Exporting Processed Agriculture Products

(1) Cotton

In Mozambique, all cotton lint are exported. Figure 3.7.2 illustrates Cotton lint production in Nampula, Zambezia and Niassa in 2009 are 9,143 tons, 1,663 tons, and 635 tons respectively, and total production of these three provinces accounts for 56.9% of total production of the country.



Source: Institute of Cotton Mozambique (IAM)

Figure 3.7.2 Production of Cotton Lint by Provinces

(2) Cashew

The market for cashew nuts is growing internationally and there is still an opportunity for Mozambican producers to capture a larger or higher-value share of this market. As mentioned above, in the Study Area, 20,000 tons of cashew nut were processed, and most of them were exported in 2009 as shown in Table 3.7.2

3.8. Agricultural Investment in the Nacala Corridor

3.8.1. Existing and Proposed Large Scale Agricultural Investments

(1) Trends in Agriculture/Agro-industry Investments in the Nacala Corridor

The investment environment for the agriculture/agro-industry sector in the Nacala Corridor has not matured fully as of yet due to the area's geographical isolation and limited trunk road networks, and its poor road conditions, which result in difficulties in the acquiring the necessary agriculture inputs and increased prices, as compared to major towns in the central and southern part of Mozambique. The proceeding table illustrates the transitions in agriculture investments in the Nacala Corridor over the past 5 years as seen through investment proposals reviewed by CEPAGRI. It indicates fluctuations in levels of investment volume as well as project areas, which resulted from large-scale investment plans for forest plantations in 2009 and 2010.

Table 3.8.1 Agriculture/Agro-Industry Investments in the Nacala Corridor (2008-2012)

	2008	2009	2010	2011	2012	Total
No. of Project	2	5	4	6	3	20
Amount (000$)	17,839	2,434,449	92,744	60,086	11,546	2,616,665
Area (Ha)	31,789	387,400	275,500	29,964	16,014	740,667

Source: CEPAGRI investment data

The following table sets out the investment volumes and project areas from 2008 to 2012 categorized by sub-sector. It clearly indicates that the forestry sub-sector contributes greatly to investment volume because of the nature of the investment, which requires large areas and associated costs, though the number of such proposed projects is only 4 out of a total of 20 projects proposed during the time period.

Table 3.8.2 Agriculture/Agri-Industry Investments in the Nacala Corridor by Activity (2008 - 2012)

	Area (Ha)	Amount (000 $)	No. of Projects
Agriculture/Agri-industry	63,978	89,572	9
Livestock	100,000	3,600	1
Biofuel	33,789	10,545	3
Forestry	466,000	2,511,948	4
Others	76,900	1,000	3
Total	740,667	2,616,665	20

Source: CEPAGRI investment data

(2) Large-scale Agriculture Investments in the Nacala Corridor

Though the number is limited, compared to the central zone including Sofala, Manica and Tete provinces where several large-scale biofuel projects have been approved,[17] foreign investors have submitted proposals for large-scale agriculture investments to be carried out in the Nacala Corridor, Most of investors are forest plantations and the development of commercial farms for the production of cereals and legumes, especially maize, soybeans and oilseeds. Their projects are mostly planned in Niassa Province where an investor could relatively easily find a large vacant area suitable for plantation or commercial farming since most districts in Niassa Province have a low population density due to their remoteness. The following table summarizes the proposed large-scale agriculture investment projects[18] in the Nacala Corridor since 2008.

Table 3.8.3 Major Large-Scale Agriculture Investments in the Nacala Corridor

Investor/Company	Activity	Project Site	Area (ha)	Remarks
Matanuska (Zimbabwean capital)	Banana Plantation	Monapo district, Nampula	3,800	- Plantation started operation in 2007
Luambala Jatropha (Finnish capital)	Jatropha plantation (biofuel)	Majune District, Niassa	8,700	- Organic soybeans have also been produced
Niassa Green Resource (Norwegian capital)	Forestry plantations (eucalyptus/pine trees)	Sanga and Lichinga district, Niassa	60,000	- 46,000 Ha in Sanga - Started planting in 2007
Lurio Green Resource (Norwegian capital)	Forestry plantations (eucalyptus/pine trees)	Nampula and Cabo Delgado provinces,	126.000	- Approved in 2009 as a 15-year plantation project
Companhia Florestal de Massangulo	Forestry plantations	Lichinga district, Niassa	80,000	- An investment proposal was submitted in 2009
Quifel (Portuguese capital)	Commercial farming (soybeans, sunflower)	Gurue district, Zambezia	10,000	- Approved in 2009 - Land conflicts with local people have occurred
Brasperson (Brazilian capital)	Commercial farming (soybeans, maize)	Mandimba district, Niassa	16,000	- An investment proposal was submitted in 2012

Source: CEPAGRI investment data

3.8.2. Agricultural Investments and Land Issues

(1) Conflict between Investments and Community

The Government of Mozambique has emphasized on encouraging foreign investments in the agriculture sector since the mid 2000's in order to promote commercial agriculture and agro-industry development by the private sector. As a result of the promotion, the Government granted concessions to foreign companies of

[17] They are mostly the Jatropha or sugar cane plantation with a processing factory.
[18] Some projects are still in the planning stage, waiting to acquire the DUAT and environmental license.

close to 1 million hectares in the period from 2004 to 2010, 73% of the area of which is for forestry and 13% for biofuel projects.[19] Some projects have come into conflict with local communities due to a lack of mutual understanding and consensus over the arrangement of compensation and relocation, which resulted from incomplete community consultation.[20]

Though large-scale agriculture investments in the Nacala Corridor are limited in number, conflict cases between investors and communities have been reported, most of which occurred during the delimitation of the concession area. The table below summarizes the land conflicts with communities resulting from agriculture investments in the Nacala Corridor and surrounding areas.

Table 3.8.4 Land Conflicts in the Nacala Corridor

Investment Project	Location (Province)	Area (Ha)	Details of Conflicts	Measures
Commercial Farm	Zambezia	10,000	- 240 farmers who have lived in the concession area have not been re-located. - Only 500 Ha out of 10,000 Ha of the concession area, has been cultivated due to land conflict with communities.	- Local district offices have tried to mediate the case with local traditional leaders.
Fruit Plantation	Nampula	3,500	- Local communities claimed that the agreed compensation payment for the land has not been paid by the investor.	- The community brought the case to the district attorney's office.
Forestry	Zambezia	150,000	- The planned area was densely populated, and most lands were being utilized for cultivation of food crops by local communities. - Communities questioned risks of impacts on food security and environment.	- The investor decided to withdraw from the plantation project.
Forestry	Niassa	30,000	- The community claimed that the investor planted trees in farmlands (out of the delimited area) of local farmers. - The investor has run into a serious conflict with communities.	- A continuous dialogue involving concerned stakeholders has been carried out to mediate the conflict.
Commercial Farm	Niassa	16.000	- Though a conflict case has not been reported yet as it is still in the preparatory stage of the project, the investor is anxious about the procedures for accruing the DUTA.	

(Source: 1) JICA Study Team, 2)"Confrontation between peasant producers and investors in Northern Zambezia, Mozambique, in the context of Profit Pressures of European Investors", Simon Norfolk and Joseph Hanlon, and 3) "Study on Community Land Rights in Niassa Province", Gunilla Akesson, A Calengo, C Tanner)

[19] "Confrontation between peasant producers and investors in Northern Zambezia, Mozambique, in the context of Profit Pressures of European Investors", Simon Norfolk and Joseph Hanlon, Annual Conference on Land and Poverty 2012, World Bank

[20] Application and community consultation procedures for acquiring a land-use right (DUAT) will be discussed in the following Section 9.2.

Though in-depth discussion on the procedures for acquiring the land-use right (DUAT) will be addressed in other sections of this report, some of the findings are summarized below in order to help to avoid conflicts with local communities as a result of large-scale agriculture investment.

1) Insufficient public consultation

Though the Land Law Legislation stipulates the holding of public consultation at least two times involving concerned stakeholders (representatives for the investor, local government offices and community representatives), the consultation process is sometimes dominated by local political/religious leaders. Even though the majority of local people who will be affected by an investment project may be present, they often hesitate to voice their opinion in front of a large audience, and as a result the genuine community's perspective might not be reflected in the agreement with the investor on the demarcation of the land.

2) Vagueness in contents of the minutes of public consultation meeting

The investor is obligated to attach the minutes of the public consultation meeting, signed by the three parties (the government, investor and community), to the application form for the DUAT. Though the minutes are required to describe the details of the agreement, including compensation, social benefits, resettlement plan, project schedule, etc., descriptions are usually vague, containing general statements on welcoming the project and indistinct references to social benefits and compensation schemes.

3) Indistinct roles of local authorities in conflict resolution

It is unclear what the jurisdiction of local authorities is in relation to conflict resolution concerning land issues of agriculture investment. Though the SDAE could take a leading role in mediating such conflicts, its capacity is limited in terms of staff and workload. A continuous dialogue with communities is necessary for solving any conflicts, and thus a proper facilitation by a third party, such as a local government office, would be critical to finding a better solution.

(2) Issues concerning with DUAT

The steps to obtain the DUAT require dedication of time and financial resources, making the legalization of land a constraint to the majority of the population. Although SPGC is available to offer guidance, interviews with companies and individuals who obtained the DUAT, or are in process of obtaining it, informs that the process is slow and complex, and that the same situation occurs in obtaining licenses and rights transferences.

The lack of interest, capacity and/or need for most local occupants to obtain the DUAT makes the National Land Register Office an instrument of low accuracy in terms of existence of available and unoccupied areas and areas that, although occupied without DUAT, can be used in other production process.

The map shown as Figure 3.8.1 below shows the land occupied by DUAT holders, by category, as indicated on the legend: agriculture, forestry, mining, other (industries, commercial sites, etc), communities, reserved (conservation area and hunting ground) and unknown (need to be clarified by DNTF). The map covers the districts of Nacala Corridor, in the Provinces of Niassa, Nampula and part of Zambézia.

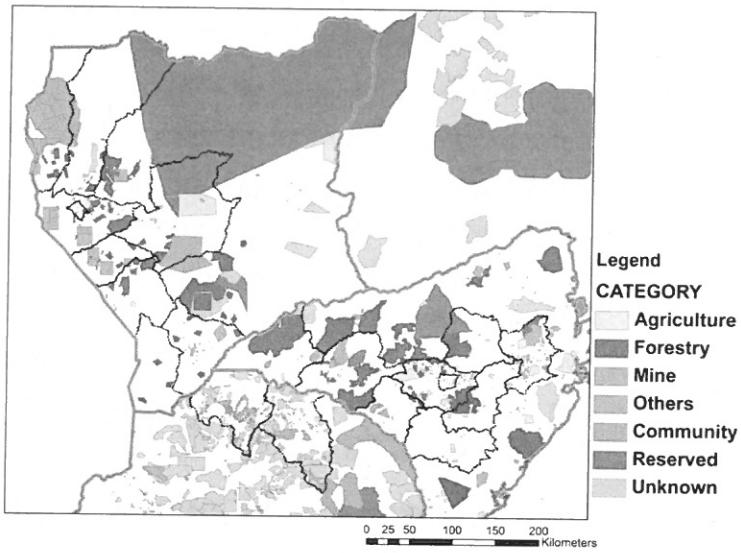


Figure 3.8.1 Land Occupied by DUAT Holder

A simple analysis indicates that there is available area on the white part. However, as mentioned before, some types of occupancy are not obliged to hold a DUAT (individuals and local communities, according to traditional practices, and national individuals who in good faith, have been using the land for at least ten years), so some of the white areas might have certain occupation.

Considering that, the map shown as Figure3.8.2 bellow was elaborated using information from the National Agency of Roads (ANE), according the methodology presented on chapter 4.9, and shows, preliminarily, areas occupied by DUAT holders and location of local farmers.

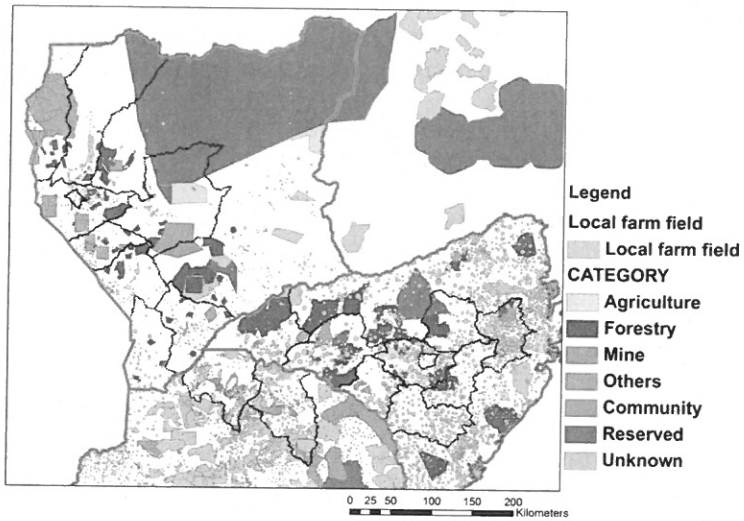


Figure 3.8.2 Land Occupied by DUAT Holder and Local Farm

From that image one can understand the

importance of a mechanism that can bring more accuracy to land occupation, for the white area available is diminished after the rose spots were added.

By ensuring the legitimate occupation of the land by its citizens, based on norms, practices and good faith, the Government of Mozambique valorizes correctly its population and its tradition. However, the lack of a mechanism to provide concrete data on this reality becomes a constraint for the definition of policies that can bring these populations, which in general is in a less favored position, into the production process, ensuring a better income and quality of life.

One must think on ways to make the obtainment of DUAT, licenses and transfers, a faster process, with reduced costs, so that more Mozambican citizens feel attracted to legalize their land (we are not here meaning legitimacy because it is already guaranteed by the constitution). By doing so, the Government may have a more realistic picture of the occupations and citizens can have access to other types of incentives such as credit lines, among others. For larger scale national and international investors, the faster and more transparent the process is, the faster they can achieve the expected results, contributing, thus, more effectively to the development of the country.

The suggestion is to make a Project, following the Quick Impact Project model, that can support rural population and local producers to obtain their DUAT, bringing more accuracy to the work performed by the National Land Registry Office. The result will support potential investor on the elaboration of their Operating Plans and on the identification of available areas; at the same time that will help Government's decisions making and policy elaboration.

It is also important to create a Working Group with stakeholders in order to address major issues, such as:

- possibility to simplify the procedures for obtaining DUATs, licenses and transferring of land, focusing reduction of processing length (time) and costs;
- to evaluate initiatives such as leasing of land in order to provide areas for larger scale productions; and
- re- evaluate criteria and deadlines of the Operating Plans inspections, 2 years for foreigners and 5 years for nationals, and address the percentage to be achieved x dimension of the Plan.

(3) Agricultural Investments and Land Issues

In addressing the subject Investment in Agriculture and Land Issues it is important to have in mind two constitutional principles of Mozambique, here often cited: *"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)".

Therefore, it is important that investors, specially foreigners, understands how to invest without expecting land valuation, unlike the paradigm of many countries with intensive agricultural production, such as Brazil, where land tenure is a property, whose value increases, with the use of technology that leads to soil fertility improvement.

The following Table 3.8.5 illustrates the meaning of adding value to land, presenting prices in two types of areas in Brazil (Bahia Juazeiro and West), located in Bahia State (Province), which resemble different Savannah regions in Nampula Province, Nacala Corridor in Mozambique.

The table 3.8.5 indicates an increase in land value in the period 2005 to 2010, caused directly by the demand for production area, and shows that prices increases in both regions, with low precipitation (semiarid / Juazeiro BA) and where rainfall rates are more suitable for grain production (1,300 to + 1,500 mm per year).

Other factor that adds value to land is the incorporation of irrigation infrastructure, which may represent an increase up to 10 times the initial value of the land (Irrigated Agricultural land / Agricultural land of high productivity). It is observed that in the case of native vegetation, with an average rainfall of 1,400 mm per year, the increase is three times (300%) the initial value of the land, after four years of work (Agricultural land with 1,400 mm / Savannah 1400 mm annually).

Table 3.8.5 Meaning of Adding Value of Land in Brazil – Bahia State

Land Value R$ / HA				
Type of Land / Province	**2005**	**2009**	**2010**	**% 10/05**
Juazeiro / Bahia State (400 to 700 mm annual rainfall)				
Caatinga – 400 mm annual	87	117	103	19%
Pasture formed (Jacobina – District)	783	867	800	2.1%
Pasture formed (Juazeiro – District)	184	315	210	14%
Agricultural land of high productivity	**826**	**2,167**	**1,233**	49.2%
Agricultural land of low productivity	147	508	500	240%
Irrigated agricultural land	**8,767**	7,025	3,600	-58.9%
Irrigable agricultural land	3,004	4,000	1,733	-42.3%
West Baiano / Bahia State (1100 a +1500 mm annual rainfall)				
Savannah with 1,100 mm annual	150	675	567	278.6%
Savannah with 1,300 mm annual	531	1,917	1,600	201.4%
Savannah with 1,400 mm annual	**1,062**	**1,500**	**1,267**	19.3%
Savannah with 1,500 mm annual	1,566	3,933	3,167	102.2%
Agricultural land with 1,500 mm	4,016	9,417	9,167	128.3%
Agricultural land with 1,400 mm	**3,239**	**5,208**	**5,233**	61.6%
Agricultural land with + 1,500 mm	4,793	10,500	10,033	109.3%
Ratio Savannah/Agricultural land 1400 mm	**300.5%**	**347%**	**413%**	

Source: PublicationAGRIANUAL – Brasil, 2011, AgraFNP.

This concept of working the land, leading to the increase of its value, is one of the main reasons of the promotion of the expansion of investments in unexplored areas in Brazil.

Therefore, in the case of Mozambique, investors especially foreigners should be aware that adding value to land is not applicable. Instead, a concession of 50 years, renewable for another 50 years, is provided by the government, as long as it has the consent of local communities where the venture will be implemented.

3.8.3. Collaboration between the Commercial Farms and Small-Scale Farmers

(1) Experience of the Beira Agriculture Growth Corridor (BAGC) initiative

The Beira Agriculture Growth Corridor (BAGC) initiative, launched at the World Economic Forum in 2010, is a partnership between the Government of Mozambique, the private sector, local farmers and donors with the aim of stimulating an increase in agriculture productivity and the income of small-scale farmers by facilitating responsible private investment. BAGC has proposed two commercial agriculture models: 1) the outgrower model; and 2) the serviced farm block model with direct links between commercial farm investments and small-scale farmers. The outgrower model is a familiar model where the commercial farm provides services, such as agriculture inputs and technical extension services, to small-scale farmers, while the serviced farm block model aims to lease irrigated farm blocks to commercial and small-scale farmers.

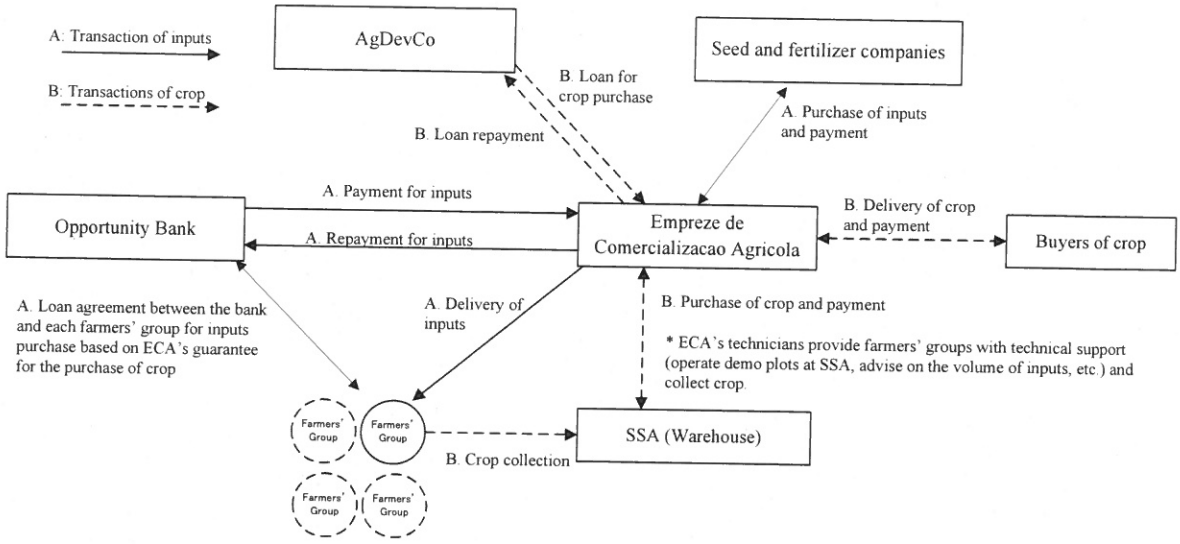
AgDevCo, a not-for-profit agriculture distribution development company operating in sub-Saharan Africa, manages a 22 million US$ Catalytic Fund,[21] a social venture capital fund targeting start-up SME agriculture businesses in BAGC, applying the outgrower model. Through the Catalytic Fund, AgDevCo offers different types of loans including a short-term bridge loan for working capital and a mid-term loan for the procurement of machinery as well as equity finance, with a low interest rate ranging from 5 % to 10 % per annum. Since it launched in 2011, twelve projects have received funding from the Catalytic Fund for which the portfolio includes horticulture, livestock, seeds multiplication, and grain and honey production.

In conducting frequent visits to loan recipients for monitoring purposes, AgDevCo also provides business advisory services, such as introducing potential markets for products and creating clusters for mutually supporting SME agricultural businesses in the BAGC area. AgDevCo has tried to find potential partners/recipients for the Catalytic Fund in order to more widely expand the BAGC initiative in the region.

[21] Major donors of the Catalytic Fund are DFID, Dutch, and Norwegian Governments.

1) An Example of an Agribusiness Model for a Service Provider (seed, fertilizer and marketing)

One of the successful businesses financed by the Catalytic Fund is ECA, which is acting as a service provider by linking a group of small-scale farmers to profitable markets. As illustrated in Figure 3.8.3 below, utilizing financing from the AgDevCo (the Catalytic Fund), ECA provides seeds and fertilizer to farmer groups,[22] while AgDevCo facilitates the acquiring of loans from local banks for farmers to purchase inputs. It should be noted that ECA provides extensive extension services to the farmer groups by establishing demo-plots for the demonstrating effective farming techniques through which mutual trust between ECA and farmer groups has been fostered. ECA achieved a nearly 100 % recovery rate on input finance for seeds and fertilizer in its first season, while the farmer groups supplied the largest harvest to ECA without selling to other traders.



Source: JICA Study Team

Figure 3.8.3 Agribusiness Model with Small-scale Farmers: ECA's Case (service provider)

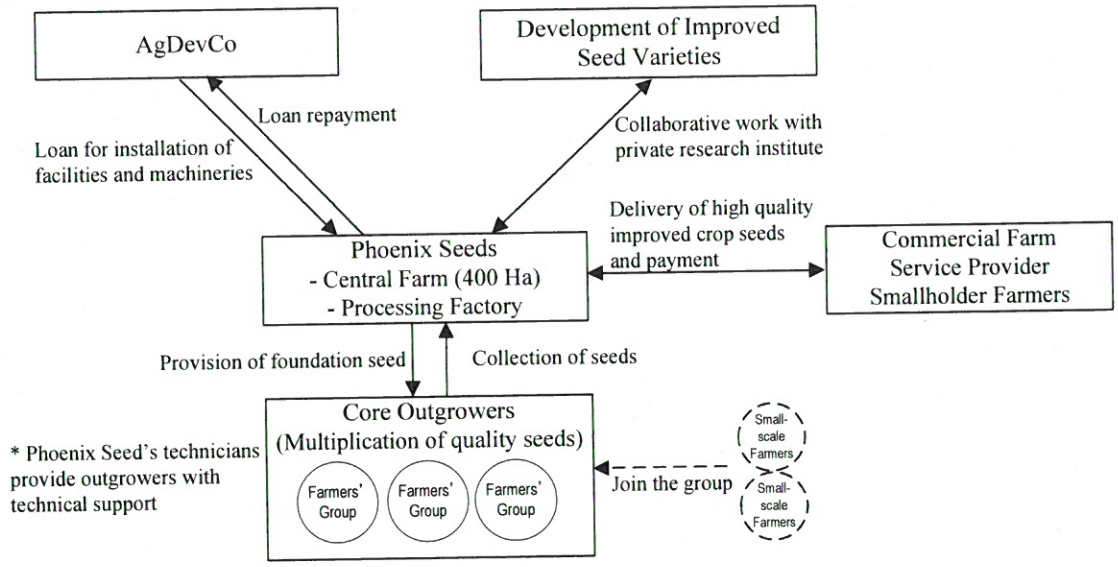
2) An Example of the Agribusiness Model by a Small/Medium Scale Commercial Farm

Though commercial agriculture in the Beira Corridor has not been well developed as of yet,[23] AgDevCo has worked with small/medium scale commercial farms with the aim of structuring equitable relationships with small-scale farmers so that they may benefit

[22] Twenty SSGs (similar to a forum) composed of 56 groups with total 850 small-scale farmers was formed to conduct the contact farming with ECA.
[23] The report indicated that of the 10 million Ha of arable land in the Beira Corridor, less than 0.3 % is farmed commercially. (source: Beira Agriculture Growth Corridor)

from the growth of commercial agriculture. Financed by the Catalytic Fund, a variety of commercial farms[24] have adopted the outgrower model providing small-scale farmers with access to farm inputs, extension services, value-adding facilities and reliable markets.

One of the pioneers in developing a commercially viable outgrower model is Phoenix Seeds, a seed development and multiplication farm. Phoenix Seeds has its own commercial farm with an irrigation facility where the improved foundation seeds of different crops (maize, soya been, cow peas, etc.) have been produced. Phoenix Seeds works with a group of farmers, as outgrowers, for the multiplication of improved seeds while providing extensive technical support and agriculture inputs. The strategy of Phoenix Seeds is to build the capacity of the core outgrowers so they may be leaders/facilitators in farmer-to-farmer technology extensions involving more small-scale farmers in the production of seeds.



Source: JICA Study Team

Figure 3.8.4 Agribusiness Model with Small-scale Farmers : Phoenix Seed's Case (Commercial Farm)

Apart from medium-scale commercial farms like Phoneix Seeds, AgDevCo also provides loans to small-scale commercial farm owners who operate farms with an area of 20 to 50 ha since supporting the entrepreneur, who is eager to depart from an individual producer to a commercial farmer, is crucial to achieving scale and impacts on commercializing small-scale farmers.

[24] It includes commercial farms for horticulture, livestock, fruits, seed multiplication, and honey production.

3) Lessons Learned from the BAGC Initiative

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. As explained earlier, 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 would be regarded as an effective agriculture development model applicable to the Nacala Corridor. The lessons learned from the BAGC initiative are summarized below.

- Medium-scale commercial farms or service providers operating in the areas should be an important partner for agribusiness development, involving small-scale farmers through the outgrower/contract farming model. It is essential that commercial farm operators should have access to soft loans[25] in order to cover the initial investment costs as well as the short-term working capital for the purchase of crops from outgrowers, since the loan interest rates of commercial banks in Mozambique are quite high.[26]
- Building mutual trust with a group of outgrowers is a prerequisite for the success of this model. A commercial business partner should develop a proper extension method that allows for close interaction with outgrowers through frequent farm visits.
- Commercial farms, with support from a government office such as CEPAGRI, needs to make proper arrangements with local banks to provide loans to outgrowers since farm inputs such as seed and fertilizer should be provided at a price under the outgrower model. With a loan contract, a commercial farm operator could easily control the input and harvest transactions with outgrowers.

(2) Current Status of Collaboration between Private Business and Small-Scale Farmers in the Nacala Corridor

Except for the cotton and tobacco sectors, which operate the largest outgrower scheme in Mozambique, working with small-scale farmers, only a few private businesses work with small-scale farmers for commercial agriculture through the outgrower/contract farming arrangement in the Nacala Corridor, while several projects, supported by NGOs, donors, or the government, have tried to link with the private sector in order to establish product value chains. Though it is still in the early stages of developing a collaborative mechanism between commercial farms/service providers

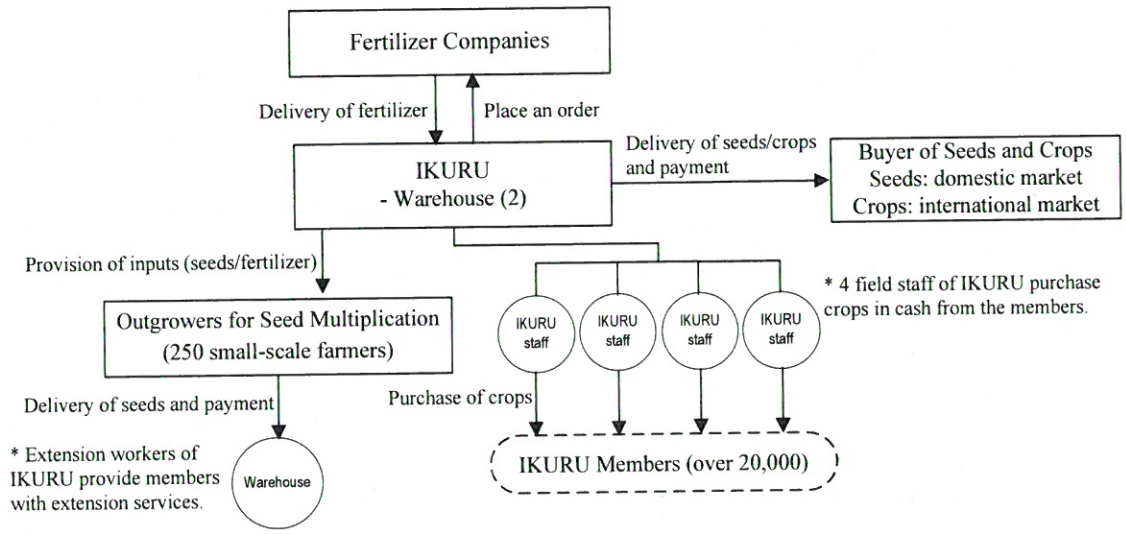
[25] Its interest rate ranges from 5 to 10 % per annum.
[26] This ranges from 20% to 25% per annum.

and a group of small-scale farmers, the current agribusiness initiative observed in the Nacala Corridor is producing food/cash crops with farmer's groups.

1) Agribusiness Initiatives by Private Businesses

<IKURU>

As a producer-owned marketing company, IKURU was established in 2003 in Nampula with the support of various external organizations, and to which shares are held by GAPI[27] (44.15%), Oxfam NOVIB[28] (44.15%) and producers (11.7%). At present IKURU has 26 farmer forums, including over 500 associations, with a total of around 20,000 farmers. Since 2010 IKURU has concentrated its trading activities on organic certified crops (sesame and ground nuts) in addition to seed multiplication. The main production area is in the Monapo and Meconta districts for sesame, and in the Mogovolas and Murrupula districts for ground nuts. IKURU has carried out contract farming for seed multiplication with 250 farmers, while other members do not have any agreements with IKURU on the marketing of crops so that they may sell their harvests to other traders. IKURU has faced an enormous challenge in purchasing organic products, especially sesame, from members due to a severe price competition with other traders. In the last season IKURU only purchased 60 tons of sesame out of the over 2,000 tons harvested by IKURU members. In terms of property, IKURU owns 2 warehouses in Nampula and Monapo; the former is currently under construction and the later is equipped with sesame processing machinery.



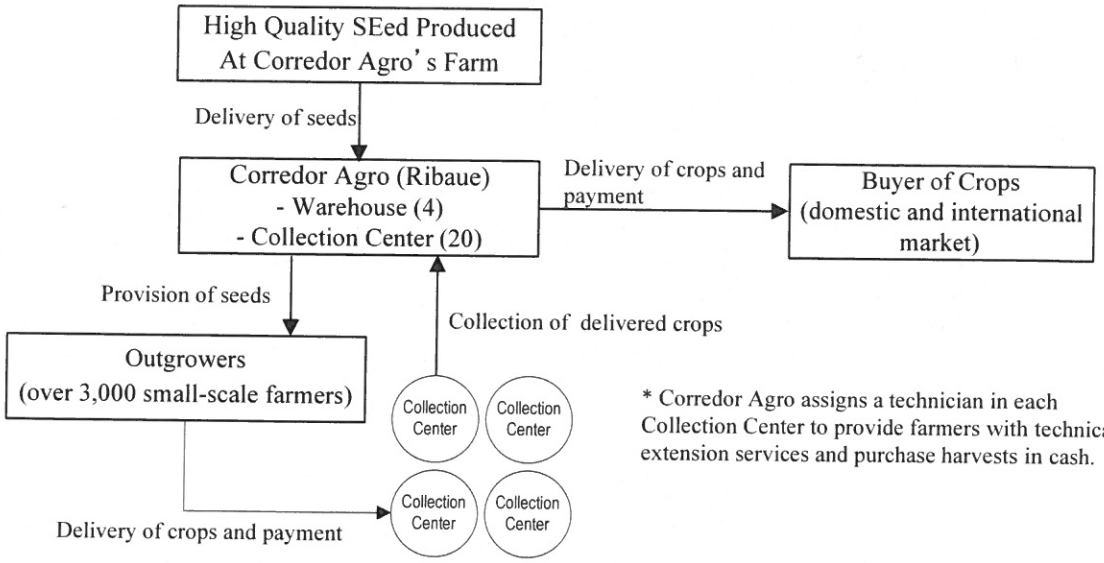
Source: JICA Study Team

Figure 3.8.5 Agribusiness Model with Small-scale Farmers : IKURU's Case

<Corredor Agro>

[27] GAPI is a Mozambican development financing institution based in Maputo, providing credit to business support services.
[28] Oxfam NOVIB is a Norwegian organization for international aid, an affiliate of Oxfam International.

Corredor Agro, established in 2009, conducts both large scale farming operations at its own farm located in Namialo[29] and contract farming for the production of maize, soybean and sesame with small-scale farmers at 2 locations; the Namialo and Ribaue districts in Nampula province. The operation in Ribaue, begun in 2011, is engaged with over 3,000 small-scale farmers through "seed-for-crop" contracts under which seed, planting instruments and guaranteed crop purchases are provided by Corredor Agro.[30] Corredor Agro built 4 warehouses and 20 collection centers in Ribaue district where an extension worker hired by Corredor Agro was dispatched with the task of providing extension services and purchasing crops from the members. Though the contract farming operation in Ribaue has gone fairly well, Corredor Agro has faced difficulty in acquiring crops, especially soybeans and sesame, from farmers due to dissatisfaction with the purchase price. Corredor Agro plans to widely expand the contract farming in the neighboring districts, Malema and Cuamba, in the near future.



(Source: JICA Study Team)

Figure 3.8.6 Agribusiness Model with Small-scale Farmers : Corredor Agro's Case

2) Agribusiness Initiatives by NGOs/Donors and Government

<NGOs/Donors>

CLUSA, the Cooperative League of the USA, has implemented the Agri FUTURO project, sponsored by USAID, in the Nacala and Beira Corridors for 4 years since 2009 with the aim of improving the competitiveness of Mozambican commercial agriculture by identifying the constraints which prevent alignments with market demand, and finding solutions to overcome those barriers. The Agri FUTURO project works with

[29] Namialo is located in Meconta District, Nampula Province.
[30] Source: Corredor Agro Company Profile. Under the "seed-for-crop" contract, farmers do not pay for seed.

selected private agribusiness companies/farms to strengthen their capacity in marketing and business management skills by providing advisory support and a series of trainings. In addition, the project provides a matching grant of up to 75,000 US$ to facilitate access to commercial loans for agribusiness investors[31].

In Nampula province the Agri FUTURO project has tried to promote the contract farming model with interested commercial agribusiness partners[32] through technical support in extension services and the provision of necessary machinery.[33]

OLIPA, a local NGO established in 1999, has carried out 2 projects in the Nacala Corridor since 2011 focusing on creating a value-chain for cash crops involving potential buyers, as summarized in Table 3.8.6 below. Despite the fact that last year the projects facilitated connections with major local traders with Nampula or Nacale as a project partners in the marketing and purchasing of products, the results were suboptimal due to limited access to the project site, especially the Malema and Ribaue districts, where vegetables were produced. Traders were reluctant to come to those sites for collecting harvests since production volumes were minimal with the costs for direct purchases, including the transport expenses, not being able to be covered.

Table 3.8.6 Project Information (OLIPA)

	Project Area	Components	Remarks
1	Malema, Ribaue (Nampula provine) Gurue, Alto Molocue (Zambezia province)	- Capacity building of farmers associations - Provision of farm inputs (seed and fertilizer) - Extension services for farm management - Market promotion (finding a potential buyers)	- Target crops: Nampula: vegetables (onion) Zambezia: soybeans, maize - Funded by the Ministry of Agriculture
2	Mogovolas, Mecuburi (Nampula province)	- Promotion and marketing support of sesame and ground nuts - Provision of farm inputs (seed and fertilizer) - Extension service (2 extension workers hired by OLIPA are assigned in each district)	- Target number: 40 associations from each district - A candidate farmer facilitator is selected from each association - Supported by the Germany NGO

<Government>

According to the Nampula Provincial Strategic Plan 2010-2020, CEPAGRI, in collaboration with a private sector partner, has planned a public-private-people

[31] Economic and Sector Work: Agribusiness Indicator : Mozambique, World Bank 2012
[32] Agri FUTURO has identified 4 private businesses, IKURU, Corredor Agro, ORINOTO, and CISTER, in Nampula province as a partner for implementing contract farming.
[33] Agri FUTURO provided 3 tractors to Corredor Agro and built a field office for IKURU.

partnership project in the Ribaue district of Nampula province to develop and test a full-package contract farming model, involving a service provider and local finance institution. The private service provider[34] provides agriculture inputs such as quality seed, fertilizer and instruments at a price, extensive technical extension services and a purchase guarantee for crops, while a finance institution provides loans to farmers with reasonable conditions.[35] The project will commence in the autumn of this year with the participation of over 300 farmers.

The Government of Mozambique has launched a cross-sectoral program in rural market promotion called PROMER, which covers 15 districts in 4 northern provinces (Nampula, Niassa, Zambezia and Cabo Delgado) with the aim of transforming the local agriculture system from subsistence to market-oriented through the implementing of several activities including: 1) agriculture extension services; 2) capacity building of farmer's associations and small/ medium local entrepreneurs; 3) support the establishing of local trader and small-scale village vendor networks to strengthen value chains; and 4) rural road rehabilitation. Private agribusiness partners are involved in the implementation of activities to improve market linkages for products. The following table summarizes the government projects for the promotion of agribusiness.

Table 3.8.7 Projects Information Implemented by the Government

	Project Area	Components	Remarks
PPP Project	Ribaue (Nampula province)	- Full-package of contract farming for maize, soybean and sesame production with 300 farmers. - A private service provider takes the leading role in implementing a series of activities (input provision, extension service and crop purchase).	- A loan to farmers for the input purchase is provided from a local microfinance institution. - Corredor Agro is nominated as a private partner in the project.
PROMER	Malema, Ribaue (Nampula province) Cuamba, Mandimba (Niassa province) Gurue, Alto Molocue (Zambezia province)	- 7-year project that covers 15 districts in the northern provinces in Mozambique. - With financial incentives from the government, private sector partners are widely involved in implementing pilot activities with small-scale farmers.	- Corredor Agro will implement a sesame and cassava promotion project under PROMER. - PROMER will provide the financial support for the procurement of machinery.

[34] Corredor Agro has been selected as a partner in the project.
[35] Modelo Microbanco, a microfinance institute operated in Ribaue district, provides a loan to farmers at 4% interest rate per month with a 6-month grace period.

3) Lessons Learned from the Agribusiness Initiatives with Small-scale Farmers in the Nacala Corridor

Compared to the Beira Corridor, commercial agriculture[36] has not fully matured due to several limitations in the agribusiness environment, such as accessibility to the large markets, the availability of inputs at an affordable price and the lack of infrastructure, particularly limited rural road networks and their condition. In addition to such limitations, private businesses, like IKURU and Corredor Agro, have faced other challenges from the business environment in creating new business models that involve small-scale farmers in the whole value chain, such as the availability of affordable loans, which are not conducive to local agribusinesses. The government and donors/NGOs are active in implementing projects supporting small-scale farmers through free input distribution and marketing support. These are definitely important for farmers who suffer emergency conditions, but some critics say that free of charge input distribution might crowd out private business, distort input markets and create moral hazard.

Taking into consideration the efforts made by the different sectors in the Nacala Corridor, 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 so as to improve productivity and strengthen the entire product value chain.

3.8.4. Japan, Brazil and Mozambique Public Private Joint Mission - ProSAVANA

The Private and Public Mission of ProSAVANA (hereinafter called PPP mission) was organized from 16th to 20th April, 2012. The mission visited filed in Nampula and Niassa Provinces and had discussion in Maputo. The number of participant in the mission was 55 in total, 19 from Japan, 16 from Brazil and 20 from Mozambique respectively. The mission consisted of 8 large-scale trade companies

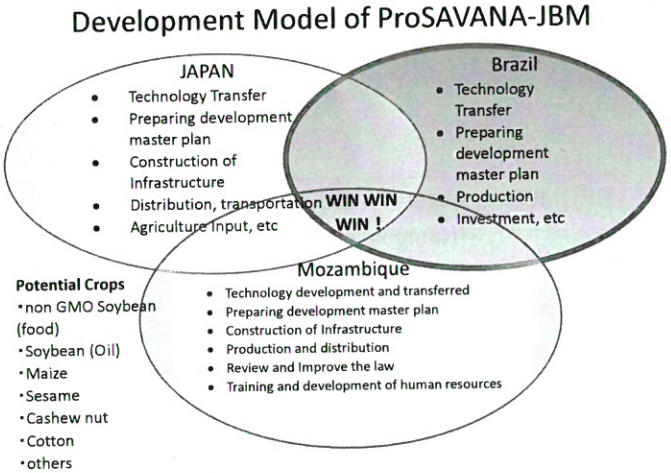


Figure 3.8.7 Development Model of ProSAVANA-JBM

[36] Though large cotton and tobacco commercial industries have been established in the Nacala Corridor, the number of medium-scale commercial farms in crop production is minimal.

and an engineering company in Japan, manufactures in Brazil, public sector and farm owners in Brazil.

Through the mission, the potential and constraints below Table 3.8.8 were confirmed and framework of cooperation among three countries shown in Figure 3.8.7 was proposed.

Table 3.8.8 Potential and Constraints Found in the Mission

Potential	Constraints
• Huge potential for Agricultural development (Soil, Climate, Water resource, vegetation etc.) • Strong motivation and commitment of the government and farmer • Possibility to apply experience and techniques in Japan and Brazil (especially one in Cerardo) • Existing of basic infrastructure (road, port, telecommunication and power supply) • Existing of system meet for Invetment (Special Economic Zone and DUAT) • Good access to Asia and Europe market • Rich available manpower • Identification of role of parties among Mozambique, Japan and Brazil in ProSAVANA. • Existence of domestic and international market. • Have similarities to Brazil in social and culture • Stable political, social and economic environment in Mozambique	• ProSAVANA Master Plan is under preparing • Necessity of establish Agribusiness model including export (value chain) • Need increasing of production value (not stable supply) • Undeveloped agricultural techniques • Low productivity • Weak extension system • Weak farmer's cooperation • Land Issues (expropriation, relocation) • Difficulty of access to agricultural input (machines, fertilizer) • Need to establish finance system (high interest, undeveloped guarantee system) • Need to strengthen coordination and implementation structure of ProSAVANA • Undeveloped governmental policy for agri-business • Need to improve infrastructure (construction, operation and maintenance) • Public Security • Need to consider social and natural environmental

3.9. Donors Interventions in Agricultural and Rural Development

A number of international agencies and NGOs have conducted activities related to agricultural development in the Study Area. They have large influence in area like extension services, provision of inputs and direct technical support, trading or facilitation of access to markets for new cash crops, provision of micro finance, introduction of new methods of conservation of agro products, etc. With respect the international organizations, such as World Bank and Asian Development Bank (ADB), and JICA, USAID, Sweden (SIDA), Switzerland (SDC), Finland (FINNIDA), etc. are supporting. As NGOs, there are many organizations that mainly carry out activities to create farmers' organizations for co-cultivation and sales of small-scale farmers. In addition, the NGOs act that compensate farmers for the shortage of the government extension workers as assistants in the agricultural extension sector (approximately half of extensionists).

3.9.1. International Institutions

The ongoing projects of the agricultural sector by the international agencies in the Surveyed Area are as follows:

Table 3.9.1 Ongoing Projects of the Agricultural Sector by the International Agencies

Province	District	Donor	Project / Programme Title	Total Commitments	Actual Start Date	Actual End Date
Nampula	Province-level	ADB	Multi-Ncala Road Corridor	95,940,480 EUR	2011/6/20	2015/6/15
		JAPAN	The Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development	737,124 EUR	2011/5/6	2016/5/5
		USA	Land Tenure Project	0 EUR	2008/9/22	2013/9/22
		SWITZERLAND	Rural income increase & diversification through micro irrigation in Northern Mozambique	189,420 EUR	2011/11/1	2012/6/1
	Monapo	UNDP	Millenium Villages Alto Molocue	112,310,025 EUR	2009/1/1	2012/12/31
		MCC	Water Supply and Sanitation Project	18,894,150 EUR	2008/9/22	2013/9/22
	Muecate	ADB	Rural Electrif. Project (ELECT. III)	1,142,469 EUR	2002/10/1	2012/12/31
	Meconta	WORLDBANK	Competitiveness and Private Sector Development	9,000,000 EUR	2009/10/28	2014/11/30
	Mogovolas		Non			
	Nampula City	MCC	Water Supply and Sanitation Project	18,894,150 EUR	2008/9/22	2013/9/22
	Nampula Dist (Rapale)		Non			
	Murrupula	ADB	Rural Electrif. Project (ELECT. III)	1,142,469 EUR	2002/10/1	2012/12/31
	Ribaue		Non			
	Malema		Non			
Zambezia	Province-level	FINLAND	Project for rural development	1,000,000 EUR	2010/10/1	2014/12/31
		JAPAN	The Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development	737,124 EUR	2011/5/6	2016/5/5
		WORLDBANK	Sustainable Irrigation Development	50,400,000 EUR	2011/12/10	2017/6/30
	Alto Molocue	UNDP	Millenium Villages Alto Molocue	112,310,025 EUR	2009/1/1	2012/12/31
	Grue	MCC	Water Supply and Sanitation Project	18,894,150 EUR	2008/9/22	2013/9/22
Niassa	Province-level	ADB	Multi-Ncala Road Corridor	95,940,480 EUR	2011/6/20	2015/6/15
		JAPAN	The Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development	737,124 EUR	2011/5/6	2016/5/5
		USA	Land Tenure Project	0 EUR	2008/9/22	2013/9/22
	Cuamba	SWEDEN	Rural Electrification in Niassa	1,875,720 EUR	2005/12/1	2013/9/30
		SWEDEN	Rural Electrification in Cuamba	4,704,000 EUR	2012/3/1	2016/12/31
		IFAD	Rural Markets Promotion Programme (PROMER)	2,876,405 EUR	2009/4/26	2015/12/31
	Mandinba	IFAD	Rural Markets Promotion Programme (PROMER)	2,876,405 EUR	2009/4/26	2015/12/31
	Nguama		Non			
	Lichinga		Non			

source: Official Development Assistance to Mozambique Database, 2012.

The projects by the international agencies are by ADB, UNDP, IFAD and World Bank. As projects by bilateral aid, there are by Japan, USA, Sweden, Finland and Switzerland. As the other, it is due to Millennium Challenge Corporation (MCC).

3.9.2. NGOs

According to the governments of the three provinces, non-governmental organizations (NGOs) implementing the activities of agricultural sector in the Study Area are as shown in Table 3.9.2.

A number of NGOs articulate their interventions by supporting different levels of activity in the value chain, commercialization and transformation of rural product by adopting the form of a consortium with other NGOs. The main NGOs involved in this type of arrangement are: CARE (providing extension services, diversification of production, financial services), OLIPA (promoting associations and commercialization, and rural socio-economic development), CLUSA (promoting associations, marketing and certification) and Technoserve (providing assistance for identification of agro-industry projects, identification of technology, plant design, formulation and implementation of business plans, mobilization of finance), OIKOS, (promoting

associations and distribution of agricultural products), ORAM (promoting community development, land rights and decentralization), KULIMA (promoting associations and commercialization of cashews), Save the Children, (promoting strengthen food security and to fight child malnutrition), and etc.

Table 3.9.2 List of NGO in the Study Area (2012)

Province	Non-Governmental Organizations
Nampula	- Save the children: Agriculture. - Action Aid: Agriculture. - ADAP-SF: Agriculture. - Africare: Agriculture. - ADPP: Agriculture. - ADIPSA: Agriculture, Marketing, Finance. - ORAM: Agriculture, Land. - CARE-International: Agriculture, Water, Environment. - Heif- International: Agriculture, Environment, Gender. - Kulima: Agriculture. - CLUSA: Agriculture. - OLIPA-ODES: Agriculture. - SCIP: Agriculture. - Technoserve: Agriculture. - Trocaire: Social Welfare, Agriculture, Health. - World Vision (WV): Agriculture, Education, Environment and Health.
Zambezia	- World Vision (WV): Health, Agriculture, Food Security, Social Action and Emrgência, in all districts. - CLUSA: Agriculture, in Gurúe - CCM (Conselho Cristão de Moçambique): Agriculture and Education, in Gurúe
Niassa	- OIKOS: Promoter of Associations, in Lichinga and Mandimba - ACORD: Promoter of Associations, in Lichinga - Concern Universal: Promoter of Associations, in Lichinga. - CCS (Concelho Cooperativo Sueco): Promoter of Associations, PASC (Programa de Apoio a Sociedade Civil) in Cuamba.

Source: Provincial Governments of Nampula, Zambezia and Niassa, 2012.

3.10. Environmental and Social Consideration

3.10.1. Natural Conservation and Protection in the Study Area

Table 3.10.1 shows a comparison between JICA Guidelines for Environmental and Social Considerations and Mozambique's EIA regulation, regarding the sensitive areas which require protection or particularly careful consideration on natural and social environment.

Table 3.10.1 Sensitive Areas by JICA Guidelines and Mozambique's EIA Regulation

Aspect	JICA Guidelines	Mozambique's EIA Regulation (Category A)
Natural	● National parks, nationally-designated protected areas (coastal areas, wetlands, areas for ethnic minorities or indigenous peoples and cultural heritage, etc. designated by national governments) ● Primary forests or natural forests in tropical areas; ● Habitats with important ecological value; ● Habitats of rare species that require protection under domestic legislation, international treaties, etc; ● Areas in danger of large-scale salt accumulation or soil erosion; ● Areas with a remarkable tendency towards desertification.	● Areas and ecosystems recognized as having special statute under the national and international legislation such as: - Coral reefs; - Mangroves; - Indigenous forests; - Small islands; - Zones of imminent erosion including coastal dunes; - Zones exposed to desertification; - Zones or areas of conservation or protection; - Marshes; - Zones containing endangered species of animal or vegetation, habitats and ecosystems; - Zones of unique scenery; - Zones of archaeological, historical and cultural value to be preserved; - Protection areas around water supply springs and fountains;
Social	● Areas with unique archaeological, historical or cultural value; ● Areas inhibited by ethnic minorities, indigenous peoples, or nomadic peoples with traditional ways of life, and other areas with special social value.	● Populated areas that imply the need for resettlement; ● Densely populated areas where the activity involves unacceptable levels of pollution or other type of disturbance significantly affecting the resident communities; ● Regions subject to high levels of development or regions where there are conflicts in the distribution and use of natural resources; ● Areas along rivers or areas used by local communities as a source of domestic water supply; ● Zones containing valuable resources such as aquatic resource, mineral, medicinal plants, etc.

Source: Adapted from "JICA guidelines for environmental and social considerations (2010)" and "Decree no.45/2004 Regulation on the process of environmental impact assessment"

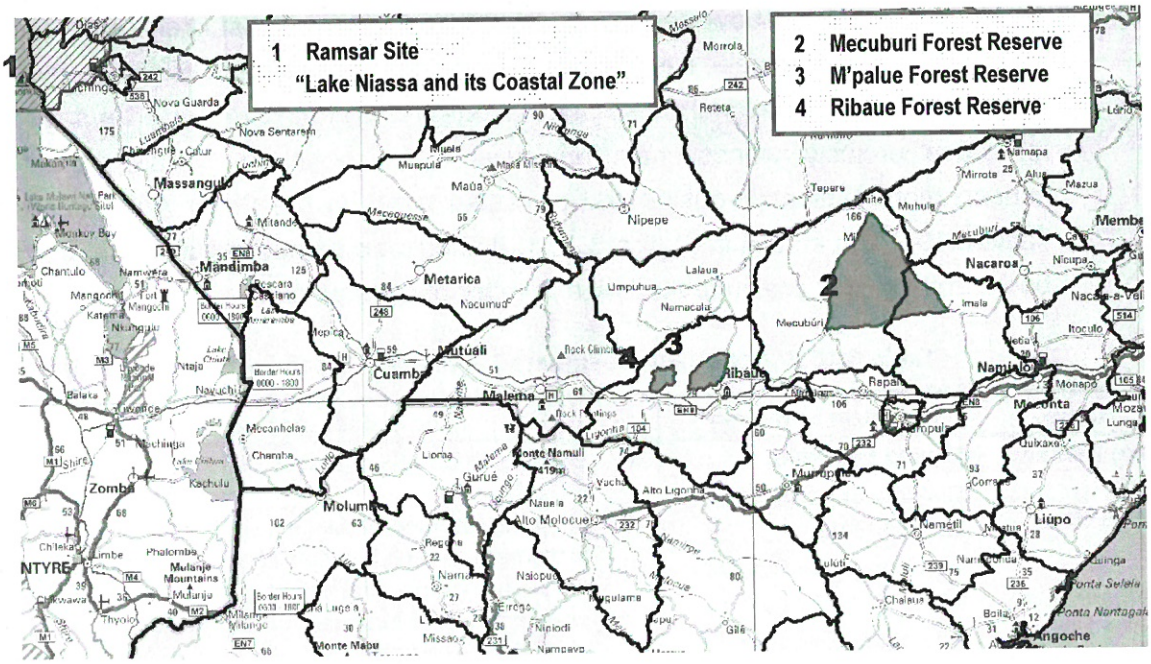
Activities situated in above-mentioned sensitive areas are most likely to be classified as category A. In principle, it is desirable to avoid implementation of any project inside or in the vicinity of national parks and nationally-designated protected areas, except for those projects whose main objective is to contribute to the promotion of conservation. Nationally-designated protected areas in the Study Area are listed in Table 3.10.2 and shown in Figure 3.10.1. It should be noted that all these areas have been, and actually are, inhabited by a number of communities.

Table 3.10.2 Nationally-designated Protected Areas in the Study Area

Name	Location and Area*	Legal background
Lake Niassa Partial Reserve Ramsar Site "Lake Niassa and its Coastal Zone"	Niassa Province; Districts of Lago, Sanga and Lichinga; Bordering with Malawi and Tanzania; *As national reserve* it has 47,800ha plus 89,300ha of buffer zone. *As Ramsar site* it has 1,363,700ha including water body (of which 129,600ha belong to the land of Lichinga District).	● Decree no.59 of November 2011 'to create Lake Niassa Partial Reserve' by Council of Ministers, aiming at preservation and increment of reproduction of species, increase in family income, promotion of ecotourism, conservation of biodiversity and protection of available resources. ● Resolution no.67 of December 2011 'to designate Lake Niassa as Ramsar Site to be included in the list of internationally important wetland' by Council of Ministers, in recognition of its ecological diversity. ● Resolution no.45 of November 2003 'Adhesion of Mozambique to Ramsar Convention' by Council of Ministers.
Mecuburi Forest Reserve	Nampula Province; Districts of Mecuburi and Muecate; 230,600ha originally and 195,400ha currently (41,800ha of which belong to Muecate District).	● Government Gazette no. 29/8459 Series 1 of July 1950, with the main objective of supplying construction timber for the two cities of Nampula and Nacala Port, and also for the railway, as well as protecting the ecosystem of the catchment of Mecuburi River.
M'palue Forest Reserve	Nampula Province; District of Ribaue; 5,100ha originally and 4,250ha currently.	● Government Gazette (number unknown) of 1950, with the main objective of conservation of water catchments that feed the River Mepuipui and protecting the flora and fauna in the area.
Ribaue Forest Reserve	Nampula Province; District of Ribaue; 5,200ha originally and 3,750ha currently.	

**Areas are cited from different publications though some figures are known to be inconsistent with reality. The partial areas of Ramsar site belonging to Lichinga District and of Mecuburi Forest Reserve belonging to Muecate District are calculated geometrically by JICA Study Team.*

Source: JICA Study Team



Source: JICA Study Team

Figure 3.10.1 Nationally-designated Protected Areas in the Study Area

Outside the Study Area, however in its vicinity, are located other nationally-designated protected areas such as Quirimbas National Park (Cabo Delgado Province), Niassa Reserve (Niassa Province), Gile Reserve (Zambézia Province), Baixo Pinda Forest Reserve and Matibane Forest Reserve (Nampula Province). The world heritage Mozambique Island is also located nearby.

Additionally, several other sensitive areas may exist which require careful consideration on natural and social environment. More detailed information shall be gathered and analyzed during the formulation of master plan and priority projects under ProSAVANA-PD. General features of these sensitive areas are described below:

Forests, Habitats, Areas with soil degradation risk

Sacred forests including cemetery for local communities ("zones of historical cultural value and use" defined by Forestry and Wildlife Law) may exist throughout the Study Area. At province level, 42 threatened plant species are reported (including 35 endemic and 3 near-endemic species) in Nampula, Niassa and Zambezia, though specific location is unknown.

According to IUCN Red List and other sources, there are at least 11 threatened (3 mammals and 8 birds) and 7 near threatened (4 mammals, 2 birds and 1 fish) animal species in the Study Area. Among them, black rhinoceros (critically endangered), white rhinoceros (near threatened), brown hyenas (near threatened), hooded vulture

(endangered), white-headed vulture (vulnerable), Madagascar pond-heron (endangered), secretary bird (vulnerable) and African skimmer (near threatened) are legally protected by Regulation on Forestry and Wildlife Law. Mount Namuli in Gurue District is especially known to be home to several endemic species. Lake Niassa, recently declared as Ramsar site, is home to more than 600 fish species, 90% of which are endemic. Also the lake lies within flyways of migratory birds between Africa and Europe. It should be noted that, in general terms, scientific survey and description of flora and fauna around the Study Area still remain at incipient level.

Dangers of desertification or large-scale salt accumulation are not prominent in the Study Area: however, several districts such as Monapo, Mogovolas, Gurue and Alto Molocue are reported to have soil erosion problems (see Table 3.1.5).

Historical and cultural sites, Issues of social concern

Mozambican legislation gives a fairly broad meaning for 'cultural heritage', classifying them into material/immaterial, movable/immovable ones or such categories as monument, complex, site and natural element, at national/local/universal level. A complete inventory of historical and cultural heritages of the Study Area is not yet available, and chances of new discovery are still left. Sites of historical importance such as mountain, lake, cave, tomb, monument, church, ritual place and rock paintings are reported in Malema, Meconta, Muecate, Nampula and Ngauma Districts.

The population of Mozambique is generally considered as relatively well-balanced mixture of different ethnic groups, and the Government of Mozambique (GOM) does not apply any legal definition or protection for ethnic minorities or indigenous peoples. The Study Area does not include any special area inhabited by such groups: however, linguistic issues are worth careful consideration where three dominant languages are spoken (*Emakuwa* in Nampula, *Elomwe* in Zambézia and *Cyao* in Niassa Province's part of the Study Area) and in average 72% of the population over 5 years old do not understand Portuguese and 79% are illiterate (both figures according to 1997 census). Therefore, special attention should be paid in the public consultations as well as information disclosure under ProSAVANA, so that all the local stakeholders could have access to and understanding of the information. Problems related to religion are hardly probable in the Study Area where Islamic majority keeps peaceful relation with Christian society: however, when involuntary resettlement is inevitable, an attention will be needed so that resettling people and host communities might not suffer from religious conflict.

Landmine clearance is another sensitive topic: it is reported that 2 "dangerous areas" still exist (1 in Meconta and 1 in Lichinga Districts) in the Study Area.

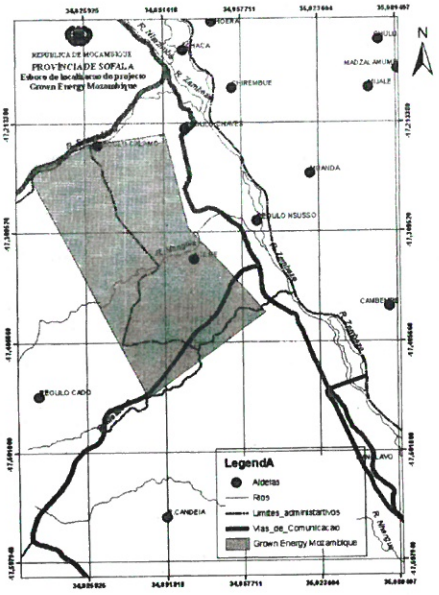
Delimited community land

Several communities carried out the delimitation of land as a means to proclaim and visualize their DUATs obtained through customary (traditional) occupation (see Figure 3.10.2 and Table 3.10.3 below). The rights of these communities as well as great many other communities should be respected especially when private investors are looking for large-scale "available land", because actually in Mozambique DUATs are being awarded to investors even for a territory which contain villages inside, as shown in the case of Sofala Province (Figure 3.10.2), based on the "partnership agreement" between investor and community.

Table 3.10.3 Community Land Delimitation at Province Level, as of 2009

	Nampula	Niassa	Zambezia	Total Mozambique
Number of Certified Communities	93	9	73	229
Number of Communities in Process	2	0	18	74
Certified Area (ha)	743,418	357,231	3,637,001	6,734,287
Area in Process (ha)	4,518	0	568,011	5,924,235
Number of Case < 1,000ha	10	0	0	14
Number of Case 1,000 to 10,000ha	67	0	45	145
Number of Case > 10,000ha	18	8	46	143

Source: Adapted from "Recognizing Rights to Natural Resources in Mozambique, De Wit and Norfolk, 2010"



Source: Bulletin of the Republic, Series I no.37, 21st September 2009

Figure 3.10.2 Example of DUAT awarded over Existing Villages

3.10.2. Case Studies in Agricultural Sector

Table 3.10.4 shows 4 case studies in agriculture/agro-industry sector which may provide lessons regarding EIA and subsequent implementation of environmental management plan as well as resettlement action plan.

Table 3.10.4 Case Studies of Environmental and Social Considerations

	Case 1 Matanuska	Case 2 New Horizons	Case 3 PROIRRI	Case 4 PROAGRI-II
Title	Matanuska Banana Plantation Project	New Horizons Chicken Slaughterhouse Project	Sustainable Irrigation Development Project	National Agricultural Development Program-II
Type	Private investment	Private investment	Sector investment loan	Sector program
Executing body	Matanuska Mozambique Lda	New Horizons Mozambique Lda	MINAG	MINAG
Budget	50 million US$	0.5 million US$	92 million US$	200 million US$
Finance	Own capital and fund	Own capital and fund	World Bank (IDA and PHRD)	Common fund by 8 donors (6 bilateral and 2 multilateral)
Province	Nampula	Nampula	Sofala and Manica	All provinces
Main Components	3,000ha of irrigated banana; 12 packaging facilities; 1 dam with 600ha of inundated area; 1 weir, 1 pumping station and 25km of canal system.	Construction of 1 slaughterhouse of 1,250m^2 with capacity of 250,000 chickens per month.	In total 5,000ha of irrigated land (rice, sugarcane, upland crops, etc.) with dams, weirs, canals, access roads, pumps, etc. and processing facilities.	Family agriculture; Commercial agriculture; Natural resources management (infrastructure, input supply, marketing, extension, finance, organization, etc.)
Applied EIA tools	EIA procedure by Decree 45/2004	EIA procedure by Decree 45/2004	EIA procedure by Decree 45/2004; WB-OPs 4.01/04/ 09/11/12/37, 7.50	Strategic Environmental Assessment (SEACAM method)
Category	A	B	B	not categorized
Products of EIA	Full EIA Report (Summary, Main report*, Environmental management plan, RAP, Public participation report*)	Simplified Environmental Report	Environmental and Social Management Framework; Resettlement Policy Framework	Environmental Strategy for Program Implementation; Environmental Criteria for Selection of Proposals.
Clearance	After January 2009	January 2007	March 2011	July 2005

**Main report and public participation report were not available.*
Source: JICA Study Team

In each case, likely adverse impacts on natural and social environment were identified and mitigation measures were proposed. A comparative summary is shown in Table 3.10.5.

Table 3.10.5 Likely Adverse Impacts and Mitigation Measures in Case Studies

Adverse impacts	Case Study				Mitigation measures (case study number)
	1	2	3	4	
Water pollution	x	x	x	x	(1) Adoption of international GAP guidelines on use of agrochemicals; Monitoring of water level, quality and salinity. (2) Effluent treatment (filtration, flocculation, deposit); Reuse for pasture irrigation; Monitoring every 3 months. (3)(4) Good management of agrochemicals; Removal of organic matter from reservoirs.
Waste		x			(2) Solid waste disposal (landfill or incineration); Reuse as animal feed; Monitoring every 3 months.
Protected areas			x		(3) Assistance for ongoing rehabilitation efforts.
Ecosystem	x		x	x	(1) Enlarged buffer zone along watercourses; Minimized disturbance. (3) Special study of biota; Creation of compensation areas. (4) Agroforestry; Alternative energy sources; Strict criteria of project selection; Awareness creation; Incentive for good practices; Zoning.
Hydrology	x		x		(1) Keeping compensation flow by dam operation; (3) Survey of hydrologic flux; Not funding large dams; Keeping minimum flow by dam operation; Periodical flush of reservoirs; Protection of floodplains; Control of ground and surface water abstractions; Adequate layout and management of irrigation system.
Erosion, siltation, salt accumulation	x		x	x	(1) Adoption of international GAP guidelines on use of agrochemicals. (3) Use of appropriate agriculture techniques and good irrigation management at watershed level. (4) Zoning for grazing area and other areas.
Resettlement	x		x		(1) Provision of new house, farmland, monetary compensation, hand tools, fuel wood and farm inputs; Consensus building with host communities; Mechanism of grievance redress. (3) Land acquisition assessment at screening; Census of all affected people; Avoidance of resettlement wherever possible; RAP approval.
Living and livelihood	x		x	x	(1) Employment of local people as labor-force; Reconstruction of existing school and rehabilitation of existing health post. (3) User participation at planning and design stages; Consultation with local communities; Provision of employment opportunities. (4) Zoning; Land cadastre; Partnership between communities and private sector; Incentive for alienation or effective use of land.
Vulnerable groups			x	x	(3)(4) Inclusion of disadvantaged groups; Keeping gender balance in resettlement committees; Awareness creation.
Heritage	x		x		(1) Relocation of tombs based on consensus and local tradition. (3) Protection of heritages by chance-finds-approach.
Working conditions including occupational safety	x	x		x	(1) Training of workers on first aid; Limitation of vehicles' speed. (2) Provision of protection equipments, sanitary toilets and trainings for workers. (4) Training of farmers on correct and safe use of agrochemicals.
Infectious disease, HIV/AIDS	x		x	x	(1) Awareness creation and installation of a medical post for workers. (3) Keeping distance between reservoirs and settlement sites; Good reservoir management. (4) Awareness creation; Assistance for affected people.
Transboundary or global effect			x		(3) Prior notification to upstream states of international rivers.

Source: JICA Study Team

We can see that water, soil, ecosystem, livelihood of affected people, workers' safety and health issue are regarded as principal concern. Mitigation measures proposed in these case studies may be valuable reference for ProSAVANA-PD. Like PROIRRI and PROAGRI-II, use of environmental check list as a requirement for any proposal shall be encouraged. Also, all information related to EIA shall be disclosed at a place easily accessible to local people.

It should be pointed out that proper environmental monitoring and audit are still rather weak in Mozambique compared to its well-structured EIA procedure. According to an officer of DPCA Nampula, environmental monitoring and audit in this region are generally well conducted with few violations. However, as shown in Table 3.10.6, numerous reports have documented the problems that affect the implementation of environmental management plan and resettlement action plan. It is evident that the root of the troubles lies principally in the following points:

(i) Poor consensus building in community consultations;

(ii) Weak legal status of community-investor partnership agreement;

(iii) Inaccessibility to investors' project proposals; and,

(iv) Lack of coordination among government institutions.

Problems of community consultation include lack of announcement in advance, insufficient number of meetings (in some cases the meeting was not repeated but performed in a single day), not fully impartial representation, inadequate or contradictory recording, vague expression of investor's commitments, lack of consideration for future land needs and community expansion, etc. As for the partnership agreement between community and investor, it is not a legally binding contract and no sanctions are in place in the event that investor or community or both of them do not respect the promises made. As far as agricultural investment project and related DUAT are concerned, project proposals are officially secret which makes it hard for civil society or media to know if they are being carried out properly or not. Also, it is worth mentioning that the coordination required among government institutions to prevent conflicts in land uses is apparently missing in some cases.

As an alternative to address these problems, active participation of neutral players, such as NGOs and consultants uninvolved in the project, shall be encouraged in the periodical review and audit of environmental/social management. Contracting outside experts will also be a recommendable option, especially for delicate issues such as resettlement and grievance redress, as well as for the capacity development of involved officers of government institutions.

Table 3.10.6 Some Reported Troubles in Agriculture Sector with Foreign Investment

Example1: Fruit Plantation Project (Nampula Province)
Around 2,000 project-affected people of 4 villages accused the company of delaying the payment of compensation for land acquisition, in April 2012, at Monapo District Prosecutors Office. Judgment was given in favor of the villagers: the Prosecutors Office ordered the company immediate payment or otherwise ban on its operation. *Source: Interview made on 15th June with Monapo District Prosecutor (Documented evidence was not available.) (courtesy by JICA Study Team for Nacala Corridor Economic Development*
Example 2: Agribusiness Project (Zambezia Province)
The 10,000ha DUAT awarded to the company in 2009 by Council of Ministers included 490ha occupied by 244 farmers for more than 10 years. For 2010/2011 soy season the company ploughed 500ha which, according to the local people, had already been cleared by them, including land which had already been planted and which was outside the allocated area. The company had not completed the procedure of land demarcation or implementation of a substantial part of its approved project within the time frame set by law. None of the company's commitments for the construction of a school, a health post, wells, extension of the electricity grid and job creation have been met. No terms of partnership between the company and the existing holders of land use rights were submitted; the formal opinion from MICOA was not attached to project proposal, either. Significant problems of consultation process were found, such as the question of representation, no signs of presence of local soy-producers at the meetings, the lack of rigor involved in capturing agreements, etc. Local farmers lost access to land without any suitable alternatives (resettlement, provision of nearby alternative land, technical assistance, seed, fertilizer and out-grower scheme as committed by the company) having been made. *Source: Confrontation between peasant producers and investors in northern Zambézia, Mozambique, in the context of profit pressures on European investors (Norfolk and Hanlon, April 2012)* **Counterargument by Agribusiness Company** (Realized) Assignment of a social responsibility manager by the company; Creation of social committee with the local authorities; Donation of a fully equipped ambulance to Ruace village; Growing potato for the regional market; Employment of 150 people; etc. (Planned) Recuperation of the bridges of the road from Ruace to Lioma; Preparation of 2,600ha for the exclusive use of local farmers, provision of inputs and transfer of know-how; Provision of training for employees (all from Gurue District) on state-of-the-art farming equipment in South Africa and Brazil; etc. *Source: http://www.landandpoverty.com/agenda/pdfs/paper/norfolk_hanlon_mozambique_response.pdf*
Example 3: Biofuel Project (Gaza Province)
The 30,000ha identified by the company to develop an ethanol production plant was being used by the communities as grazing land, and it also included land reserved by the Limpopo National Park to relocate communities from within the park according to its already approved land use plan. Villagers felt that ProCana had been encroaching on their land with no respect for the agreed boundaries. Only after conducting aerial survey the company approached the communities, but local opinions and concerns were ignored by the company and misrepresented in consultation minutes. Promise of the delimitation of community lands by District Cadastre Service was not completed. the project was approved in 2007 and operations initiated without obtaining environmental license. Today, the DUAT was revoked by the government due to the company's non-compliance with the investment plan. *Source: Biofuels, land access and rural livelihoods in Mozambique (Nhantumbo and Salomão, IIED, 2010)*

Source: JICA Study Team *(adapted from different sources shown in the table.)*

Readers are recommended to see also Chapter 4.8 on the "Responsible Agricultural Investment (RAI)" which is closely related to these issues.

3.10.3. Implications of Cerrado agriculture development for Mozambique

The nature of ProSAVANA as triangular cooperation among Japan, Brazil and Mozambique, as well as the similarity of natural environment between Nacala Corridor and Brazilian Cerrado, make it reasonable to draw lessons from the experiences of Cerrado agriculture development to be applied in Nacala Corridor with regard to environmental and social considerations.

Population density in Cerrado increased from 2.5 in 1970 to 8.8 persons/km^2 in 2000 after long and active migration mainly from northeastern and southern states. By contrast, among the 14 districts of the Nacala Corridor, population density in 2011 ranged from 20.4 (Lichinga District) to 97.2 persons/km^2 (Monapo District) which means quite different initial condition in terms of land availability and pressure on natural resources. Dependency on forest resources such as firewood, charcoal, timber, fiber, medical plants, bush meats, etc. is also considered higher in today Nacala Corridor than it was in Cerrado some forty years ago, implying the relative difficulty of clearing forests for agricultural purpose unless alternative sources of energy, protein and medicine are rapidly widespread. Forests' cultural importance for Mozambican traditional communities and its function as fallow land in slash-and-burn farming system should be taken into consideration as well. As for indigenous peoples and ethnic minorities, detailed reports are hardly available about the interaction supposedly occurred during Cerrado agriculture development, which makes it difficult to seek meaningful lessons for Mozambique.

Rapid deforestation is the greatest concern in Cerrado: according to an estimate, if the loss keeps current rate of 2.2 million ha/year the remaining forest in Cerrado could disappear in 2030. Depletion of surface water as well as groundwater resources due to excessive irrigation is also a serious problem in Cerrado. Increasing awareness of these issues led the federal government of Brazil to adopt a series of conservation measures as shown in Table 3.10.7. Also, important environmental parameters such as soil erosion, river discharge, water quality, vegetation, insect fauna and land use have been monitored by EMBRAPA, CAMPO and JICA experts, which is one of the following technical cooperation projects implemented in response to increasing need of environmental conservation in Cerrado:

- Project of research for the agro-environmental conservation in the Cerrado (1994 – 1999, CPAC)
- Study of environmental monitoring in the Cerrado (1992 – 2000, CAMPO/EMBRAPA)
- Cerrado ecological corridor conservation project (2003 – 2006, IBAMA)
- Jalapão region ecological corridor project (2010 – 2013, ICMBio)

Table 3.10.7 Natural Environment of Cerrado biome and Nacala Corridor

	Cerrado biome	Nacala Corridor
Biodiversity	<table><tr><th></th><th>Species</th><th>Endemism</th></tr><tr><td>Plant</td><td>12,356</td><td>44%</td></tr><tr><td>Mammal</td><td>195</td><td>7%</td></tr><tr><td>Bird</td><td>607</td><td>3%</td></tr><tr><td>Reptile</td><td>225</td><td>15%</td></tr><tr><td>Amphibian</td><td>186</td><td>15%</td></tr><tr><td>Fish</td><td>800</td><td>25%</td></tr></table>	Detailed scientific survey is not fully carried out. Reported species at least include: - 3 threatened mammals; - 8 threatened birds; - 4 near threatened mammals; - 2 near threatened birds; - 1 near threatened fish; - 42 threatened plants (in 3 provinces).
River Systems	Upper catchment of 3 major rivers: Amazon, Paraná (tributary of La Plata), São Francisco.	Upper to middle catchment of several rivers: Rovuma, Lugenda, Lurio, Mecuburi, Monapo, Meculi, Ligonha, Molocue, Licungo.
Protected Areas	108 strictly protected areas and 288 sustainable use areas covering 167,777 km^2 (8.23% of total area)	4 national reserves covering 1,869 km^2 (2.82% of total area)
Conservation Measures (not including nationally-designated protected areas)	● Legal reserve (20 to 50% of each farmland, individually or jointly as "condominium") by Forest Law, thus forming macro- and micro-corridors which unite gallery forests; ● Rural environmental registry GIS; ● Conservation farming technology such as rotation, contour terracing and non-tillage direct planting; ● Farm reforestation programs such as "produtor de água".	● "Zones of historical cultural value and use" by Forest and Wildlife Law, to protect communities' right to access to forest resources in traditional way. Conservation measures other than basic legal provisions are not fully devised.

Source: Adapted from "Cerrado Agriculture (JICA Research Institute, 2012)" and "Conservation International (www.conservation.org/where/priority_areas/hotspots/south_america/Cerrado)"

An in-depth baseline survey and monitoring of environmental parameters should be started urgently in Nacala Corridor once the agricultural master plan is drafted under ProSAVANA-PD, paying special attention to disturbance in upper catchment areas of important rivers. In this regard, EMBRAPA's professional contribution is greatly expected as one of the components of ProSAVANA-PI. Transfer of conservation farming technology from Brazil shall be encouraged too, with adequate adaptation for Mozambican farmers. In parallel, efforts by the GOM to devise and enforce legal instruments or incentive schemes for environmental conservation at farm level should be supported by Brazilian and Japanese experts.

CHAPTER 4 ANALYSIS OF PRESENT CONSTRAINTS AND AGRICULTURAL DEVELOPMENT POTENTIAL

4.1. Agricultural Production

4.1.1. Scale of Cultivation Area and Farming System

Mozambican agriculture is characterized by small-scale farming. It is generally considered that the major reason of the small-scale farming in the country is lack of manpower and/or means of cultivation, with understanding that Mozambique is blessed with a vast arable land that is not in use now. This perception is also shared by most farmers in the Study Area. Table 2.3.2, however, implies that population pressure might be a latent reason of the small-scale farming at present. The average farming size of Nampula and Zambezia provinces, where are the most population dense area in the country, is significantly smaller than the national average, while the size of Niassa province, where is less population dense area, is much bigger than the national average.

Because of extensive farming with shifting cultivation, farmers in the Study Area must need a land area bigger than the actual cultivated area in order to continue their farming on sustainable basis. According to the field survey result, many farmers in the area shift their farmland every 3 to 5 years, when they feel that soil fertility of the cultivated land is getting poor. If they save enough time of fallowing for 10 to 15 years in order to recover the soil fertility of the abandoned land, they theoretically need reserved fallow land 2 to 5 times bigger than the actual cultivated area in addition to the existing farmland. It means that there must be 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 as shown in Table 3.1.7, substantial number of farmers in the area may face difficulty to continue the extensive farming practice on sustainable basis.

A book reporting slash and burning cum shifting cultivation practices in various Asian countries, that is "*Inasaku Izen*" (Farming Practices in Japan before Rice Farming Came), Sasaki Komei, NHK Books, 1971, estimates that the extensive practices, in any case, can feed only maximum 40 person/km^2 even counting supplementary foods from other activities such as hunting and collection. Table 3.1.7 shows that a population density in many districts, as well as the average in the Study Area, exceeds 40 person/km^2.

It is interesting that fire occurrence in Figure 3.3.1 in high population dense districts in the eastern part of Nampula district is less than the other districts. On the contrary, the fire occurrence is still high in Alto-Molocue and Gurue districts in Zambezia Province even though they have high population density. It is assumed that farmers in the eastern Nampula Province have already shifted to settled-farming because of high population pressure and probably existence of many commercial farms for producing cotton, banana, etc., while farmers in the two districts in Zambezia Province still continue the extensive farming practice by deteriorating their sustainable farming bases.

In some area in the Study Area, population pressure on land has started to appear, and it causes land conflicts between people, especially in the area where is fertile and easy to access from main roads. Farmers in the area are at a crucial point to change their familiar farming practice for surviving. Even though most of the farmers don't recognize the present situation well, their existing farming practice may trigger a serious environmental destruction as we have experienced in the other part of the world. They should understand that there is no remained vast 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 every possible support of the government. They can expect the following benefit after they shift to settled-farming.

1) To increase crop productivity through intensive farming practices
2) To expand actual farmland area by reclaiming the reserved fallow land
3) To conserve environment condition in order to protect their farming bases

4.1.2. Cropping Technology

Subsistence farmers are dominant in the Study Area. Most of small-scale farmers produce crops only for consumption, and are characterized by low yields and modest returns. Those who manage around 1 to 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 more than certain 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 where is accessible to a water source for irrigation. However, farmers who cultivate more than 5 ha of farmland are only 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 4.1.1 shows a productivity (ton/ha) of crops, which are popular in the Study Area, in Mozambique and in relatively advanced countries such as, Brazil, South Africa and Kenya. The table implies that Mozambique still has very big room for improvement of the productivity of many crops.

Table 4.1.1 Productivity of Crops in Mozambique and Some Countries in 2010

Crops	Productivity (ton/ha)			
	Mozambique	Brazil	S. Africa	Kenya
Maize	1.2	**4.4**	4.7	1.6
Cassava	6.0	**13.7**	NA	5.3
Sorghum	0.6	**2.3**	**2.3**	0.7
Millet	0.5	NA	0.5	0.5
Paddy, rice	1.0	**4.2**	2.6	4.0
Wheat	1.0	2.8	2.6	**3.2**
Groundnuts, with shell	0.2	**2.7**	1.5	1.0
Beans	NA	0.9	1.2	0.6
Cowpea	NA	NA	0.6	0.4
Pigeon pea	NA	NA	NA	0.7
Soybean	NA	2.9	1.8	0.9
Sweet potato	7.1	**11.2**	3.3	9.1
Potato	13.8	25.3	**33.3**	2.9
Sesame seed	0.7	0.6	NA	0.5
Sunflower seed	0.5	1.1	**1.2**	1.0
Vegetables	4.2	**11.9**	11.6	9.5
Cashew nuts, with shell	0.9	0.1	NA	0.3
Bananas	7.0	14.3	**49.5**	19.0
Sugar cane	13.0	79.2	60.0	**83.1**
Seed cotton	0.5	**3.6**	3.5	0.7
Tobacco	1.5	1.7	**2.8**	0.6

Source: FAOSTAT

This is due to combined factors including the extensive farming practices and the low use of inputs. Majority of farmers in the Study Area except for the eastern part, still much depend their farming on slush and burning cum shifting cultivation. They usually shift their cultivated land every 3 to 5 years in order to find a new fertile land. Fundamental cause of the low use inputs must be the extensive farming practices prevailing in the Study Area. As long as continuing slash and burning cum shifting cultivation, farmers don't need such inputs. They also use only simple hand tools, such as hoe, machete and ax which are typical tools for slash and burning farming. In view of soil and water conservation, scratching the soil surface only with such simple tools is a common land preparation practice in everywhere the farming prevails.

Considering the present uncertain rainfall condition and unclear rights to farmland, it is very reasonable that farmers choose a steady farming strategy of low-inputs and low-return but stable production by shifting cultivation. In the strategy, increased crop production shall be obtained through expanding cultivated land with every available

labor force, with the perception that there is still a vast land for shifting cultivation surrounding them. Therefore, introduction of intensive farming aiming at improving crop productivity will be realistic to farmers, only after transforming their shifting cultivation to settled one, through understanding on-going situation that the land is going to be saturated with increasing population and they are losing a base to continue shifting cultivation on sustainable basis in the Study Area.

4.1.3. Promising Crops

Promising crops in the Study Area were examined from a view point of supply (production) side. In prior to the examination, 24 crops were selected based on the Minutes of Meeting on Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique on September 17, 2009 and familiarity of crops in the Study are. Then, scoring of the corps was made by the 6 criteria as described below.

<Scoring Criteria>

(1) Government's Key Policy

PEDSA stated priority smallholder commodities in the context of the corridor approach and also apply to IIAM and its zonal research centers. The IIAM CZnd in Nampula and the IIAM CZnw) in Lichinga, covering the Study Area respectively, also stated research priority crops in their 5 years (2011 to 2015) activity plans. The priority crops sated by PEDSA and by the IIAM zonal research centers are subtly different each other, while many of the crops are overlapped. The Study team, therefore, classified the 24 crops into 3-grades, i.e. high-priority, priority and non-priority, by integrating the priority crops of PAEDSA and the IIAM zonal research centers.

(2) Value Chain Overview

CEPAGRI is determining the most suitable farm-products value chains for investment under PNISA (the National Agricultural Sector Investment Plan). CEPAGRI's working team will filter the products through 3 sets of criteria to determine which prioritize for future action planning. While the filtering work is still in progress, 9 value chains have selected after 2 steps of filtering at present. The 24 crops were classified into 3 groups by the following criteria.

- High prospect: Included in the second filtered value chains
- Fair prospect: Included in the second filtered value chains
- Low prospect: Not included in above value chains

(3) Popularity in the Study Area

Based on crop production data in the Study Area provided from respective concerned DPAs, an average annual planted area from 2006 to 2011 are calculated for each of 24 crops. The 24 crops were classified into 3 groups by the planted area as follows.

- Very popular: > 50,000 ha
- Popular: 10,000 – 50,000 ha
- Unpopular: < 10,000 ha

(4) Present productivity (in 2010)

Based on the productivity (ton/ha) data in FAOSTAT, the 24 crops were classified into 3 groups as follows. The missing data for several crops were estimated by the Study team in light of the present productivity in the Study Area.

- High: > 5 ton/ha
- Fair: 2 – 5 ton/ha
- Low: < 2 ton/ha

(5) Future productivity (in 2030)

With an assumption of the Study team that the present productivity in relatively advanced countries may represent the productivity of Mozambique in 2030, the FAOSTAT data in 2010 for Brazil, South Africa and Kenya were analyzed. The highest productivity among the 3 countries for each crop was considered as the future productivity in Mozambique. The 24 crops were classified into 3 groups by the same manner of the present productivity (in 2010).

(6) Farmgate price

Based on the collected information as shown in Table 3.3.8, The 24 crops were classified into 3 groups as follows.

- High: > 10 MT/kg
- Fair: 5–10 MT/kg
- Low: < 5 MT/kg

Table 4.1.2 shows the scoring result.

The result in the table shows that nine (9) crops have got more than 9 points (3 points x more than 3 criteria). The nine crops are; Maize, Cassava, Ground nut, Soybean, Potato, Vegetables, Cashew nut, Banana and Cotton. It is considered that these crops would be promising crops in the Study Area from the view point of production (supply) side. The final prioritizing of crops, however, shall be made in the next stage of the Study by a comprehensive examination from every possible aspect including the aspects in terms of market potential, country competitiveness and social impact.

Table 4.1.2 Scoring of Crops

Crops	IIAM/PEDSA Priority in Study Area	PNISA's Focusing	Popularity in the Study Area	Productivity (ton/ha)		Farmgate Price	Total Score	Crops in Minutes of Meeting
				Present (in 2010)	Future (in 2030)			
Maize	3	3	3	0	1	0	**10**	**Yes**
Cassava (dry)	3	3	3	1	1	0	**11**	**Yes**
Sorghum	1	0	3	0	1	1	6	No
Millet	1	0	0	0	0	3	4	No
Paddy (Rice)	1	3	1	0	1	0	6	**Yes**
Wheat	3	0	0	0	1	0	4	**Yes**
Ground nut (with shell)	3	1	3	0	1	1	**9**	No
Haricot beans	3	0	1	0	0	3	7	No
Cowpea	3	0	1	0	0	1	5	No
Mungbean	3	0	0	0	0	3	6	No
Pigeon pea	1	0	0	0	0	3	4	No
Soybean	3	3	0	0	1	3	**10**	**Yes**
Sweet potato	1	0	0	3	3	0	7	No
Potato	3	0	0	3	3	1	**10**	No
Vegetables	1	3	0	1	3	3	**11**	**Yes**
Sesame	1	3	1	0	0	3	8	No
Sunflower	0	0	0	0	0	1	1	No
Cashew-nut	3	3	1	0	0	3	**10**	**Yes**
Banana	0	3	1	3	3	1	**11**	**Yes**
Sugarcane	0	1	0	3	3	0	7	**Yes**
Castor oil seed	0	0	0	0	0	3	3	**Yes**
Jatropha	0	0	0	0	1	3	4	**Yes**
Cotton (before ginnig)	3	1	1	0	1	3	**9**	**Yes**
Tobacco	3	0	0	0	1	3	7	**Yes**

Legend: High/Good: 3 points
Fair: 1 point
Low/Bad: 0 point

Source: The JICA study team

4.1.4. Balance Sheets of Crop Production

Cost-benefit calculation was made for 5 (five) of the nine (9) promising crops based on the available data in DPA of Nampula province and collected information by the Study team. Since data collection for some crops are still in progress at present, the calculation was made only for the five crops, i.e. maize, cassava, ground nut, soybean and cotton. The Study team is continuing the calculation for the remained crops.

The calculation was made for 2 cases, namely the present case and the improved case, for comparison. In the present case except for cotton, any inputs application except for seeds was ignored from the costs calculation in accordance with the actual farming practice in the Study Area. For the seeds, only 1/5 of the amount in the improved case was calculated, since farmers should bear a certain cost for seeds even though they are not using improved seeds. For cotton, the Study team referred corrected information from IAM Nampula. And the totals sales were calculated based

on the productivity (ton/ha) of Mozambique in 2010 in FAOSTAT (see Table 4.1.3 and present average market price in Table 3.3.8).

In the improved case, costs were calculated based on a DPA's recommendation except for soybean and cotton. The total sales were calculated as the same way to the present case, though the productivity were calculated based on the highest productivity of corresponding crops in Table 4.1.3. For soybean and cotton, the Study team referred a presentation material of TechnoServe "Soy Balance Campaign 2011/12" and the IAM's data, respectively, for the calculation of costs and sales.

Table 4.1.3 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 (1.2 t/ha)	2,360	0	175	0	0	0	2,535	5,040	2,505
	Improved (4.5 t/ha)	2,280	2,000	875	13,100	26	0	18,281	18,900	619
Cassava (dry)	Present (1.8 t/ha)	2,040	0	500	0	0	0	2,540	4,320	1,780
	Improved (4.11 t/ha)	1,520	1,500	2,500	0	249	0	5,769	9,864	4,095
Ground nut (with shell)	Present (0.2 t/ha)	2,120	0	520	0	0	0	2,640	1,180	-1,460
	Improved (2.7 t/ha)	1,760	1,500	2,600	4,800	1,356	0	12,016	15,930	3,914
Soybean	Present (0.75 t/ha)	3,520	0	300	0	0	0	3,820	9,075	5,255
	Improved (1.5 t/ha)	3,000	2,000	1,500	0	250	300	7,050	18,150	11,100
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

Source: The JICA study team

Table 4.1.3 implies that farmers in Mozambique cannot expect an increase of net profit for maize, even if they could increase the productivity with improved farming practices. Increased production costs, mainly caused by the fertilizers, offset against the gross profit. While other crops show an increased net profit in accordance with the increased production after transforming to the improved practices, fertilizers costs of those crops are nil or relatively low. It is also interesting that mechanized cultivation (tractor) costs exceed the manual labor costs for all crops according to the table. It is assumed that high inputs costs, especially the fertilizers costs, may impede farmers in the country to enjoy a due profit from the improved farming.

4.1.5. Animal Husbandry and Inland Fisheries

Animal husbandry is not popular in the Study Area in general. Chickens are main and only appealing animal products in the area, while goats and sheep are raised to some extent by small- and medium-scale farm-households. Chicken production has

been growing in the area in accordance with a steady increased demand in the domestic market. The area has a high potential to develop chicken industry, since the production of maize and soybean, which are major materials of chicken feed, is popular and expanding among local farmers. The demand for chicken meat is expected to more than triple, in parallel with urbanization and income growth in the country, according to a CEPAGRI's workshop material "Stimulating Private-Sector Agribusiness Investment in Mozambique" on July 16, 2012.

It is generally understood that the Northern Region, where most Study Area are included in, has relatively few cattle, mainly due to high prevalence of tse-tse and tripanosomiasis (PEDSA 2011-19, MINAG). Though cattle are being introduced through development programs in some areas in Nampula province where are less affected by tse-tse, it is assumed that cattle breeding will not be a major part of animal husbandry in the near future in the Study Area. Pigs are also seriously affected by regular outbreaks of African Swine Fever according to the PEDSA 2011-19.

There is limited information about inland fisheries in the Study Area. According to the DPA of Nampula province, there are 400 households who were participating inland fish cultivation in the province in 2008. While the JICA study team visited several number of ponds developed for inland fish cultivation through PROAGRI in the area, almost all fishery ponds were not used for fish cultivation due to the following reasons. Consequently, some of the ponds are used for irrigation ponds, while the others are abandoned.

1) No continuous supply of juvenile fish
2) Unstable water supply to fishery ponds

Since inland fish cultivation is a new industry in the Study Area, it is difficult to establish the fisheries as a solid income generation source in the area without developing a comprehensive supporting structure, consisted of hatchery, supply of juvenile fish and necessary inputs, technical extension, as well as marketing.

4.1.6. Land Holding System

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 transform their farming to be more intensive one.

As indicated in many concerned materials to land issues in Mozambique, majority of farmers cannot reach a bank loan. Agricultural land is out of the picture of collateral

under the present legal system. The Mozambican Land Law of 1997 confirms that land is state property as stated in the Constitution.

Background of the land issues is complicated, since the Land Law is not harmonized well with actual land managing system prevailing in most rural communities. In fact, land in community areas are managed by traditional leaders according to customary rules. The responsibility for the use, exploitation and distribution of land belongs to the leaders, though they don't have a property right on the land. There is, however, no reference in the Land Law to the traditional leadership system, while the low only mentions that DUAT is something private, an actual right belonging to communities and their members.

The inharmoniousness 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 confusion about acquiring the DUAT. The investors usually respect the traditional leaders, with understanding that they represent the target community regarding land management subject, when the investors make negotiation about the DUAT acquisition. According to the principle in the Land Low, investors should deal with local communities in return for using land in 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 such situation, suspicion against the investors easily prevails in the community.

Furthermore, customary acquired land rights, which are usually 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 the rotation under shifting cultivation system. This could be a reason of excessive self-defense reaction of rural people against investors who are looking for the DUAT in or surrounding their community.

In order to address the land issues, the government should have a system that farmers' land shall be registered by law after farmers shift to settled-farming, by paying a respectful attention to the traditional leadership system. This also might be a good incentive for farmers to cease their shifting cultivation.

4.2. Farm Supporting Services

4.2.1. Agricultural Technology Extension

Agricultural extension in Mozambique was historically focused on commercial and export cash crops, such as cotton, tobacco and sugarcane, mainly financed by the corresponding crop sectors before independence. Even after independence, priority was given on such crops, since these crops were mainly produced by government owned state or cooperative farms under socialism policy. 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 already launched a comprehensive agricultural extension project covering the all country, PRONEA, as a operational program of the Agricultural Extension Master Plan (2007 to 2016). PRONEA aims at attaining increased returns and improved household food security of subsistence farmers through a steady uplift in production efficiency. This will be achieved through the following main three concepts.

1) To provide wider access to effective technical support services focused on districts
2) To organize better producer groups influencing supply of services
3) To enhance delivery of support services in response to requests.

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.

The PRONEA approach which represents SISNE must be reasonable, considering a 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 a root cause which impedes farmers to transform their farming practice 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 cut into the core issue.

4.2.2. Agricultural Inputs Supply

Less demand from farmers is a critical problem for running agricultural inputs supply business according to all dealers and shop owners interviewed by the Study team. Small sales and high handling costs due to the small market cause high retail price of the inputs. This again causes the low demand from farmers. Another problem is access to a bank loan. 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 to the credit, high interest rates commonly exceed 25 % is a real difficult challenge for them in many cases.

A structural problem of agricultural inputs business in the country is that a limited number of companies dominate the market as shown in sub-chapter 3.5.4. This might be caused by the small market in the country. Less competition among the companies arose from the structure may lead high-cost characteristics of the value chain. Furthermore, the government still keeps a significant influence on the market, especially on the market of seeds and tractors, through its shareholding of agribusiness companies or development programs. The government intervention should be modest, and much focus on enhancing private sector including small- and medium-scale enterprises rather than increasing a government role in the value chain.

In order to vitalize the agricultural inputs market, the following measures shall be considered by the government.

1) To transform the existing farming practice to be more intensive, so that farmers will start to use more agricultural inputs
2) To establish a favorable financial system targeting farmers, as well as small- and medium-scale agribusiness enterprises
3) To provide subsidies or tax incentives to a strategic inputs, maybe chemical fertilizers, with a definite conditions to prevent a dependency culture among farmers and the enterprises

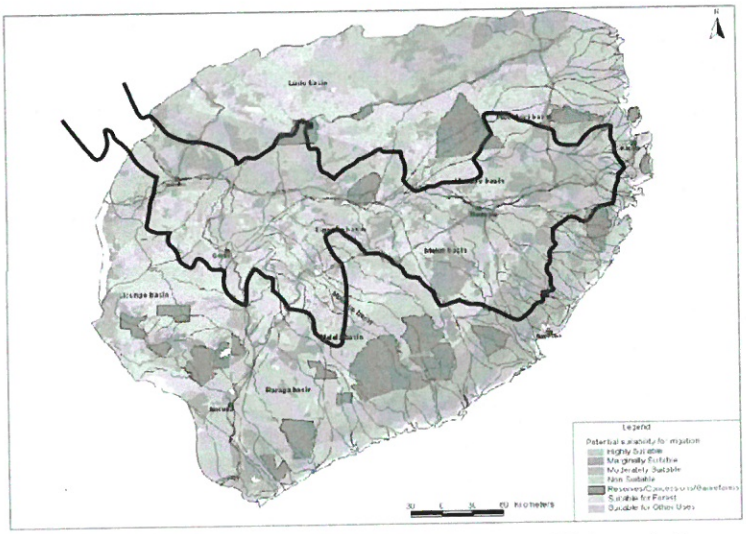
4.2.3. Agricultural Loan and Credit

Financing to individual farmers and agribusiness industries is another critical issue for the development of agriculture in Mozambique, as examined above. However, there is no practical financing system targeting them at present. The existing system cannot deal with the potential demand for finance for the agricultural sector. The government should pay serious attention on this matter. The Study team recommends a hypothetic countermeasure to address the issue in sub-chapter 4.7.

4.3. Irrigation and Drainage

4.3.1. Land Suitability for Irrigation Development

The land suitability for irrigation development is physically evaluated based on the identification of those areas, which are sufficiently productive under irrigation development, considering with the constraints imposed by soils, climate and other land characteristics with the crop eco-physiological requirements. In the study done by ARA-CN[1], the land is classified in the suitability for irrigation development into four classes, i.e., Class 1 refer to high potential for irrigation development, Class 2 to moderate conditions where some limitations are present but areas could be developed with improvement and mitigation of such constraints, Class 3 to low potential, generally not irrigable although some areas could be developed where hazards are not too severe, and Class 4 consider land with no potential, where soil, topographic and drainage deficiencies are too severe to justify development. As for the Study Area within the jurisdiction of ARA-CN, which excludes districts of Niassa except for Cuamba, Class 1 (high potential) and Class 2 (moderate suitable) areas were estimated 824,750 ha and 594,550 ha, which occupy 27% of total land. Those areas are considered the ones possible to develop irrigation area under the condition of land and water resources are available and irrigation farming is economically feasible. The area highly or moderately suitable for irrigation is distributed to overall of the Study Area, while Malema has the largest potential and Monapo is next to that.



Source: Present Status Report of Study for the establishment of ARA-CN (2006)

Figure 4.3.1 Suitable Land for Irrigated Crop Production in the ARA-CN Area

[1] Present Status Report of Study for the establishment of ARA Centro-Norte, 2006, DNA.

Table 4.3.1 Suitability Classification for Irrigated Crop Production

District	Class 1 High (ha)	Class 2 Moderate (ha)	Subtotal of Class 1 & 2 (ha)	Class 3 Low (ha)	Class 4 Not Suitable (ha)	Others (ha)	Total (ha)
Monapo	129,300	107,375	236,675	76,975	3,775	33,825	351,250
Muecate	59,175	20,375	79,550	83,575	26,075	219,950	409,150
Meconta	44,350	35,225	79,575	99,700	12,350	175,800	367,425
Mogovolas	28,700	79,900	108,600	196,975	24,176	140,825	470,576
Nampula	3,675	21,900	25,575	133,425	76,100	160,000	395,100
Murrupula	1,425	8,525	9,950	57,975	58,150	182,025	308,100
Ribaue	93,925	33,825	127,750	113,500	72,475	309,200	509,425
Malema	276,300	85,675	361,975	27,375	135,275	80,250	604,875
Alto Molocue	67,600	76,900	144,500	59,250	68,250	356,125	628,125
Gurue	23,550	55,925	79,475	21,975	212,800	245,575	559,825
Cuamba	96,750	68,925	165,675	135,650	52,625	171,375	525,325
Mandimba	not included in assessment						
Ngauma							
Lichinga							
TOTAL	824,750 15.7%	594,550 11.3%	1,419,300 27.1%	1,006,375 19.2%	742,051 14.1%	2,077,600 39.6%	5,245,326 100.0%

Source: Present Status Report of Study for the establishment of ARA-CN (2006),

4.3.2. Available Water Resources

(1) Potential of Surface Water Resources of the Study Area

Due to malfunctioning and abandon of the hydraulic observation network after 1990's, the river discharge data has a serous limitation to assess hydraulic situation in the Study Area. However, even though it is estimated by the limited available data and it causes inaccuracy of the estimation, it is still worth to estimate the runoff to understand the situation and potential of water resources. In the Study, the mean annual runoff in the each district was estimated as shown in Table 4.3.2 and Figure 4.9.17 by the runoff of major river basins estimated by ARAs. The mean annual runoff in the Study Area is estimated 8,800 million m^3/year for districts of Nampula Province, 5,700 million m^3/year for districts of Zambezia Province and 5,700 million m^3/year for districts of Niassa Province, where that total of the Study Area is approximately 20,000 million m^3/year. By overviewing the runoff of districts, smaller runoff both in specific and amount is observed in the district in the eastern part such as Monapo, Muecate and Meconta, and higher runoff is observed in the eastern part such as Ribaue, Malema and districts of Zambezia and Niassa.

Table 4.3.2 Estimated Mean Annual Runoff of Study Area by District

District	Average Runoff (mm/year)	Area (km^2)	Mean Annual Runoff (million m^3)
1. Nampula Province			
1) Monapo	111	3,514	391
2) Muecate	101	4,103	413
3) Meconta	175	3,675	643
4) Mogovolas	256	4,707	1,205
5) Nampula	215	3,989	859
6) Murrupula	256	3,091	790
7) Ribaue	330	6,245	2,062
8) Malema	395	6,053	2,393
Sub-total	248	35,376	8,757

District	Average Runoff (mm/year)	Area (km^2)	Mean Annual Runoff (million m^3)
2. Zambezia Province			
1) Alto Molocue	322	6,338	2,040
2) Gurue	648	5,646	3,657
Sub-total	475	11,984	5,698
3. Niassa Province			
1) Cuamba	400	5,353	2,143
2) Mandimba	265	4,712	1,246
3) Ngauma	262	3,001	786
4) Lichinga	262	5,657	1,482
Sub-total	302	18,724	5,658
Total of Study Area	304	66,084	20,113

Source: Study Team compiled data of ARA-CN, ARA-N
Note: The runoff data at the station of the lowest reach of each basin shown in Table 3.1.3were applied expect for Lucinga basin (E90 near Gurue city was adapted instead of E91.), Melela basin (E192 near Alto Molocue town was adapted instead of E99.) and Lurio basin (Average of E142 of Malema river, E133 of Mepuipui river and E128 of Lurio river was adapted.) due to the location of the Study Area.

(2) Global Water Balance

The potentials of surface water of the whole jurisdiction areas of ARA-CN and ARAN are estimated to be approximately 25,000 million m^3/year and 24,400 million m^3/year, while the water demands are 405 ~560 million m^3/year and 160 million m^3/year for ARA-CN and ARA-N representatively, as shown in Table 4.3.3. Those regions have a large potential for water developments and the available volume is quite large and farm from estimated water demand, even if 30% of the runoff is reserved for ecological flows and conservation purposes. The situation of the Study Area is same with those analyses.

Table 4.3.3 Estimated Mean Annual Runoff and Water Demand in the Basin

Organization	ARA-CN	ARA-N
Basin	Lurio and other basins	Rovuma basin
Area of basin	188,000 km^2	
Estimated mean annual runoff	25,000 million m^3/year	24,400 million m^3/year
Estimated water demand	405~560 million m^3/year	160 million m^3/year
Urban water supply	23 million m^3/year	9.2 million m^3/year
Small pipes or peri-urban supply	5 million m^3/year	14.2 million m^3/year
Rural water supply	67 million m^3/year	16 million m^3/year
Irrigation	310~465 million m^3/year (assumed 31,000 ha)	120 million m^3/year (assumed 8,000 ha)

Source: Study for the establishment of ARA Centro-Norte, 2006, DNA, Study for the Establishment of ARA- North, 2006, DNA
Note: The runoff is estimated only for major basins and small basins, which occupy approximately 30% of territory, is not considered.

(3) Time Distribution of River Water

Even though, mean annual runoff of the basin is far larger than the expected demand, it is to be considered that there is a time distribution of river flows, both along the year and from year to year. In the Study Area, the river flow is concentrated from January to April, of which period occupies more than 70 % of annual runoff in average. 4 rivers discharge almost 90 % of annual runoff and the remaining discharge almost 80% until April, while the region has an abundant annual runoff, As shown in Table

4.3.4 and Figure 4.3.2. Even though the amount of water will not be a constraint environment, the intake and storage facility, which is necessary to cope with the uneven water distribution in time, would be constraints of development. That is to say the potential of water can be utilized is limited by the capacity of water storage.

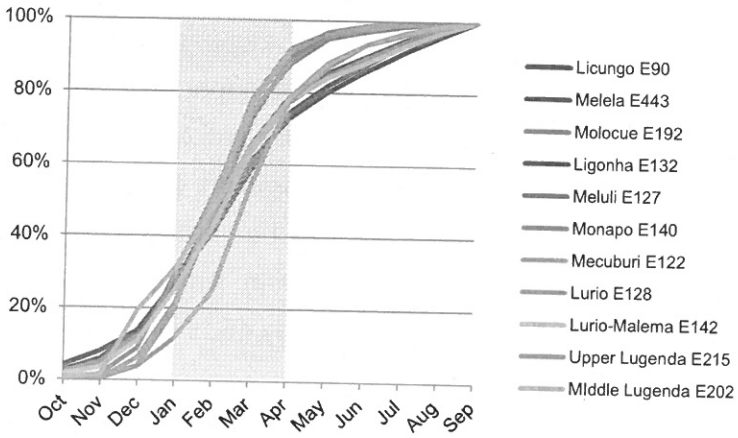


Figure 4.3.2 Accumulate Discharge of Major Rivers in Percentage

Table 4.3.4 Mean Monthly Discharge of Basins

(Unit: million m^3)

Basin	Station	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Annual
Licungo	E90	3.7	4.9	11.9	19.9	20.3	25.3	23.4	10.9	8.6	8.1	5.8	3.9	147
Melela	E443	8.0	11.5	34.2	66.8	92.4	86.1	60.2	30.3	20.5	20.5	15.1	9.7	455
Molocue	E192	3.2	4.3	11.7	22.1	27.7	29.5	21.3	11.0	8.0	6.9	5.2	3.7	155
Ligonha	E132	60.3	59.6	85.4	202.3	261.2	239.5	177.6	107.7	87.8	77.2	68.4	61.3	1,488
Meluli	E127	0.3	6.4	46.5	219.5	336.4	357.2	228.6	73.5	38.5	15.0	6.8	1.5	1,330
Monapo	E140	1.9	9.6	55.7	156.7	165.3	172.9	100.0	53.6	15.7	11.3	7.0	3.5	753
Mecuburi	E122	0.1	0.1	6.9	17.2	30.5	32.7	16.4	6.3	2.1	1.0	0.3	0.1	114
Lurio	E128	13.3	18.0	289.1	1,282	2,493	2,242	1,156	356.2	130.4	78.4	45.6	23.5	8,127
Lurio-Malema	E142	11.4	16.1	57.5	109.3	135.1	161.6	107.4	48.7	32.2	36.3	30.1	23.0	769
Upper Lugenda	E215	27.0	13.6	107.2	307.2	505.1	1,135	916.7	357.8	242.2	111.7	71.7	69.7	3,865

Source: ARA-CN, ARA-N

(4) Potential of Water Storage

Because the usable water potential is mainly limited by the storage capacity instead of runoff of basins as discussed above, the present capacity of water storage was tried to evaluate in the Study. The major water storage facilities in the Study Area expect for irrigation systems are summarized as shown in Table 4.3.5.

Table 4.3.5 Major Storage Dam Structure in the Study Area

Name of dam	River name	District	Height (m)	Capacity (million m^3)	Main use
Nampula	Monapo	Nampula	17.5	4.3	Urban Water Supply
Cuamba	Mepopole	Cuamba	22.0	2.6	Power*
Locomue	Lucheringo	Lichinga	17.5	1.9	Urban Water Supply

*: not in use for power generation

Besides above major dams, the area many hydraulic structures for taking and storing water. Most of structures are small scale ones and the majority are for irrigation systems. At present, it is impossible to accumulate the total amount of storage of those facilities due to lack of information. However, it can be cursorily estimated

based on the equipped irrigation area and the assumption of water demand of irrigation field. With assumption of overall irrigation water demand of 10,000 m^3/ha/year, the storage capacity in the Study Area is estimated 67 million m^3 from the equipped irrigation area of 6,746 ha which is shown in Table 3.4.1 and Figure 4.9.18. Because some of irrigation systems take water by pump or gravity canal without storage facility as well as reduction of capacity by malfunctioning, this estimation is considered as maximum. Among the estimated potential of water storage of existing irrigation systems, only 45 % is in use due the condition of facility.

The total storage capacity in the Study Area is assumed to be 76 million m^3 in maximum. This value is significantly far from the potential water resources of the Study Area, which is estimated 20,000 million m^3. It can be said that the water resources in the Study Area is kept intact at present.

(5) Expected Problem in Water Management

Even though the Study Area has abundant water resources in general, a concentration of development is observed in some river basins such as Monapo River in Nampula Province. The mean annual runoff of the Basin is estimated to be 975 million m^3/year from 7,734 km^2 of catchment area. On the other hand, the water concessions are given to urban water supply by FIPAG-Nampula and large scale irrigation farms in total 57 million m^3/year. FIPAG is planning the increases of the capacity of Nampula Dam, which is the source of urban water supply. As for water demand of rural water supply, it is estimated to be 4.5 million m^3/year with assumption of 407,000 of population[2] and 30 L/day/person. Even it is difficult to estimate accurately the water demand of small scale irrigation due to lack of data, it can be assumed that horticulture crops are cultivated with full irrigation by small irrigation, which occupies 590 ha in the Monapo Basin[3] in 2010/11. With the assumption of overall irrigation water demand as 10,000 m^3/ha/year, the water demand for small scale irrigation is estimated to be 6 million m^3/year. Furthermore, there are approximately 5,400 ha of paddy cultivation using swamp area and they are considered as potential demand of water in the Basin.

Considering the demand increase of urban and rural water supply by population growth, of small horticulture irrigation along the river, of industrial development, there is concern that the balance of water resources and water demand would become seriously tight in future. Thus, it is required to establish the appropriate management of water resources and the water allocation plan in such basins.

2 The population 2011 of the Basin is estimated by combining the district population shown in Table 3.1.7 and the areal proportion of basins.

3 The horticulture and paddy area of the Basin is estimated by combining the cultivation area by district shown in Table 3.3.5 and the areal proportion of basins.

4.3.3. Assessment of Rain-fed Crop Cultivation

The condition of rain-fed crop cultivation is assessed from the aspect of water deficit of crop in selected districts, i.e., Lichinga, Cuamba, Malema, Nampula and Meconta. The districts was selected in consideration of the Agro-Eco Zone of IIAM (refer to Section 3.1.1), which is prepared based on the crop environment including climate. The assessment was carried out with the average precipitation of 1998/99 to 2010/11, with some exception. Due to lack of adequate agricultural climate, the data of CLIMWAT/FAO[4] was applied to the climatic data necessary for estimating crop water requirement. Maize, Beans, Soybeans, Potato, Cotton were adapted to the target crops of assessment.

Table 4.3.6 Water Deficit of Rain-fed Cultivation in the Study Area

Crop	Items	Lichinga	Cuamba	Malema	Nampula	Meconta
Maize	Seeding Day	15-Oct	15-Oct	15-Oct	15-Nov	15-Oct
	CWR (mm)	448.6	592.3	662.9	504.9	652.3
	Water Deficit (mm)	8.3	18.8	29.6	28.2	93.9
	in % to CWR	1.9%	3.2%	4.5%	5.6%	14.4%
Beans	Seeding Day	1-Nov	1-Nov	1-Dec	1-Dec	1-Dec
	CWR (mm)	284.3	390.1	400.2	332.0	398.9
	Water Deficit (mm)	0.0	2.9	0.0	0.0	11.6
	in % to CWR	0.0%	0.7%	0.0%	0.0%	2.9%
Soybeans	Seeding Day	15-Dec	15-Dec	15-Dec	15-Dec	15-Dec
	CWR (mm)	301.9	394.5	446.1	363.1	438.1
	Water Deficit (mm)	0.0	20.7	30.4	0.0	30.5
	in % to CWR	0.0%	5.2%	6.8%	0.0%	7.0%
Cotton	Seeding Day	1-Nov	1-Nov	1-Nov	1-Nov	1-Nov
	CWR (mm)	490.4	646.0	725.4	585.7	711.5
	Water Deficit (mm)	36.0	97.3	135.6	45.2	136.1
	in % to CWR	7.3%	15.1%	18.7%	7.7%	19.1%
Potato (1st Season)	Seeding Day	1-Jan	1-Jan	1-Jan	1-Jan	1-Jan
	CWR (mm)	283.1	368.3	415.2	336.7	406.7
	Water Deficit (mm)	15.6	62.4	81.6	12.3	64.2
	in % to CWR	5.5%	16.9%	19.7%	3.7%	15.8%

CWR: Crop Water Requirement (CWR) is represented by Crop Evapotranspiration (ETc) estimated by the FAO methodology based on CRIMWAT data.
Effective rainfall: USDA Method
Rainfall Data applied: Lichinga - INM 2000-2010, Cuamba - INM 1996/97-2006/07, Malema, Nampula and Meconta -DPA 1998/99-2010/2011

The water deficit of crops during vegetation period is estimated from 2% to 14% for maize, where 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 seeding timing in the districts from Lichinga to Nampula. Beans are observed to be cultivated without water stress except for the eastern area, that is represented by Meconta. The water deficit of soybeans is estimated from 0% to 7%, which is observed in the late stage of vegetation in April. Even though corps of maize and soybean are cultivated with small degree of water stress in the average condition, it is considered that the

[4] Scope of application of climate data in CLIMWAT DATA: In compiling the data, an effort was made to cover the period 1971 - 2000, but when data for this period were not available, any recent series that ends after 1975 and that has at least 15 years of data have been included.

unevenness of rainfall both throughout the year and from year to year affects to the growth of crops in the Study Area, as shown in Figure 4.3.3. Thus, supplemental irrigation is expected to contribute to increase and stabilize the productivity of crops.

Cotton suffers around 19% of water deficit in Malema and Meconta mainly in April, that is in the late stage of vegetation. For the potato of 1st season (rainy season), from 4% to 20% of water deficit is estimated and it is required to apply supplemental irrigation from March to May for expecting adequate productivity.

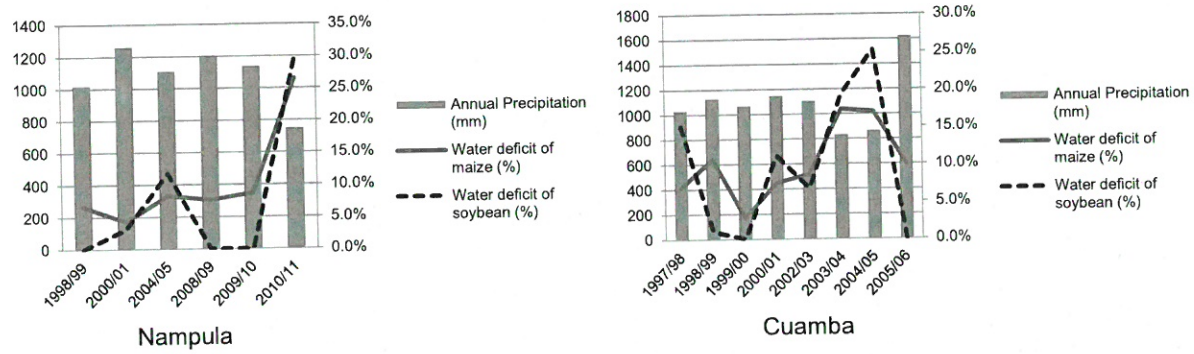


Figure 4.3.3 Annual Precipitation and Water Deficit of Crops in Selected Districts

4.3.4. Expected Direction of Irrigation Development

The future development of irrigation in the Study Area can be discussed from two different main actors of irrigation, i.e., the one small and medium irrigation farmers and another is large scale irrigation user such as farming enterprise or foreign investment.

Regarding the small and medium irrigation farmers, the following direction of the irrigation development can be considered:

- Full use of the potential of irrigation development through rehabilitation existing irrigation systems is considered as an essential for expanding irrigation area. Improving operation and maintenance of facilities, increasing efficiency of water use and improving technology of irrigation farming are required to utilize the expanded irrigation area effectively.
- Due to existence of scattered small family farmers in the ex-beneficiary area of the existing irrigation systems regardless they use irrigation or not, it is considerable rather difficult to invite newly development for large scale users. Those areas are recommended to use for expanding and increasing small and medium irrigation farmers.

- Through land consolidation during the rehabilitation of existing irrigation systems, the systematic irrigation network will be established as well as solving the mixture of irrigation and rain-fed cultivation in the area.
- Bringing up commercial farmers who use irrigation, through expansion and re-arrangement of irrigation area as well as promotion of appropriate irrigation technology.
- Establishing water users association or strengthening the function of farmer's group and association for is required to improve operation and maintenance of facility as well as water management of small irrigation system.
- Promotion of vegetable production by small scale irrigation by promoting mobile pump and small storage equipment in the area easy access to rivers, lake and marsh as well as access to the market.

As for the large scale irrigation development by farming company or foreign investment, the following direction of the irrigation development can be considered:

- There are abundant water resources to be developed for the newly large scale irrigation development. The issues are to secure free land which is close to rivers, lakes and marshes and necessary to develop water storage facility.
- It shall be taken in consideration that the basins in the eastern part represented by Monapo Basin is not suitable for newly large scale development due to its small runoff and concentration of land and water resources development.
- Stabilizing and increase productivity of crops such as maize, soybean and cotton which are cultivated by rain-fed currently, through introducing supplemental irrigation.
- Promoting full irrigation with modern irrigation technology of maize, soybean and other cash crops, that aims high productivity as well as high quality of production.

4.4. Logistics and Processing the Agricultural Products

4.4.1. Logistics

(1) Transportation Cost

High transportation cost causes price competitiveness in domestic market. Lowering transportation cost and produce losses by damage are expected by rehabilitation of national roads in Nacala corridor. Apart from national road, rural roads connecting to national roads are still remained as a constraint for producers and traders.

(2) Storage Facility

According to the result of the trading survey, average annual turnover level of storage facilities is quite low as 462% or 4.62 times. Utilization of storage facility except a peak period of transaction should be considered. Some produces, such as soybean and sesame, both are high value crops, have high loss rate at storage level. Rehabilitation of old facility should be stimulated. And hygiene management should be appropriately applied. At producer's level, in terms of efficient transaction of produce and avoiding quality deterioration in certain aggregated production area, produces are rather assembled and stored at one place near production area than keeping at each house. Appropriate capacity and location of rural storage facility should be considered with cooperation of farmer association.

4.4.2. Value Chain and Market Demand

(1) Soybean

As mentioned above, 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. Chicken meat industry is growing adopting domestic chicken meat demand. Chicken farms are seeking domestic soybean as well as import ones. Demand of soybean is increasing as import substitution.

(2) Maize

Maize is one of the food staple in Mozambique, as well as important material for animal feed. As mentioned above, domestic chicken meat production increasing and it suggests increase of feed demand. Furthermore, maize is important produce in Niassa province for export to neighboring countries through Mandimba boarder and Nacala port. More demand of domestic and international market exists adopting increase of production volume inside the Nacala corridor.

(3) Sesame

Farm gate price of sesame is high as about 23 MT/kg. Furthermore, export of sesame increases, and reached about 40,000 tons in 2009. According to the estimation of Agrifuturo, potential volume of international market is estimated 2.8 million tons. Unstable production by insect attack is one of constraints. More capacity of processing facility will be necessary for increase of production and export volume.

(4) Cassava

Cassava has stable demand in domestic market. Apart from food staple, cassava is utilized for materials of brewery. Utilization for a material of biofuel is under

experiment. Demand for cassava will be continued to increase as food staple and materials for brewery and possible biofuel.

(5) Cashew nut

Cashew nut is competitive product in international market. Cashew factories in Nampula can receive more material to fulfill its processing capacity. Increase of number of cashew nut processing factory in 2000's causes shortage of raw cashew nut. The constraint of cashew factories is stable procurement of quality and volume cashew nuts.

(6) Peanut and Beans

Peanut and haricot bean have demand in both domestic and international market. Farm gate prices of these products are very high as 22MT/kg and 19MT/kg respectively. These products have price competitiveness adapting demands in Maputo market, and other central and south region.

(7) Vegetables

Prices of vegetable, such as tomato, onion and potato are high in each step of value chain. Demand of these products is high in population dense areas, Nampula city and eastern part of Nampula province. Malawi will be one possible market in Niassa depending on production cost and market price.

4.5. Farmers Organizations

Farmers' organizations which present in the Study Area can be mainly divided into "farmers' group" and "farmers' association". The farmers' group means what farmers are just assembled, but the farmers' association has its rule (constitution) and management body for its purpose. The size of one organization is usually 10 to 40 farmers, for instance; the extension service of MINAG 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.

Almost all have, at least during part of their formation process, connections to funding entities, either NGOs or donors and MINAG, in the history of organization of Mozambique. Many of farmers' organizations were grouped for the purpose of receiving the support by NGOs, when the support by NGOs is stopped or the support projects terminate, the activities of farmers' organizations would be declined, is real situation. On the other hand, the farmers' associations have been formed for the purpose of saucer of governmental support through DPA, such as agricultural inputs materials of PAPA from the MINAG. In addition, MINAG (DPA and SEDAE) are not able to grasp the whole picture of farmers' organizations.

(1) Results of Inventory Survey

The results of the inventory survey regarding the farmers' organizations are as follows:

Most farmers' associations have no offices and warehouses. They also have no irrigation system. There is lack of input supplier. They are also sold in the informal markets. There are no affordable financial services for the farmers. Farmers and associations do not fulfill bank requirement due to lack of mortgage. Many farmers' associations did not receive appropriate training in terms of organizational development, internal governance, management, and marketing. Many NGOs do not use demand driving approach, but offering extension approach through provision of seeds and other inputs.

The aspects highlighted above together with leadership weaknesses, the majority of the farmers' organizations do not function well. The major aspects encountered in the organizations are less management skills, internal governance, and accountability. The linkage between association and forum and/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 have been pointed out by both the Green Revolution Strategy (MINAG, 2007) and PEDSA (2009-19).

On the other hand, according to the DPA of Nampula, the main problems that may pose as a major factor for the development of the farmers' associations are as follows:

- Lack of information and training on the association;
- Lack of knowledge in financial management;
- Lack of support of agricultural machinery to increase production areas;
- Lack of exchange of experience among the members;
- Lack of training in preparing and implementing of the projects;
- Lack of training in agri-business;
- Lack of coordination in marketing.

(2) Business Challenges of Farmers' Organizations

PRODECER project which is a typical example of development in Brazilian Cerrado region, the cooperatives had carried out various support measures, to settle by mainly the children of members of agricultural cooperatives existing, as well as to provide funds and to donate such as agricultural processing facility, that had been a major factor of success.

Usually, for individual small-scale farmers will be able to have an equal bargaining power with intermediaries and agro-processing companies, to develop a voluntary organization or cooperative by individual farmers is necessary. Unless there is a system in which farmers could respond to distribution or price formation themselves, farmers would always passive attitude. From this perspective, to organize the farmers is important.

However, many NGOs in the Study Area have been working in the organization of farmers long period of more than 20 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 results in the economic perspective would not be expressed/seen. Many international NGOs have often been criticized for being more concerned with production than with marketing, also when supporting the creation of producers associations. In addition, it is clearly from the study results, "for the small-scale farmers, rather than demand markets and market information do not exist, there is no buyer; the buyer cannot come up to the farm gate", it is a big problem. This is also true with respect to farmers' organizations as well as individual farmers.

The result has been a lack of sustainability as a business view point. The major challenge 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, recent years, some agricultural production companies and part of NGOs, without having to take advantage of an existing farmers' organization from a business perspective, have started a new business grouping of farmers. They place emphasis for the activities focusing on purchase and marketing. It is notable that such new trial also has been successful.

(3) The new Cooperative Law

The new Cooperative Law provides a well-defined legal framework for organizing farmers' cooperatives - with a clearly defined purpose. 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 in Mozambique.

In the Study Area, there is one (actually the first) farmers' cooperative to be established under the new Cooperative Law, ALIMI in Cuamba district of Niassa province. ALIMI is a producer cooperative; its goals are to improve producers' bargaining power in agricultural markets, began trading in the 2009 marketing

season, with sales of 3.16 million MT in the 2010 season. In the 2011 season ALIMI's sales target was 4,300 tons. ALIMI members numbered about 500 in May 2011, with each member paying a 200 MT one-off fee that constitutes the cooperative's capital stock and Cooperative Social Fund. The cooperative is based on local 'unions' at sub-district level, termed 'localidades', each with a purchasing point (posto de compra) and storage depot run by a technician of commercialization and production (TCP: técnico de comercialização e produção) paid by commission on the amount purchased. ALIMI currently has 52 purchasing points. In the 2010 marketing campaign, the cooperative used its social (membership) fund of about 30 000MT to finance its marketing operations (Development of National Producer Organizations and Specialized Business Units in Mozambique, Noragric, 2012.).

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. The experience of the ALIMI, now in its third year of trading, will be of great interest in this regard. However, these new cooperatives will probably need some years to prove their effectiveness and sustainability.

(4) Support for the Farmers' Organizations

Due to limited capacity of family labor, lack of access to improved input, technology, management skills, and business orientation, to support for the farmers' organizations, it would be considered as follows:

- Establishment of rural credit system by farmers' organizations/cooperatives for agriculture production at small scale farmer level to increase working capital, to hire labor and equipment for agriculture mechanization, including irrigation system, plowing, sowing, weeding, and harvesting;
- Provide qualified technical assistance in agriculture production and management of production chain, including development cooperative business;
- Set up mechanisms to improve farmer access to improved technology through empowerment of farmers' organization at association, forum, union, cooperative, and federations; and
- Provide post-harvest technology at individual farmer, and set up a system to facilitate storage facilities access at farmer's organization level of association, forum, union, cooperative, and federation.

4.6. Road and Social Infrastructure

(1) Road Transportation

At the present, many roads in Nacala Corridor Area are under development. By early 2015, two parallel horizontal lines will be established with paved two lanes roads. One line is called "Nacala Corridor" from Nacala Port to Cuamba and the other is "Pemba Corridor" from Pemba in Cabo Delgado Province to Lichinga.

Source: Study Team

Figure 4.6.1 Future Road Network

Connecting to Cuamba in Nacala Corridor, rehabilitation of N13 road from Cuamba to Lichinga is discussed with African Development Bank and JICA. It might be completed before the target year.

As vertical network, N1 road from Quelimane in Zambezia to Pemba and No.103 road from Mocuma at N1 to Magegi passing Gurue in Zambeiza, are also going to be rehabilitated by 2014.

The rehabilitation/pavement of road from Magegi to Cuamba, and Cuamba to Marrupa at Pemba Corridor in Niassa had been agreed by the Government of Portugal, but it is suspended due to economic crisis. Even though, it might be implemented sooner because its design and tender document had been prepared.

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

(2) Railway Transportation

The CDN, a company operating the Nacala Railway, has an improvement plan of the North Railway line (hereinafter called Nacala Railway) in order to connect for Tete Province through the Malawi. The Vale Company, operating Coal Mining in the Tete, main share holder of CDN and JV leader for the rehabilitation works, plan to produce 22 million ton of coals per a year in their short-term plan. They expect to ship 4 million ton of the coal from Beira port and remaining 18 million ton from Nacala Port. Then, in order to transport the 18 million ton of coal, Nacala Railway should be rehabilitated.

The transportation capacity of Nacala Railway will reach to 29 million ton per year after rehabilitation. The CDN expect to handle 22 million ton per year consist of 18

million ton of coal, 2 million ton of national cargo and 2 million ton of transit cargo. Agricultural products will be able to be included in 2 million ton of national cargo.

The discussion regarding rehabilitation of Lichinga line is not opened yet. If CDN improve the Lichinga line, Niassa Province will have good mass transportation.

(3) Nacala Port

The Nacala port has advantage of its natural depth and location closed to the Asia. Due to that, the Port is considered one of the important port in east Africa.

However, The port started its operation in 1951 as international port, and its facilities are getting old and their handling is not efficient. Due to that, rehabilitation plan was prepared by JICA with grant aid and yen loan in order to secure its competitiveness and sustainability for development of Nacala Corridor Area.

The plan says capacity of the port will be increased by stages up to 250,000 T.E.U. in 2030. The expectation of handling amount of cargo per year in the plan is shown in Table 4.6.1.

Table 4.6.1 Expected Amount of Cargo

	Unit	2008	2020	2030
Total	1,000MT	995	4,523	9,972
Container	1,000MT	397	2,073	4,744
	1,000TEU	50	211	491
Bulk	1,000MT	598	2,450	5,228

Source: The Preparatory Survey on Nacala Port Development Project , 2011 June

The Nacala Port is operated by CDN under concession till 2020 and the concession can be extended 15 years more. The Vale has plan to make new special port for coal shipping at Nacala-a-Velha.

(4) Power Supply

By improvement of North Cahora Bassa Hydro Power Plant, HCB will increase its capacity as 3,320 MW from present 2,075 MW. In order to stable power supply from HCB to Nacala Area, it plans to lay new power grid between Caia to Nacala. The new line will operate in 2020, after that, power supply for Nacala, Nampula and other east part of the Study Area until Ribaue district will be stable.

Regarding power supply for rural area, the Government of Mozambique stated that power supply network will be expanded along the existing network. They will connect administration posts at first then cover localities in that area, where the power line laid. It means there is a potential to install agriculture mechanical or irrigation pump in these area.

(5) Water Supply

The city water systems are managed by water supply authority, FIPAG. The FIPAG has plans to upgrade all water supply systems in Nacala Corridor Area.

The all district centers in the Study Area have Small Water Supply System (PSAA - Pequenos Sistemas Abastecimento de Agua), excluded Alto Morocue in Zambezia. The district has PSAA has potential to install small factories related to the agriculture. Moreover, construction of wells is an alternative to secure the water easily in Malema, Cuamba and part of Ribaue.

(6) Education and Health

Number of the facilities for education and health is not sufficient, and securing required number of teacher or medical staff in rural area is big challenge. In case of investment with land development, the rural community may be able to have better health and education facilities with necessary human resource, if the investor agrees to prepare them by CSR.

4.7. Agricultural Investment: Potential for Commercial Farming Involving Small-Scale Farmers

(1) Potential Contract Farming Models Applicable to the Nacala Corridor

As discussed in the Section 3.9.3, 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 3 types, as listed below, according to the conditions for input supply and its repayment. The following table summarizes the detailed arrangement of each model:

- Model 1: Input supply (seed and fertilizer) 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) based on a mutual agreement with farmers on the delivery of the harvest. Input costs are deducted from the payment for the harvest; and
- 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 as described in Table 4.7.2.

Table 4.7.1 Summary of Arrangements for Contract Farming

	Contract Agreement	Input Supply and Repayment	Remarks
M1	- Farmers make a loan contract with a financial institution. - Purchase guarantee is provided by a company.	- Farmers purchase seed and fertilizer using a loan. - Farmers make the repayment to the bank after the harvest.	- A company provides extensive extension services to farmers to increase productivity. - A local financial institution should be involved in the contract farming arrangement.
M2	- No written contract made. - Oral agreement with a company on the delivery and purchase of crops.	- A company provides seed and fertilizer to farmers. - Input costs are deducted from the payment for the harvests.	- Farmers are expected to sell crops to the company providing the inputs (seed and fertilizer). - Farmers and a company have to mutually agree on the repayment for input costs in advance to avoid conflicts during the harvest.
M3	- No written contract made. - Oral agreement with a company for the delivery and purchase of crops.	- A company provides only seed. - Repayment of the seed cost is not required.	- Farmers are expected to sell crops to the company providing the seed (but not obliged). - The company needs to take measures to ensure the collecting of enough of the harvests from farmers.

As the successful case of ECA in the Beira Corridor, Model 1, which requires a loan contract arrangement with a commercial bank for input financing, seems to be ideal since a private sector partner can establish a reliable partnership with the small-scale farmers. Both parties share equitable responsibility for the provision of inputs and extensive extension services by a private sector partner, and the delivery of crops by farmers. The compensation method for the debt of farmers should a crop failure due to natural phenomenon, such as bad weather or disease/pest outbreak, occur should be considered even though the private sector partner does not provide a loan guarantee.

Model 2 and Model 3 are the commonly applied systems in the Nacala Corridor by service providers (trader) or cotton and tobacco commercial farms. Although the tobacco and cotton farms have a long history in carrying out contract farming with farmers by providing necessary inputs, it is still at the preliminary stage in involving small-scale farmers in commercial agriculture for the production of food/cash crops such as maize, soybeans, sesame, etc. in collaboration with private sector partners in the Nacala Corridor. As a result private sector partners have suffered difficulties in working with small-scale farmers in relation to the effective delivery of inputs and technical extension services as well as the collecting of the expected harvest amounts. 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 a private sector partnerships, which would eventually contribute to improved food security and incomes for the local population.

Table 4.7.2 Advantages and Disadvantages of Contract Farming Models

	Advantage	Disadvantage
M1	-Productivity is improved through the use of appropriate inputs; hence farmer's net income even after the repayment of the bank loan is increased. - Farmers can acquire advanced farming skills through the frequent extension services provided by the private sector partner. - Appears to be a sustainable model for contract farming involving private agribusiness and financial institutions.	- In case of crop failure due to bad weather (drought, etc.), farmers will incur the risk of default. - Farmers might hesitate to acquire a bank loan for the purchase of inputs due to the high interest rate. - The government and donors/NGO have carried out projects in input distribution free of charge, which would dissuade members from contract farming as they are required to pay for the input costs with a bank loan.
M2	- Productivity is improved if farmers use provided inputs (especially fertilizer) in an appropriate manner. - Farmers can acquire advanced farming skills through the extension services provided by the private sector partner.	-There would be the risk of conflict with farmers when deducting input costs at the time of purchasing crops if they are well informed of the repayment arrangement. - Farmers might sell the harvests to other traders once they have compared the offered prices. As a result the private sector partner may not collect enough crops from the farmers to cover input costs (seed and fertilizer).
M3	- Productivity is improved if farmers apply appropriate farm management using the quality seed provided by a private sector partner. - A private sector partner could widely expand this approach to involve thousands of small-scale farmers since the initial investment cost is minimal (only providing seeds to farmers).	- Farmers might sell the harvests to other traders after comparing the offered prices, which in turn would make it so that the private sector partner would not gain the expected profits. - Distribution of free seed might eventually lead to dependency with the small-scale farmers.

(2) A Tentative Idea for the Implementation of Pilot Projects in Collaboration with Private Sector Partners

In the Agriculture Development Master Plan for the Nacala Corridor, Quick Impact Projects (QIPs), which are expected to produce a positive effect in a short period, should be identified from a list of priority agriculture development projects, which will be 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 technologies, financial schemes, policies and regulations, markets, and the organizational framework of supporting a business, in order to attract private businesses to participate in agribusiness investment. Though it is still premature to select priority agriculture development projects at this stage, it is worthwhile to implement some pilot projects 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 be reflected in the Master Plan, which could make the implementation scheme for QIPs more feasible.

1) The basic principles for implementing of pilot projects

The basic principles for implementing pilot projects are:

a) To carry out, on a trial basis, an effective and efficient contract farming model with a private sector partner involving small-scale farmers in order to evaluate the feasibility of the model;

b) To work with the private businesses in the Nacala Corridor introduced in the Section 3.8.1 for the implementation of the pilot projects, taking into account their experiences and networks with local communities, which would contribute to producing results within a limited time period;

c) To establish an accessible financing mechanism to benefit a private sector partner for the developing of an applicable contract farming model; and

d) All experiences and lessons learned from the pilot projects shall be reflected in the designing of the implementation framework of QIPs in the Master plan.

2) The financing mechanism: Introduction of an Investment Fund

As discussed in the Section 3.9.4 with "the experiences of the BAGC initiative", it is critical to introduce a soft loan scheme to support the efforts of private sector partners in expanding their businesses, which would then be used to acquire necessary machinery or facilities as well as purchase crops from farmers. In consultation with the Ministry of Agriculture, the mobilizing of the Counterpart Fund,[5] of which funds accumulated in the account managed by the Ministry of Agriculture and JICA Mozambique Office, will be proposed in order to create an investment fund for private sector partners to implement pilot projects. A private financial institution that has a specific mandate for supporting small/medium entrepreneurs with business loans, such as GAPI, will be involved in the management of the investment fund, and consignments to GAPI as a trust fund. The criteria for mobilizing the fund should be clearly defined, taking into consideration the social impacts on small-scale farmers and local communities, the commercial viability of the business, and the sustainability of the proposed business model.

[5] 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) Selection of private sector partners for the pilot projects

Once the criteria for the awarding of the Investment Fund has been confirmed, the ProSAVANA-PD, in collaboration with the CEPAGRI Nampula office, will hold a public briefing to explain: i) the purpose of implementing the pilot projects; ii) available financial support and the criteria therefor; iii) the expected timeframe of the projects; and iv) other necessary information. It should be emphasized that a proposed project should involve a group of small-scale farmers as a partner with commercial agriculture to establish a model for contract farming. An official call for proposals should be announced after the public briefing. It is expected that 3~4 private businesses will be selected as partners in the implementing of the pilot projects.

4) The proposed implementation scheme and management structure for the pilot projects (the proposed contract farming model)

Figure 4.7.1 below illustrates the proposed implementation scheme for the pilot projects, showing the potential partners for contract farming involving small-scale farmers. A pilot project operation team that includes the Japanese experts of ProSAVANA-PD and local technical staff would be formed to provide support to the private sector partners in the implementing of activities. The team will be specifically tasked with providing the following services:

- Support in the preparing of the project implementation plan;
- Provision of a soft loan from the Investment Fund;
- Training of the extension staff of the private sector partner;
- Technical advice on demo-plot management, including the preparation of a technical extension manual; and
- Monitoring and advisory services during implementation.

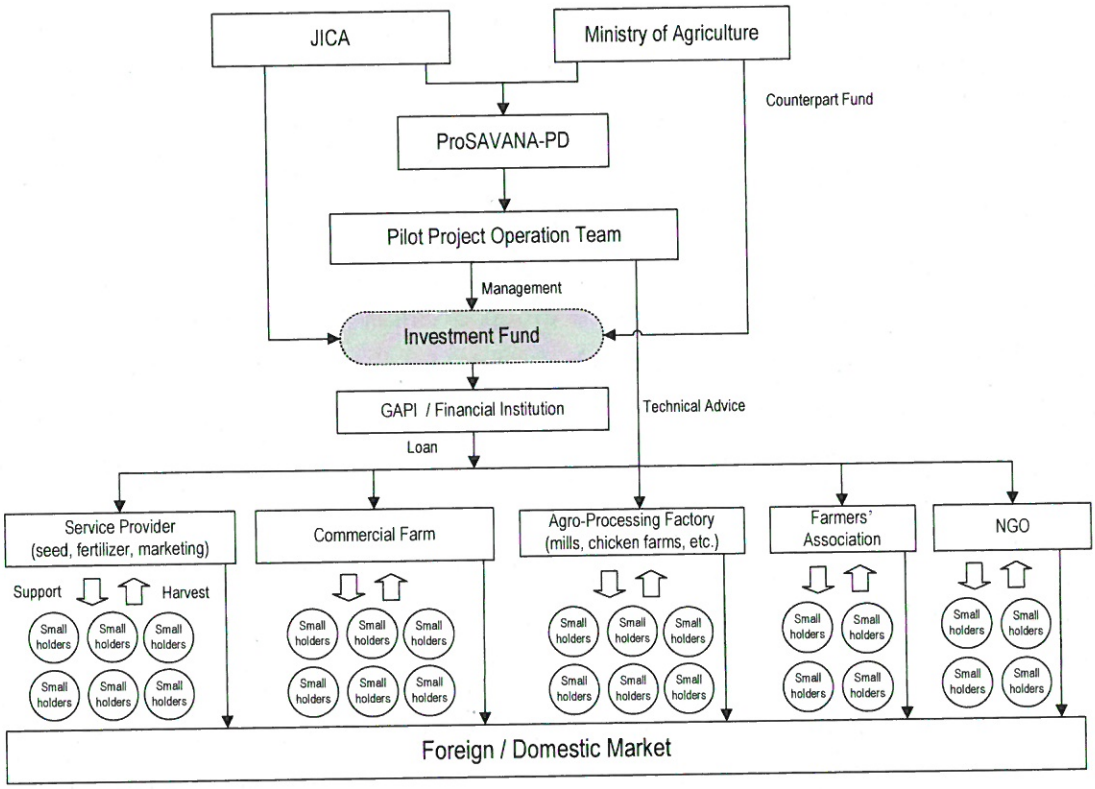


Figure 4.7.1 Implementation Scheme of the Pilot Project

5) Tentative Timeframe for Pilot Projects

The proposed timeframe for the pilot projects is summarized in Table 4.7.3 below. Considering the crop production cycle in the Nacala Corridor, where the rainy season starts in November, the project should commence in October 2012 with the selection process for potential partners, and completed in July 2013 so that the entire production and marketing cycle can be observed in order to learn lessons from the pilot projects.

Table 4.7.3 Tentative Timeframe of the Pilot Projects

	Activities	In-Charge	2012				2013								
			9	10	11	12	1	2	3	4	5	6	7	8	9
	(Preparatory Stage)														
1	Consult with concerned government agencies to establish an Investment Fund	ProSAVANA, Government													
2	Develop criteria for the assessment of an application for the Investment Fund	ProSAVANA, Government													
3	Hold a public briefing and announce a call for a proposal of the Investment Fund	ProSAVANA													
4	Selection of potential private sector partners for the pilot projects	ProSAVANA, Government													
	(Implementation Stage - Production)														
5	Support the finalization of the project implementation plan	ProSAVANA													
6	Conduct a training for extension workers of private sector partners	ProSAVANA													
7	Organize a group of small-scale farmers for contract farming (a series of consultation with farmers)	Private Sector Partners													
8	Conduct a technical training for farmers (establishment of demo-plot, etc.)	Private Sector Partners													
9	Procure and provide agriculture inputs to farmer groups	Private Sector Partners													
10	Conduct a regular technical extension session with farmer groups	Private Sector Partners													
11	Regular farming practice (farm management)	Farmer Group/Private Partner													
12	Regular monitoring and technical support	ProSAVANA													
13	Harvest of crops	Farmer Groups													
	(Implementation Stage - Post harvest)														
14	Consultation between farmer groups and a private partner to arrange the purchase of crops	Farmer Group/Private Partner													
15	Purchase crops from farmer groups and payment	Private Sector Partners													
16	Regular monitoring and technical support	ProSAVANA													
	(Wrap-up Stage)														
17	Repay the loan (a short term loan for crop purchase)	Private Sector Partners													
18	Summarize experiences and lessons learned from the pilot projects	ProSAVANA													

(3) Transition of Investment Fund for the Pilot Projects into a permanent Investment Fund for Agriculture development in the Nacala Corridor

Once the pilot projects have produced positive results with which the effectiveness of the Investment Fund is able to be demonstrated, it is recommended that a permanent funding scheme to support local agribusiness/agro-industry actors be introduced through the morphing of the Investment Fund for the pilot projects into a formal agribusiness support fund (formal Investment Fund) with additional funds added. A formal structure for the managing of this fund, such as a steering committee involving the concerned authorities, should be organized at the central level in order to oversee the fund's operations as well as the investment projects planned in the Nacala Corridor. At the same time an investment fund operations unit should be formed, providing advisory/consultation services to potential investors who are interested in applying to the Investment Fund for new agribusiness investments. Figure 4.7.2 below sets out a tentative concept for the investment fund's management and operational structure during the implementation phase of the Agriculture Master Plan of the Nacala Corridor.

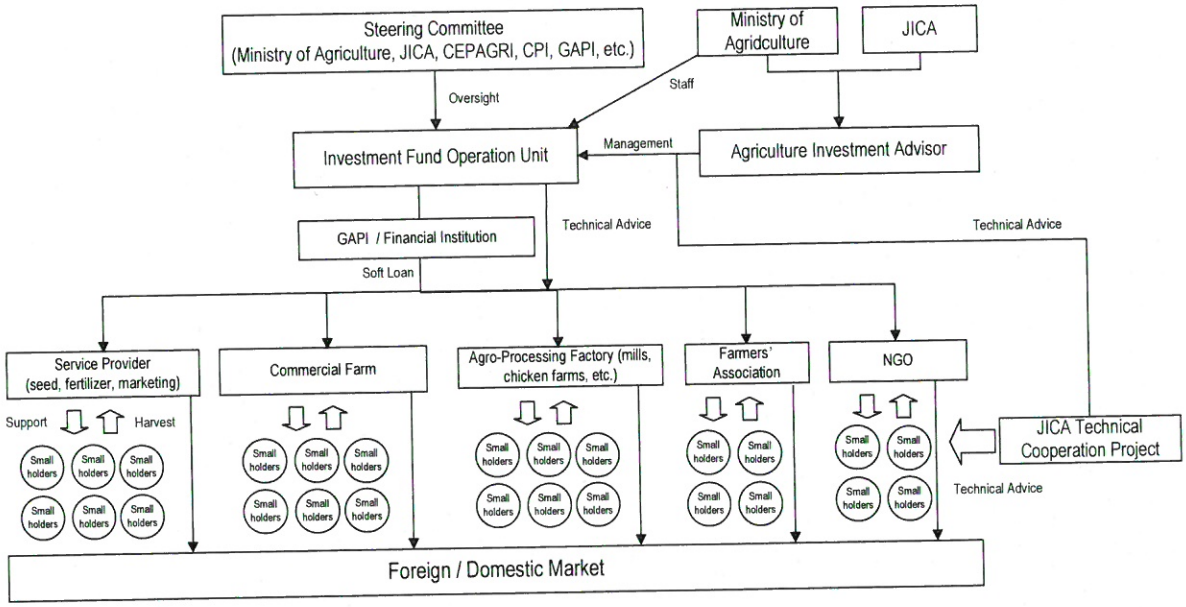


Figure 4.7.2 Future Plan for Investment Fund Management and Operational Structure

4.8. Responsible Agricultural Investment

ProSAVANA is expected to establish a model of Responsible Agricultural Investment (RAI) as a bench-mark under globally changing food security circumstances. A discussion note prepared by FAO, IFAD, UNCTAD Secretariat and World Bank Group "Principles for RAI that Respects Rights, Livelihoods and Resources" has been made public since February 2010. Although the proposed principles are voluntary and subject to consultation and refinement, main international agencies agreed that the following seven key principles are essentially the right ones:

Table 4.8.1 Key Principles of RAI

	Principles	Specific Requirements
1	Existing rights to land and associated natural resources are recognized and respected. ***(RESPECTING LAND AND RESOURCE RIGHTS)***	i) Identification of all rights holders; ii) Legal recognition of all rights and uses, together with options for their demarcation and registration or recording; iii) Negotiation with land holders/users, based on informed and free choice, in order to identify the types of rights to be transferred and modalities for doing so; iv) Fair and prompt payment for all acquired rights; v) Independent avenues for resolving disputes or grievances.
2	Investments do not jeopardize food security but rather strengthen it. ***(ENSURING FOOD SECURITY)***	i) Continuing access to food is assured; ii) Opportunities for outgrower involvement and off-farm employment are expanded to protect livelihoods and raise incomes; iii) Dietary preferences are taken into account if the mix of products grown may change; iv) Strategies to reduce potential instability of supply are adopted.
3	Processes relating to investment in agriculture are transparent, monitored, and ensure	i) Ensuring public availability of relevant information, such as land potential and availability, core aspects of prospective investments, and resource flows or tax revenues;

	accountability by all stakeholders, within a proper business, legal, and regulatory environment. ***(ENSURING TRANSPARENCY, GOOD GOVERNANCE, AND A PROPER ENABLING ENVIRONMENT)***	ii) Developing the capacity of institutions that handle investment selection, land transfers and incentives to follow principles of good governance, operate efficiently and transparently; iii) Ensuring that an independent system to monitor progress towards a better investment climate is in place.
4	All those materially affected are consulted, and agreements from consultations are recorded and enforced. ***(CONSULTATION AND PARTICIPATION)***	i) Definitional and procedural requirements in terms of who represents local stakeholders and what is a quorum for local attendance need to be clarified; ii) The content of agreements reached in such consultations should be documented and signed off by all parties; iii) Methods for enforcement and sanctions for non-compliance should be specified.
5	Investors ensure that projects respect the rule of law, reflect industry best practice, are viable economically, and result in durable shared value. ***(RESPONSIBLE AGRO-ENTERPRISE INVESTING)***	i) Comply with laws, regulations, and policies applicable in the host country (and ideally with all relevant international treaties and conventions); ii) Adhere to global best practices for transparency, accountability and corporate responsibility in all sensitive areas; iii) Strive not only to increase shareholder value but also to generate significant and tangible benefits for the project area, affected communities, and the host country.
6	Investments generate desirable social and distributional impacts and do not increase vulnerability. ***(SOCIAL SUSTAINABILITY)***	i) Relevant social issues and risks are identified during project preparation, and strategies devised to adequately address them; ii) The interests of vulnerable groups and women are considered explicitly; iii) The generation of local employment, transfer of technology, and direct or indirect (e.g. via taxes) provision of public goods and services is part of the investment design.
7	Environmental impacts of a project are quantified and measures taken to encourage sustainable resource use, while minimizing the risk/magnitude of negative impacts and mitigating them. ***(ENVIRONMENTAL SUSTAINABILITY)***	i) Independent environmental impact analysis to identify potential loss of public goods, such as biodiversity or forests, is conducted prior to approval; ii) Preference be given to reclaiming or increasing productivity on resources already in use; iii) The most appropriate production system is selected to enhance the efficiency of resource utilization, while preserving the future availability of these resources; iv) Environmental good practices in agriculture, processing and manufacture are adhered to; v) Provision of desirable ecosystem services is encouraged; vi) Negative impacts are addressed through regularly monitored environmental management plans and compensated where appropriate.

Source: Adapted from "Principles for RAI that Respects Rights, Livelihoods and Resources, 2010"

These principles now need to be translated into actions, hopefully as a balanced mixture of voluntary self-regulations and compulsory instruments, for the following different actors:

- Mozambican government at central and decentralized levels;
- Investors including enterprises and financing agencies;
- Local stakeholders including communities;

- Independent neutral players such as NGOs, civil society and academy;
- Bilateral/multilateral donors and, to the extent possible, governments of the countries from which investment initiatives are emanating.

The Government of Mozambique already has a number of laws and regulations which can, in theory, respond to some of the above-mentioned principles and requirements. Most donors also have their own guidelines on environmental and social protection applicable to identification, appraisal and implementation of the projects. Therefore, main challenges of RAI under ProSAVANA will be the following:

(1). Strengthen the law enforcement by the government and include RAI principles into the evaluation processes of different licensing;
(2). Lead the investors to proper application of self-regulations; and,
(3). Involve neutral players in the decision-making and monitoring.

Elaboration of ***"ProSAVANA Guidelines on RAI"*** as an annex to the "Data Book for Private Investors" (the fourth output of the present study) will be a plausible idea to achieve these goals. One chapter of the Guidelines shall be oriented for government agencies such as CEPAGRI and CPI as an operation manual of the procedures related to evaluation, public consultation, authorization, monitoring, assistance, inspection and eventual revocation of agricultural investment projects. In longer term, it is desirable that RAI principles be adopted as public policy of the Government. Table 4.8.2 outlines the expected process to elaborate the Guidelines.

Table 4.8.2 Supposed Outline of "ProSAVANA Guidelines on RAI"

Working Group	Government agencies (CEPAGRI, CPI, MINAG/DPA, MICOA/DPCA, etc.), Producers' organization (such as UNAC), Investors' organization (such as CCIABM), Observers (academic institutes, etc.)
Contents	● Synopsis of RAI principles ● Outline of Mozambican legislation about agricultural investment ● Initial check-list of compliance with RAI principles ● Code of conduct expected for investors (enterprises and financing agencies) ● Criteria for evaluation, authorization and inspection of investment projects ● Key points in public consultation, monitoring and assistance of investment projects ● Good practices in investor-community partnership, farming and agro-industry ● Contact list and useful links (such as "Knowledge Exchange Platform for RAI")

Source: JICA Study Team

As for the Nacala Fund, the consultative council will play a key role in the selection of investment proposals. ProSAVANA Guidelines on RAI is expected to be utilized in this process, too. However, we should also keep in mind that excessively strict rules may repel potential investors from Nacala Corridor.

4.9. Agricultural Zoning of the Study Area

4.9.1. Review of Existing Zoning in Mozambique

Several types of "zoning" are applied in Mozambique for different purposes such as orderly territorial arrangement, protection of forest environment, mapping of agricultural potential, etc. In legal terms, two main systems are giving framework to the zoning as follows:

Territorial Arrangement Law (Law no.19/2007) and its Regulation (Decree no.23/2008)

- "Zoning" is defined as an informative and indicative tool, having its basis on soil quality evaluation, existence of natural resources and human occupation, which serves to evaluate and divide the territory into different areas for preferable land use such as economic, social and environmental activities. The objective of zoning is to safeguard environmental and ecological qualities of diverse regions in the national territory, through definition of the limits among human occupation, economic exploitation and any other forms of land use, in order to prevent degradation of environment and promote its sustainable use.
- Zoning is also one of the seven general instruments for territorial arrangement: 1) Soil quality evaluation; 2) Land classification; 3) National land cadastre; 4) Environmental/ Social/ Economic inventory; 5) Zoning; 6) Geological map; and, 7) Mining cadastre.
- A zoning represents the following elements about the concerned area: 1) Geographic location and environment; 2) Forms of land occupation and established DUATs; 3) Unique natural qualities; 4) Interdependent relations among nature, infrastructure, administration, economy and others; and, 5) History of human occupation.

Forest and Wildlife Law (Law no.10/99) and its Regulation (Decree no.12/2002)

- "Zoning" is defined as division and classification of forests and wildlife according to the type of vegetation and alternative land use, and also considered as one of the fundamental tools for law enforcement.
- Forests are classified into "conservation forest", "buffer zone", "productive forest" and "multiple-use forest" through zoning, in order to identify suitable activities such as protection, conservation or exploitation of forest/animal resources.

Territorial arrangement planning is being undertaken at district level with the help of provincial government. In an example case of Monapo District in Nampula Province, future land use plans are proposed at scale 1: 350 000, dividing the territory into residential area, forest reserve, agricultural concession area and community

development area. Such products shall be collected for all the districts to be incorporated in the process of Nacala Corridor's zoning.

On the other hand, so-called "agro-ecological zoning" is widely practiced mainly by MINAG's initiative. It consists of characterization of climate, topography, soil, vegetation, hydrology and other natural parameters, followed by matching with different crops and mapping of suitability. In recent cases, other factors such as awarded concessions and road accessibility are also taken into consideration. Some well-known examples area listed below:

Table 4.9.1 Examples of Agro-ecological Zoning in Mozambique

	Example 1	Example 2	Example 3	Example 4
Coverage	Nation-wide	Niassa Province	Nation-wide	Nation-wide
Year	1996	2007	2008	2010
Result	Map showing 10 agro-ecological regions. 	Suitability maps for investment in forestry, agriculture, animal husbandry and eco-tourism. 	Map of potentially available lands for agriculture, forestry, pasture, etc. at scale 1:1,000,000. 	Suitability maps for 4 crops (cassava, cotton, Irish potato, and cashew) at different climatic scenarios. 

Source: JICA Study Team

The Example 2 shows the potential area for large scale development in Niassa Province estimated by the view point of vegetative cover, land slope, soil depth, space for large scale development, water source, and accessibility from main roads.

The Example 3 was an epoch-making approach to identify available lands for agricultural purpose. The criteria used for excluding "not available land" from the total land area of Mozambique in its two phases are shown in Table 4.9.2.

Table 4.9.2 Exclusion Criteria and Results of Identification of "Available Lands"

	Exclusion Criteria for "Not Available Land"	"Available Land" in Mozambique (ha)
Phase 1	Productive forests (dense forest, open forest); Conservation areas (national park, national reserve, game reserve, protected forest); Mangroves; Farmlands (annual crop, sugarcane field); Tree farms (cashew, tea, coconut); Forestry plantation (actual reforestation); Areas without vegetation (dune, river-bed, residential area, etc.); Shifting cultivation with forest; Forests with shifting cultivation.	12,016,800
Phase 2	In addition to above, Areas allocated for non-agricultural purpose (ecotourism, fish culture, wetland with limited use); Areas allocated for centers of resettlement of the people affected by recent floods; Areas prospected for mining; DUATs (approved, in process); Concessions (forestry, mining); Wild animal ranch; Community areas; Local and donor-aided initiatives.	6,966,030

Source: National agrarian zoning of lands available for large investments at local level, IIAM 2008

Distribution of "potential available lands" in the Study Area is presented in Figure 4.9.1 and Table 4.9.3. It should be noted that plots smaller than 1,000ha were not considered in this work, so probably there are more "potential available lands" at relatively small scale. On the other hand, it is also reasonable to think that currently in 2012 there may exist less "potential available lands" due to progressing award of DUATs and concessions as well as delimitation of community lands. Now the GOM is carrying out an upgrading of this similar work at scale 1: 250,000 till 2014.

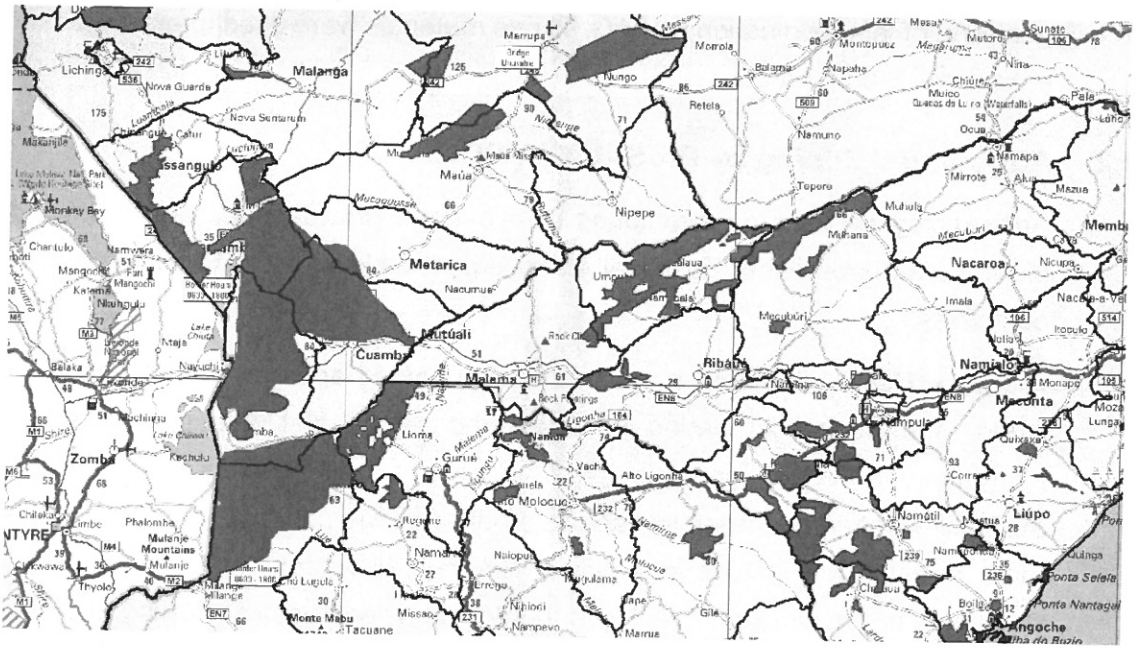


Figure 4.9.1 Distribution of "Available Lands" in Nacala Corridor

Table 4.9.3 Distribution of "Available Lands" in Nacala Corridor

District	Area (ha)	Province	Area (ha)	Total Area (ha)
Monapo	0	Nampula	298,047	968,159
Muecate	0			
Meconta	0			
Mogovolas	143,280			
Nampula	44,371			
Murrupula	74,182			
Ribaue	28,109			
Malema	8,105			
Alto Molocue	44,481	Zambezia	153,512	
Gurue	109,032			
Cuamba	232,800	Niassa	516,600	
Mandinba	243,800			
Nguama	40,000			
Lichinga	0			

Source: JICA Study Team, adapted from "National agrarian zoning of lands available for large investments at local level, IIAM 2008"

Land cover and land use map is also necessary for considering Agro-ecological zoning. CENACARTA provided land cover and land use map covering nationwide based on analysis of the satellite images acquired in 1997. DNTF also provided land cover and land use map covering nationwide based on the satellite image acquired in 2004 and 2005. The category of land cover and land use are basically followed to the guideline of land evaluation by FAO. Those materials were used to estimate the farm area in the Stud y Area.

4.9.2. Agricultural Zoning by ProSAVANA-PD

Agro-ecological zonings mentioned above don't provide sufficient information to meet the requirement of Territorial Arrangement Law, as they are aiming at different objectives.

ProSAVANA-PD will adopt a comprehensive zoning approach for Nacala Corridor, where agro-ecological zoning is considered as the first step to be followed by integration of socio-economic parameters such as demographic trend, land availability, market accessibility and territorial arrangement planning of each district. Final product will include not only maps but also proposal of measures, both promotion and restriction, to achieve the desirable land uses according to the zoning result. The approach is explained as follows.

4.9.3. Principal Methodology for Zoning

The principal methodology of zoning in the Study is shown in the Table 4.9.4. Firstly, natural conditions are considered, because agriculture is highly influenced by natural

conditions. Secondly, socio-economic conditions are considered. The both conditions are considered by the view point of "Supply (available resources)" and "Limitation". Thirdly, potential for the development is considered, based on analysis of the natural conditions and the socio-economic conditions. Finally, zoning map is composed based on integrated analysis of the current conditions and the potential of the Study Area. The detailed process and maps of zoning will be shown from sub-chapters 4.9.4 to 4.9.7

Table 4.9.4 Matrix of the Idea for Zoning

Stage	Supply	Limitation
1. Natural Conditions	NS-1. Crop suitability NS-2. Distribution of crop production by district	NL-1 Slope (< 8%) NL-2. Land use (excluding bare land, water bodies, swamp area) NL-3 Soil (excluding low productivity soil)
2. Socio-economic Conditions	SS-1 Irrigation & water resource SS-2 Road, railway SS-3 Power supply	SL-1 Occupied area by local farmers SL-2 Conservation & DUAT SL-3 Harmonization between agriculture and forestry
3. Potential for the development	Irrigation development and promoting high-value crops production (combination of SS-1 and 2)	Large scale development (Combination of NL-1, 2, 3 and SL-1, 2, 3)
4. Integrated Zoning	Zoning of the Study Area based on analysis of the above	

Source: JICA Study Team

4.9.4. Classification of Suitability for Agriculture by Natural Conditions

Classification of suitability for agriculture by natural conditions is considered by suitability of major crops for local climate conditions and current distribution of crop production. Availability of reliable agro-climatic data prevents the Study team from making a proper examination on the crop suitability. Further analysis on the crop suitability will be made, by collecting more detailed agro-climatic data from various sources. On the other hand, enough data are available for the distribution of crop production. Local farmers should select and adopt common crops, i.e. cassava, maize, sorghum and beans, to local climatic and socio-economic conditions through long trials.

(1) Crop Suitability by Natural Conditions

1) Crop suitability by climate conditions (NS-1)

Crop suitability to climate conditions is considered by annual mean temperature and annual precipitation only for 4 crops, as summarized in Table 4.9.5. The number of crops in Table 4.9.5 is able to be increased by collecting more information of crop cultivation condition and agro-climatic data from agencies concerned.

Table 4.9.5 Crop Suitability by Climate Condition

Crops	Temperature (°C)	Precipitation (mm)	Reference information
Potato	16-22	300 - 650	SA Guideline, J textbooks
Haricot beans	18-24	Over 600	SA Guideline, J textbooks
Cassava	20 - 36	400 - 1600	IIAM, SA Guideline, J Textbooks
Maize	20 - 33	600 - 1200	IIAM, SA Guideline

Reference information: IIAM = Interviewing to researchers of IIAM, SA Guideline = Production Guideline (Ministry of Agriculture, forestry & fisheries in South Africa),
J Textbooks = Japanese textbooks for food crop cultivation covering all over the world

The suitability maps of potato and haricot beans are shown in Figure 4.9.2 and 4.9.3. The suitable area of both crops covers the western part of the Study Area, and the suitable area is almost synchronized the high production area of haricot beans and potato, as shown in Figure 4.9.7 and 4.9.13, respectively.

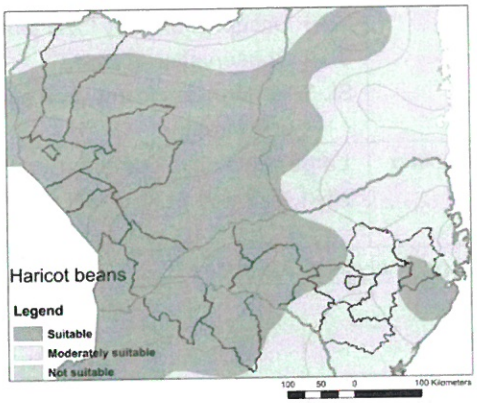


Figure 4.9.2 Suitability of Haricot Beans
Source: JICA Study Team

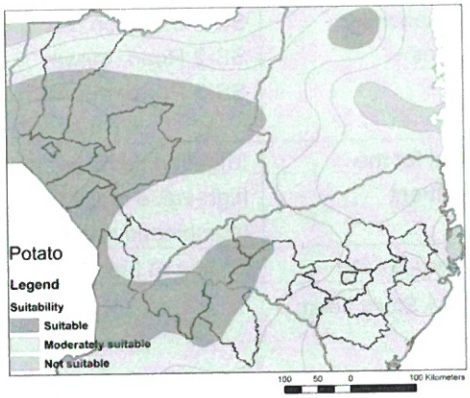


Figure 4.9.3 Suitability of Potato
Source: JICA Study Team

The suitability maps of maize and cassava are shown in Figure 4.9.4 and 4.9.5. The suitable area of both crops covers the almost whole Study Area, except for high altitude area. While the current distribution of maize production is concentrated in the western part of the Study Area, the area of cassava is concentrated in the eastern part of the Study Area, as shown in Figure 4.9.6. This difference may be caused by distribution and stability of annual rain fall. Monthly precipitation data for long years at several locations are needed for making a deep examination in order to make these crop suitability maps to be practical ones.

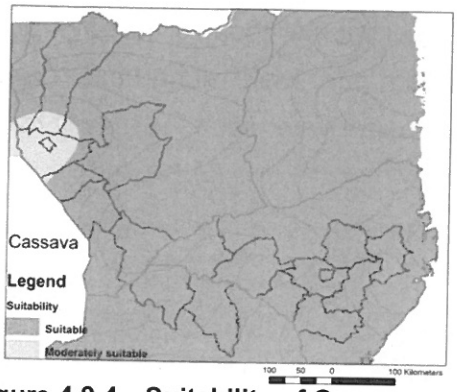


Figure 4.9.4 Suitability of Cassava
Source: JICA Study Team

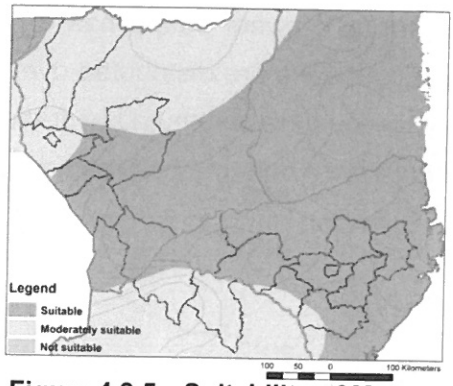


Figure 4.9.5 Suitability of Maize
Source: JICA Study Team

2) Distribution map of crop production (NS-2)

Distribution map of crop production show the crop production situations by district, based on statistical analysis by district collecting from each provincial office, as shown the section of 3.3.5.

a) Staple food crops

The situations of staple food crops are shown on the maps in Figure 4.9.6. The main staple food crops in the Study Area are maize and cassava. Cassava production is distributed over the eastern part of the Study Area, while maize production is distributed over the western part. The central part of the Study Area is the transition area in between the cassava area and the maize area. In the transition area, both of cassava and maize are cultivated. Then, sorghum, millet and paddy are cultivated supplementary to cassava and maize in accordance with local conditions. In Monapo, Meconta, Nampula, and Murrupula, which are high population density areas, various crops are cultivated as supplementary crops to cassava. An isothermal map is overlaid on a distribution map of crop production, as shown in Figure 4.9.6. It shows that maize is the main crop in low temperature condition areas, while cassava is mainly cultivated in high temperature condition areas.

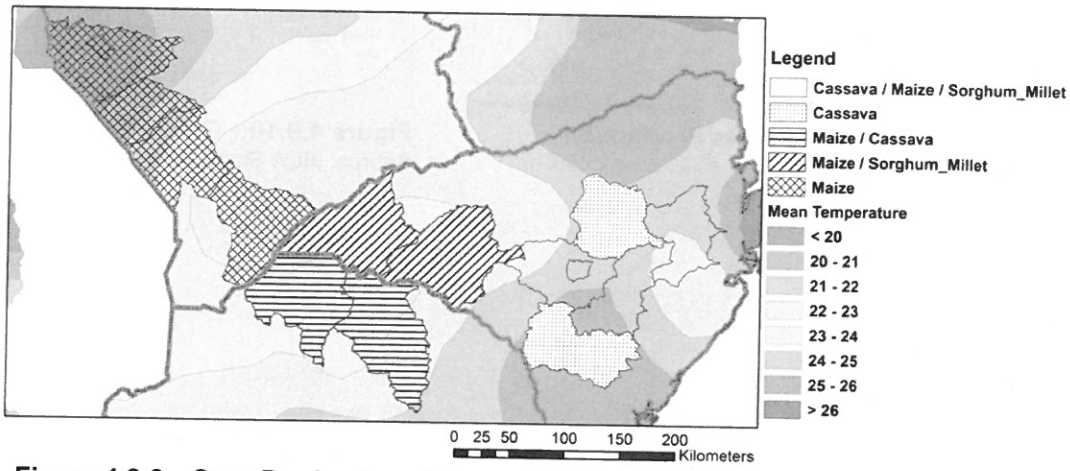


Figure 4.9.6 Crop Production of Cassava, Maize, Sorghum, and Millet
Source: JICA Study Team

Beans and sweet potato has a role of supplemental food to cassava and maize. Haricot beans are distributed over the western part, while mung bean, cowpea, and pigeon pea are distributed over the eastern part. Sweet potato is mainly cultivated in the western part, may be replacing cassava.

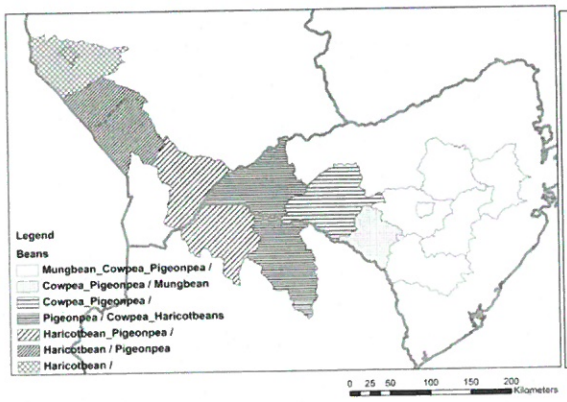


Figure 4.9.7 Beans Production
Source: JICA Study Team

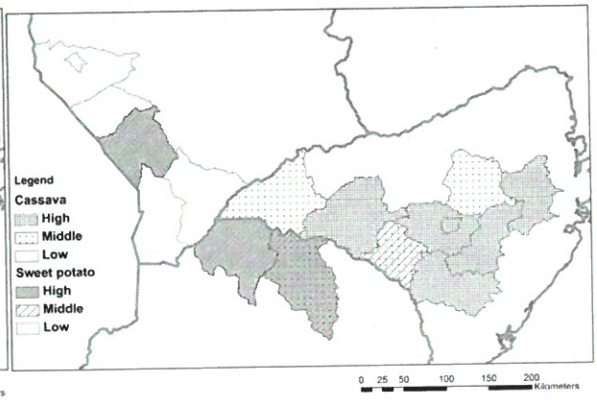


Figure 4.9.8 Sweet Potato Production
Source: JICA Study Team

b) Non staple food crops

The distribution of non staple food crops, such as cashew nuts, ground nuts, sesame, soy bean, are shown in Figure 4.9.9 to 12. Cashew nut is concentrated in the eastern side of the Study are, while ground nuts, sesame, and sunflower are broadly cultivated from eastern to central part. Cotton is concentrated in the eastern and the central areas, while tobacco is concentrated in the central and the western areas.

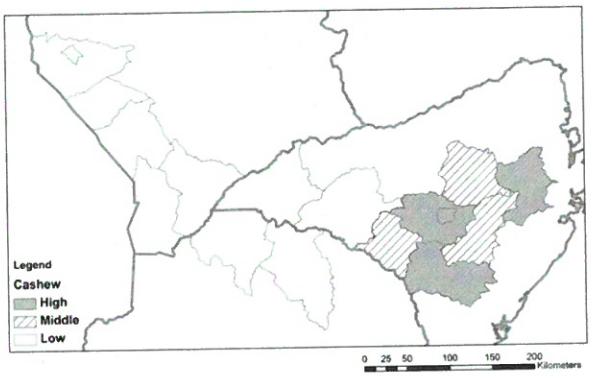


Figure 4.9.9 Cashew Nuts Production
Source: JICA Study Team

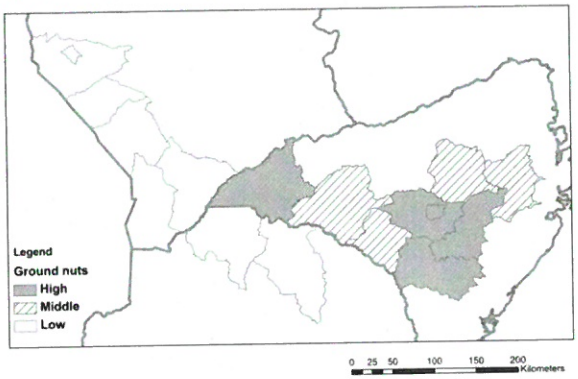


Figure 4.9.10 Ground Nuts Production
Source: JICA Study Team

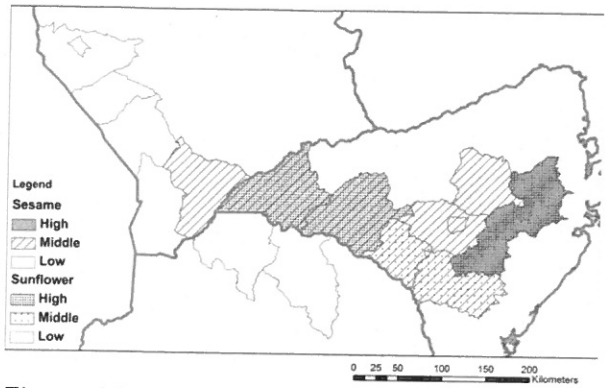


Figure 4.9.11 Sesame and Sunflower Production Source: JICA Study Team

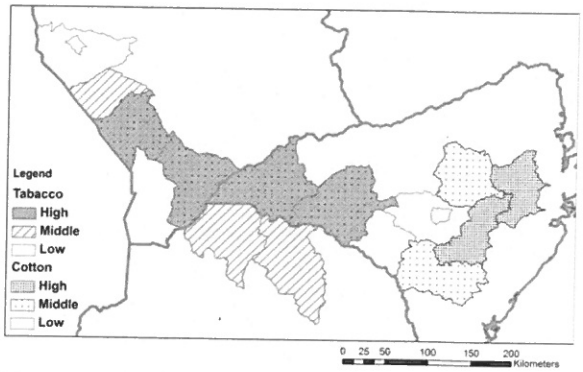


Figure 4.9.12 Cotton and Tobacco Production Source: JICA Study Team

c) Soy bean, Vegetables, and Potato

Soy bean are concentrated in the central part of the Study Area, and the cultivation area is expanding to surroundings, especially to the western part, as shown in Figure 4.9.13. The distribution of vegetable production and potato is shown in Figure 4.9.14. Vegetables and potato production is concentrated in the central part, especially in Gurue district, while Lichinga district also provide much volume of potato.

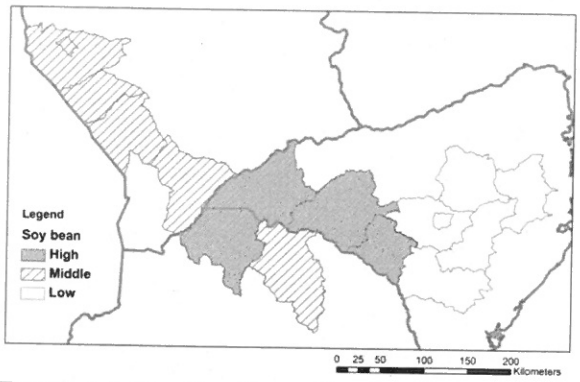


Figure 4.9.13 Soy Bean Production
Source: JICA Study Team

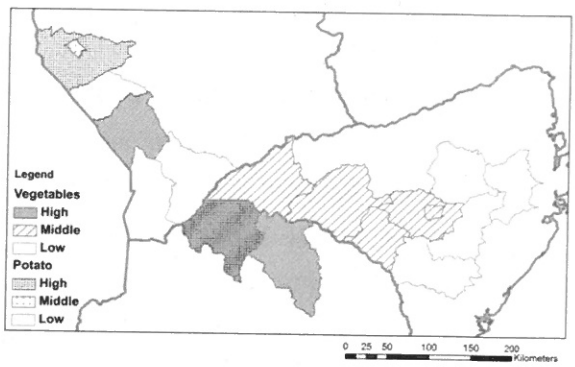


Figure 4.9.14 Vegetable and Potato Production Source: JICA Study Team

(2) Limited Area for Agriculture by Natural Conditions

1) Land Slope (NL-1)

Figure 4.9.15 shows land slope map, based on SRTM data acquired from CGIAR. The limitation slope for using agricultural machine, i.e. tractor, is commonly 8 %. The area beyond 8 % of slope must be excluded from the suitable area for large scale farming using a tractor.

2) Integrated limitation map for farm development

Integrated limitation map in Figure 4.9.16 is made by overlaying a land slope map extracting the area beyond 8 % of slope, a land use map (refer to sub-chapter 3.1.7) extracting water body and swamp area, and soil map (refer to sub-chapter 3.1.7)

extracting unsuitable area for crop cultivation. This integrated limitation map will be used to consider potential area for large scale development.

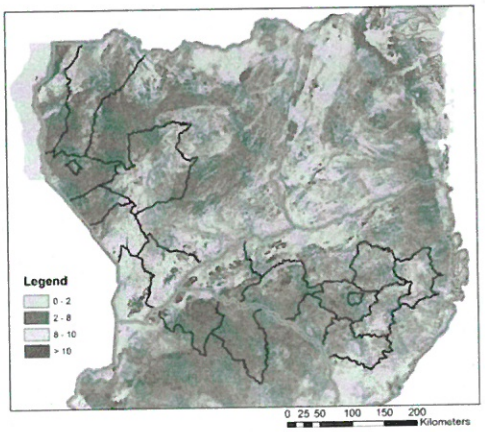


Figure 4.9.15 Land Slope Map
Source: SRTM from CGIAR

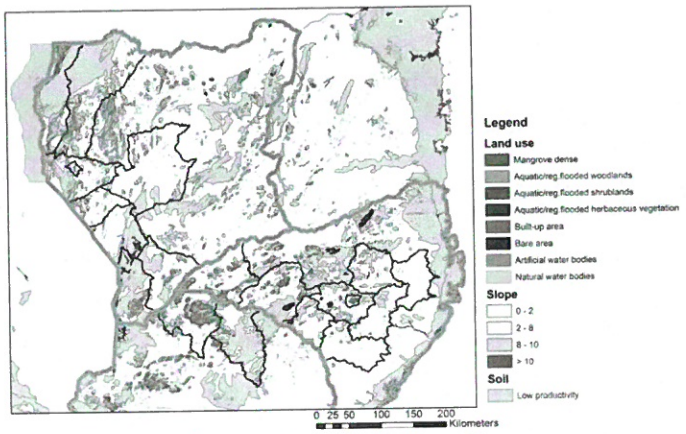
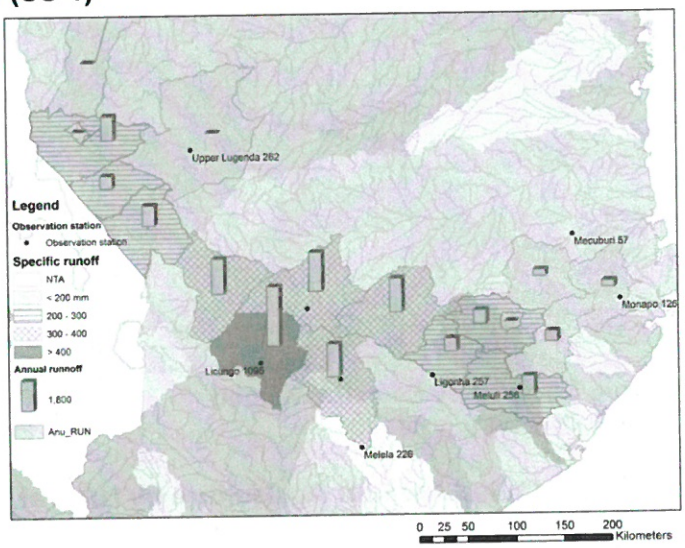


Figure 4.9.16 Integrated Limitation Map
Source: Arranged by JICA Study Team

4.9.5. Socio-economic Conditions

(1) Irrigation and Water Resource (SS-1)

As shown in Figure 4.9.17, the mean annual runoff of the Study Area was estimated based on the specific runoff observed at the stations of the lowest reach of basins, except for some large basins where middle reach stations or average of stations of the basin was applied. The runoff in each district is estimated by the basin runoff of sub-basins. In general, the runoff in the eastern part districts, such as Monapo, Meconta and Muecate, is smaller and the larger runoff is observed in the mountainous area in the middle of the Study Area.



Source: ARAs
Figure 4.9.17 Estimated Mean Annual Runoff by District

Figure 4.9.18 shows the area with equipped and in-use of existing irrigation system based on inventory provided by the concerned provincial offices. Malema has the largest area both with equipped and in-use, and Monao, Murrupula and Nampula are in the second even though the ratio of in-use is extremely low. The area not in-use, that is calculated by the deference between the areas with equipped and in-use, is

considered as a potential area of irrigation development by rehabilitation of the existing irrigation system.

Figure 4.9.19 shows the number of irrigation systems in terms of scale, i.e. small (less than 50 ha), medium (50 – 500 ha) and large (more than 500 ha). In general, small irrigation system is predominant in the Study Area, while Alto Molocue, Gurue and Lichinga have medium scale of irrigation systems. Nampula has a characteristic that there are many smaller sized systems comparing with other districts.

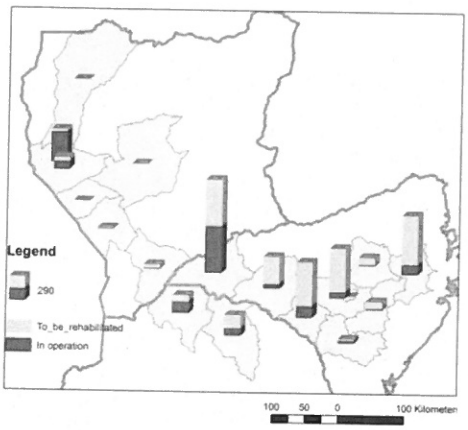


Figure 4.9.18 Area Equipped and in-use of Existing Irrigation System by District Source: DPA of Nampula, Zambezia, Niassa

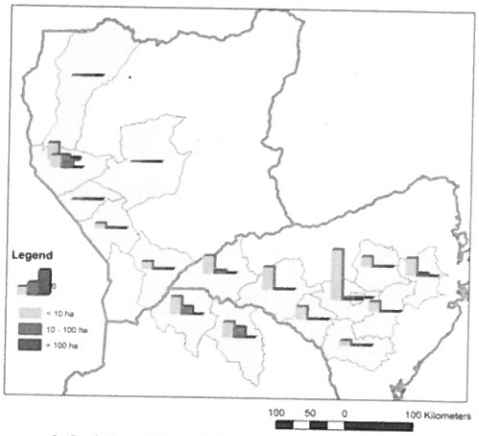


Figure 4.9.19 Size Distribution of Existing Irrigation System by District
Source: DPA of Nampula, Zambezia, Niassa

(2) Road, Railway and Power Supply (SS-2, 3)

The situations of road, railway and power supply were explained in sub-chapter 3.1.8. Those social infrastructures are important to form a value chain of agricultural products and access markets, as well as to be one of key factors to analyze potential of agricultural development.

(3) Occupied Area by Local Farmers, Conservation, and DUAT (SL-1, 2)

The occupied area by reserved area, conservation area and DUAT are overlaid on the map of occupied area by local farmers (refer to sub-chapter 3.1.7), as shown in Figure 4.9.20. The lands not indicated with specific purpose of use in the DUAT map are classified as "Unknown" in the map,

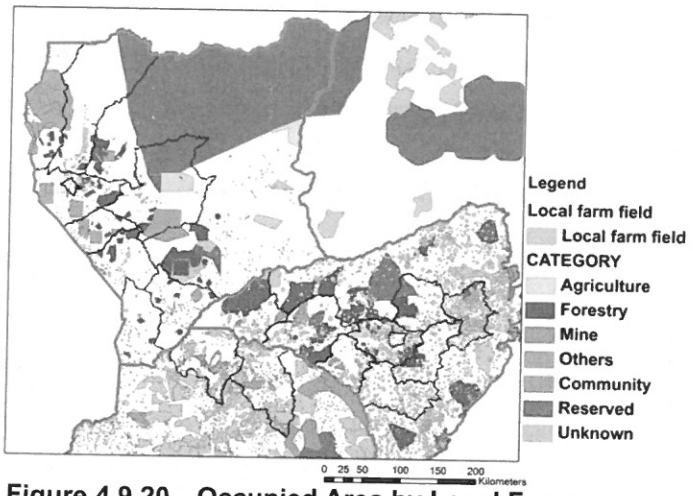


Figure 4.9.20 Occupied Area by Local Farmers, Conservation and DUAT
Source: Arranged by JICA Study Team

while a database of DUAT should contain the information of land use. In Nampula province, almost all of the area is occupied by local farmers and DUAT. In the western part from Malema to Sanga, especially in Mandimba, Majune, and Sanga districts, a substantial space not occupied by local farmers and DUAT is found. However, the potential for large scale development will be considered in sub-chapter 4.9.6 (2) by overlaying all information concerning limitations mentioned in sub-chapters 4.9.4 and 4.9.5.

(4) Harmonization between Agriculture and Forestry (SL-3)

Figure 4.9.21 is a simplified land use map in sub-chapter 3.1.7, which shows the area of agricultural area including field crops, tree crops, grassland etc., and forest area and others. The DNTF of the MINAG defined the productive forest area in their forestry inventory survey (AIFM) in 2007. The productive forest area is almost same as the area classified as forest in Figure 4.9.21. The ellipsoidal areas in Figure 4.9.21 are further processed for analyzing potential areas for large scale development as shown in Figure 4.9.23 and 4.9.24. Majune district is relatively abundant in possible potential areas for large scale development. Most of those areas, however, are included in the productive forest area defined by DNTF. In those areas, the harmonization between agriculture and forestry should be considered from viewpoints of economic efficiency and environmental conservation.

Potential area for large scale development

Figure 4.9.21 Land Use Map showing Productive Forest Area
Source: Arranged by JICA Study Team

4.9.6. Potential for the Development

(1) Irrigation Development and Promoting High-valued Crops

Malema district has high potential of water resource and irrigation development in terms of rehabilitation of existing irrigation system, as described in 4.9.5 (1). High-valued crops such as vegetables are cultivated in the very limited area near rivers in dry season. The primary road connecting from Nampula to Cuamba will be paved up to 2017. The access to market in Nampula and Nacara will be improved

significantly by the paved road. Promoting vegetables or other high-value crops production by irrigation development is an effective approach in the middle part of the Study Area, especially in Malema district. As for large scale irrigation development, it is required to consider newly development of water storage facility or ground water usage.

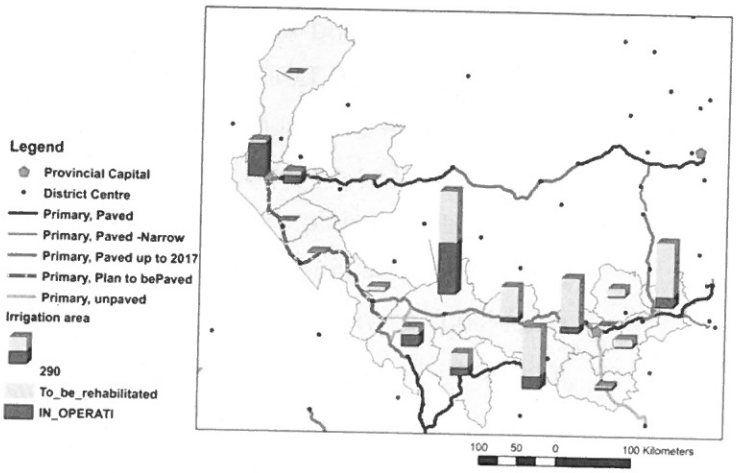


Figure 4.9.22 Irrigation Development and Promoting Vegetable Production
Source: Arranged by JICA Study Team

(2) Potential for Large Scale Development

Figure 4.9.23 contains all of the limiting conditions mentioned in the section of 4.9.4 and 4.9.5, and shows the area from Mandimba district to Sanga district. The ellipsoidal area in Figure 4.9.23 shows the area, which may have favorable conditions for large scale development. However, a serious attention should be paid to harmonize agriculture and forestry development, especially in case of large scale development, as mentioned in the sub-chapter of 4.9.5 (4).

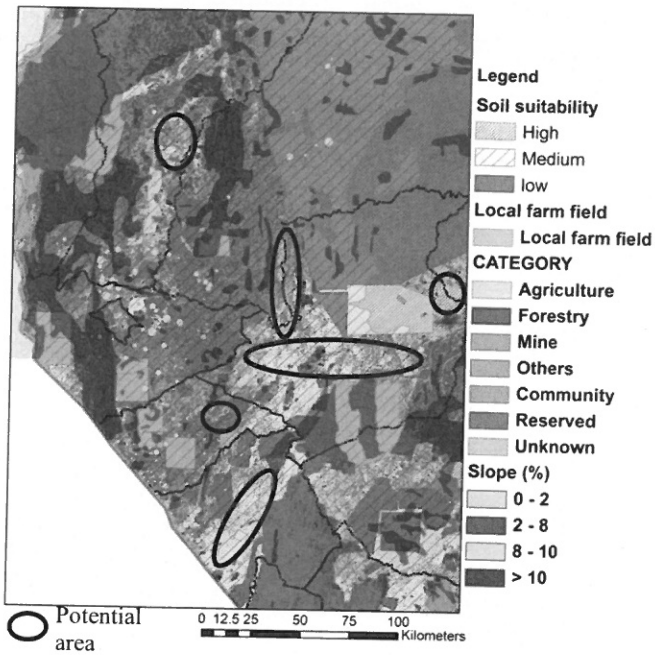


Figure 4.9.23 Potential Area for Large Scale Farm Development in the Western Part of the Study Area
Source: Arranged by JICA Study Team

Figure 4.9.24 shows potential areas for large scale development in the central part of the Study Area. Some potential areas are found in Malema and Cuamba district, while it is difficult to find the space in the eastern part as shown in Figure 4.9.25.

In the eastern part, small to middle scale development less than 1,000 ha may be possible instead of large scale farm development. The area of shifting cultivation

including grass and bush land is estimated to be 1,785 thousand ha in the Study Area, as shown in Table 3.1.15. The real figure of the shifting cultivation area might be larger than the figure, considering the actual farming practices observed in the Study Area. The potential area for small to middle scale farm development shall be reclaimed by transforming the existing shifting cultivation area, including the area for reserved fallow land, to normal farmland area. Simultaneously, encouragement of extension service for promoting intensive farming practices through providing incentives to farmers shall be combined.

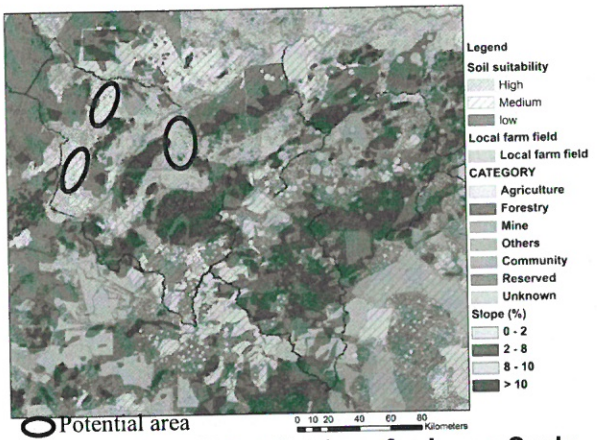


Figure 4.9.24 Potential Area for Large Scale Development in Central Part of the Study Area
Source: Arranged by JICA Study Team

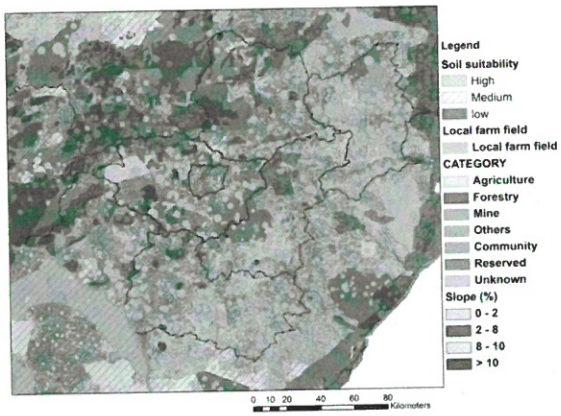


Figure 4.9.25 Potential Area for Large Scale Development in Eastern Part of the Study Area
Source: Arranged by JICA Study Team

4.9.7. Integrated Zoning

(1) Summary of Analysis Process

The above analysis process for zoning is summarized in Table 4.9.6

Table 4.9.6 Summary of Consideration for Zoning

Items	Result of analysis	Limitation of analysis (L), Remarks (R) & Challenge (C)
1) Natural conditions	**a) Supply**	
Crop suitability	Crop suitable map was provided only for a few crops, caused by lack of climatic data	**(C)** Collecting more detailed climatic data, especially, monthly precipitation data at several locations
Distribution of crop production by district	Distribution of main crops, i.e. cassava, maize, fits isothermal map. The finding shows that local farmers have selected suitable crops in order to adapt climate conditions through long trials. Each cash crop also has a similar tendency of its distribution.	Analysis was almost completed (**(L)** Some data collected from DPA s was unreliable. INE did not make its agricultural statistic at district level.) **(L)** Distribution of new crops, i.e. soy bean, doesn't match to the climatic situation. (**(C)** Refer to the results of adaptability trials by IIAM 2010, soy bean can grow in wide locations in the Study Area)
1) Natural conditions	**b) Limitation**	

Slope	Extracting the area where the slope beyond 8%	Almost complete
Land use	Extracting water body, bare rocks, swamp area (Unsuitable area for upland crops)	**(R)** Another analysis is needed, if paddy cultivation is considered
Soil	Extracting unsuitable soil for crop production (Unsuitable area for upland crops)	**(R)** Another analysis is needed, if paddy cultivation is considered **(C)** More detail soil map is needed, in case of zoning at district level
2) Socio-economic conditions	**a) Supply**	
Irrigation & water resource	Central area in the Study Area has high potential for the development	**(C)** More information is needed, in case of zoning at district level
Road, railway	Many routes around Nacala corridor will be paved by 2017	**(C)** Monitoring the possibility of railway rehabilitation between Cuamba and Lichinga
Power supply	Collecting information	**(L)** Power company does not show outside the plan of electrical line installation
2) Socio-economic conditions	**b) Limitation**	
Occupied area by local farmers	Estimating occupied area by local people by population and average farm size Much area of Nampula province is occupied by local farmers.	Almost complete **(R)** Update the map, in case the latest data is collected
Conservation & DUAT	Showing the occupied area by Conservation and DUAT Much area of Nampula and Zambezia provinces is occupied by DUAT	**(L)** Estimating the figure of occupied area by conservation and DUAT is inadequate, because much DUAT area defined by various sources overlapped and an integrated DUAT database necessary for verification are unable.
Harmonization between agriculture and forestry	Most of potential areas for large scale development are located in the productive forestry area in Majune and Sanga districts. Harmonization with forestry is needed	**(C)** Guideline or standard of judging whether large farm development or environmental conservation
3) Potential		
Irrigation development and promoting high-value crops production	Promoting high-value crops, especially vegetable production by using irrigation in Malema	**(C)** Making an irrigation potential map at district level
Large scale development	Some areas remain where may be possible for large scale development in western area from Malema to Sanga	**(L)** Estimating an accurate figure of the potential area is difficult, due to lack of integrated information of the DUAT area **(R)** Potential area for middle scale development might be found in almost all of the districts, except for high population dense area, such as Monapo and Nampula districts.

Legends: (L): Limitation of consideration, (R): Reference, (C): Challenge
Source: JICA Study Team

Three key factors for zoning are chosen from Table 4.9.6, such as 1) Distribution of crop production, 2) Large scale development, 3) Irrigation development. Sixteen districts in the Study Area are classified by the 3 key factors, as shown in Table 4.9.7

Table 4.9.7 Classification of 16 Districts by 3 Key Factors

Key factors	Zoning of districts
Distribution of crop production	As shown Figure 4.9.6 Non-staple food crops distribution are also almost corresponding to Figure 4.9.6 zoning in spite of small discrepancies.
Large scale development	Few area remains Monapo, Muecate, Meconta, Mogovolas, Nampula, Murrupula, Ribaue, Alto Molocue, Gurue, Lichinga A little area remains: Malema, Cuamba Some area remains: Mandimba, Ngauma, Majune, Sanga
Irrigation development	High: Ribaue, Malema, Alto Molocue, Gurue Middle: Cuamba, Mandimba, Ngauma, Lichinga, Majune, Sanga Low: Monapo, Muecate, Mogovolas, Meconta, Nampula, Murrupula

Source: JICA Study Team

(2) Zoning

The Study Area is divided into 6 zones, as shown in Figure 4.9.26, based on the above considerations. The features of each zone are summarized as follows;

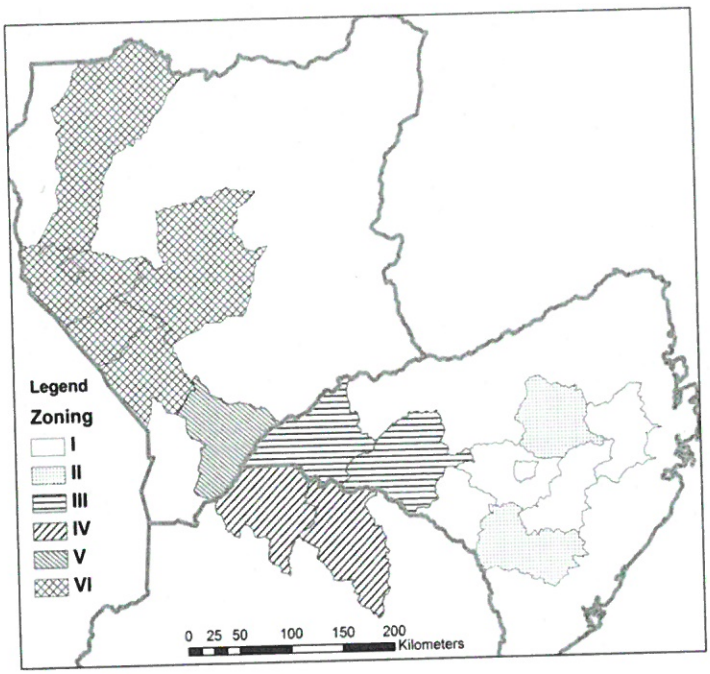


Figure 4.9.26 Zoning of the Study Area
Source: JICA Study Team

Zone I: High population dense area including Monapo, Meconta, Nampula, and Murrupula. Little space remains for new farm development.
Cultivating high-valued crop and value added activity is recommendable by using advantage of high accessibility to markets

Zone II: Cassava and cashew nuts concentration area including Muecate and Mogovolas. Little space remains for new farm developing. Fruits cultivation is also recommendable in addition to high-value crops.

Zone III: High potential zone for irrigation development including Malema and Ribaue. Small space remains for new farm development in the western part of Malema.

Promoting high-valued crops such as vegetable cultivation using irrigation are recommendable in addition to the existing cash crops, i.e. cotton and tobacco when the road between Nampula and Cuamba will be paved by 2015.

Zone IV: Concentration of high-value crops vegetable production including Alto Molocue and Gurue. Little space remains for new farm development due to high population density and hilly land conditions. As the area is relatively blessed with high precipitation and good road access conditions, various crop developments by intensive farming practices are recommended.

Zone V: High potential for developing various crops including industrial crops. Since the zone is located at the intersection point, from the east to the west and from the north to the south by roads or by railroad, the area has potential to be a value-chain center of many agricultural products in the Study Area.

Zone VI: Center of maize production including Mandimba, Ngauma, Lichinga, Majune, and Sanga. Potential space for large scale farming is remaining in Mandimba, Majune, and Sanga. Development of large scale farming in harmonizing with forestry and environmental conservation would be possible, if the space is not occupied by DUAT or local people.

The other features of each zone are shown in Table 4.9.8. It is assumed that a vast free space suitable for large scale development is not remained in the Study Area, as mentioned in 3.1.7 and 4.9.5.

In this report, the zoning is carried out by district unit, because information and data are collected by the district unit by the JICA Study Team. The conditions, however, would vary within district. The situation of high altitude area in Gurue district, for instance, is different from flat area located at lower altitude. Muecate district also has several different conditions by distance from primary road. The zoning of the Study Area will be modified by collected information through the further study.

4.9.8. Further consideration

(1) Crop Suitability Map by Agro-climatic Conditions

In this report, the crop suitability map was made only for 4 crops. The number of crops for suitability map will be able to increase by collecting more information of crop growing conditions and agro-climatic data from agencies concerned.

(2) Zoning at District Level

As mentioned in 4.9.1, Territorial Arrangement Law (Law no 19/2007) requires that each district should make the development plan with zoning and some districts in

Nampula province implemented zoning study in their districts. The zoning map prepared by the Study Team shall be revised in order to harmonize with district zoning maps in the future. In order to keep the balance of development and environment properly, the zoning study at district level is also needed. At the first step, collecting information about the current situation, difficulties, and future plan of zoning study at district level is needed. At the second step, it is proposed that the central government support one or two districts in the Study Area to make zoning plan, in order to accelerate making zoning plan at district level.

(3) Proposal of Zoning and Expected Measures for its Materialization

Expected measures for materialization of proposal in zoning plan will be proposed in the next stage of the Study.

Table 4.9.8 Features of Each Zone

Zone	Districts	Crop		Irrigation development	Farm development	Remark
		Food crops	Cash crops			
I	Monapo, Meconta, Nampula, Murrupula	Composition of cassava, maize, sorghum/millet and paddy Beans (mung bean, Cow pea, and Pigeon pea)	Cashew nuts, Ground nuts, Sesame, Cotton, Sunflower	Low potential for water resource. Small scale irrigation by mobile pump along the river course is recommended.	Few space for new farm development	Good access to market centers because of high population density
II	Muecate, Mogovolas	Cassava and sorghum/millet Beans (mung bean, cow pea, and pigeon pea)	Center of Cashew nuts, Ground nuts, Sesame, Cotton	Low potential for water resource	Making farmland space by reducing shifting cultivation	
III	Ribaue, Malema	Composition of maize and sorghum/millet Beans (cow pea and pigeon pea)	Ground nuts, Sesame, Soybean, Cotton, Tobacco	High potential for water resource. Promoting irrigation investment for growing high-value crops, especially vegetables	Making farmland space by reducing shifting cultivation Some area is found for new farm development	
IV	Alto Molocue, Gurue	Composition of maize and cassava Beans (haricot beans, pigeon pea, cow pea)	Vegetables Potato Soy bean	- ditto -	Making farmland space by reducing shifting cultivation	Gurue has two different condition areas, such as mountainous area and flat area.
V	Cuamba	Maize, sorghum/millet and paddy Beans (haricot beans , pigeon pea)	Tobacco, Cotton Soy bean	Moderate potential for water resource	Making farmland space by reducing shifting cultivation	Good access to wide area, located at the intersection point from the east to the west and the north to the south
IV	Mandimba, Ngauma, Lichinga, Majune, Sanga	Maize and sweet potato Beans (Haricot beans)	Vegetables, potato	Moderate potential for water resource	Making farmland space by reducing shifting cultivation Potential space for large scale development is remaining in Majune and Sanga	Little space for farm development in Lichinga Monitoring the possibility of railway rehabilitation from Cuamba to Lichinga is needed

CHAPTER 5 Further Study

5.1. Output 2: Drawing of an Overall Picture (August to November 2012)

5.1.1. Drawing an Overall Plan (Draft Master Plan) of Agricultural Development in the Nacala Corridor

Based on the analysis of collected information and data in the Study Area described in the previous Chapters, the draft Master Plan on agricultural development in the Nacala Corridor, which is also conducive to socio-economic growth, will be formulated. The Master Plan is addressed to promote a sustainable agricultural development system by private investment and to contribute poverty alleviation. The expected procedure for formulation of the draft Master Plan is as follows.

(1) Study of the Agricultural Development Potential in the Nacala Corridor

The preliminary integrated zoning was developed based on the analysis of natural and social conditions as described in the previous Chapters. The examination of the integrated zoning will be continued with further considerations of additional data and information. The potential to archive the direction of development in each zone shall be analyzed based on the results of collection and analysis of basic information and inventory surveys. The analysis shall be carried out from multilateral standpoints. The analyzed development potentials are summarized for each subsector to compare with constraints examined.

(2) Analysis of Constraints of Agricultural Development

The constraints disturbing development in each subsector will be examined each zone. In particular, subsectors that are not well developed but have potential will be focused in the analysis and causes of disturbing the potential use and their background will be clarified.

The identified constraints for agricultural development in each zone or each subsector shall be summarized together with the potential for agricultural development. The results will be used for the formulation of the Master Plan.

(3) Formulation of Activities for Agricultural Development

The agricultural development potential of each zone will be reviewed based on the direction of development in each zone. Then, the measures will be examined in order to remove the constraints of subsectors effectively and efficiently and to develop the potential. Firstly activities of countermeasures will be formulated. Then main actors and beneficiaries of the formulated activities shall also be clarified.

These processes will be carried out for each zone, and activities in each zone will be tabulated.

(4) Development Goal of Master Plan and its Target Year

The development goal of the Master Plan will be decided based on the analysis of the current situation of agricultural products in the Nacala Corridor, potential and constraints of the agricultural development in each zone. The object of development in each zone will be set and the development goal of the Master Plan on agriculture development in the Nacala Corridor will be established.

The target year of the Master Plan shall be ensured the consistency with the target year of PEDSA is 2019. However, about 15 years with 1) short term, 2) middle term and 3) long term is required for agricultural development in the Nacala Corridor area after considering system development, construction of basic infrastructure, improvement of agricultural productivity, and a stable supply of agricultural products/processing products for the international market. Therefore, the target year is currently expected to be 2030

(5) Formulation of Activities for Agricultural Development

The agricultural development potential of each zone will be reviewed based on the direction of development in each zone. Then, the measures will be examined in order to remove the constraints of subsectors effectively and efficiently and to develop the potential. Firstly activities for countermeasures will be formulated. Then main actors and beneficiaries of the formulated activities shall also be clarified. These processes will be carried out for each zone, and activities in each zone will be tabulated.

(6) 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.

(7) Evaluation of the Project and Formulation of Master Plan

All of the agricultural development plans shall be integrated as the Master Plan of Agricultural Development in the Nacala Corridor. Among the plans in the zone, similar projects will be organized and the projects will be integrated into one as a "cross-zone project," which may be done more efficiently if implemented in several zones or all areas at the same time.

The draft Agricultural Master Plan will be formulated with several recommendations for project implementation. These recommendations include improving the investment environment in the agricultural sector in Mozambique, improving the system for agricultural development, improving the system for farmers' organizations including rural financing, and a recommendation to archive the 7 principles of Responsible Agriculture Investment (RAI). Moreover, the development projects and the studies like will be considered in the draft Master Plan formation.

The project evaluation of formulated projects in each zone and cross-zone projects will be conducted and some revisions will be done 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 calculated. 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 summarized. Finally, the draft of the Master Plan of Agriculture Development in the Nacala Corridor will be formulated.

(8) Supporting the 2nd Stakeholder Meeting

The second stakeholder meeting will be organized by the MINAG with support of the Study Team. The formulated draft Master Plan shall be explained and the opinions from participants will be collected. The presentation should be conducted by the Mozambique Counterpart as a part of OJT for technical transfer under the Study Team's support. The second meeting will be held at Maputo in order to call on a wide range of participants, like investors for the agricultural sector in Nacala Corridor or private companies interested in investment in addition to the attendees of the first stakeholder meeting in the Nacala Corridor. The number of expected participants is

80. The invitees will be decided after discussion with the MINAG. And the Study Team

In order to inform implementation and output of the Study in public and to promote private investigation, PR will be done for the second stakeholder meeting. Presently, the mass media, like newspapers, are expected to be invited to the meeting. Details will be discussed with the MINAG and the Study Team. Similar PR activities will be done for the third meeting.

(9) Preparation and Submission of Interim Report (II)

The draft Master Plan and discussion results in the second stakeholder meeting will be submitted as Interim Report II: Data Collection and Analysis of Agriculture in Nacala Corridor and Drawing of an Overall Picture of Development Plan (in November 2012)

The report will be prepared in English, and translated into Portuguese tentatively for discussion with related institutes in Mozambique. The progress of the Study shall be shared among them and the discussion results will be reported in the minutes of the meeting.

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

The QIPs which can achieve the rapid impacts in short period will be selected among the zone-wise priority projects to be implemented early stage of the Master Plan.

The selection criteria for priority projects shall be formulated under the due consideration of 1) direct impacts to the direction of zone-wise development direction and regional economic development, 2) synergetic effects for small, medium farmers and large scale commercial farm, 3) implementation capacity of the MINAG, 4) environmental and social impacts, together with 5) needs and expectation of private investors and MINAG..

Selected priority projects shall be confirmed based on the pre-feasibility level analysis on components of activities, implementation schedule, investment costs/benefits, possible financial resources, etc.

(2) Selection of QIPs

The detailed criteria of QIPs, especially the relationship between scale of preparatory work and selection, will be decided with the MINAG and Brazilian experts based on discussions with private companies. The preference order of the selected QIPs will be studied according to expected financial resources. The expected financial resources are shown on the right.

Table 5.2.1 Criteria for Prioritization of QIPs (draft)

Expected finding resources	Criteria (draft)
Middle and Large Scale	Investment Risk High profitability for investment
Small Farmers	Investment Risk Lower of initial cost
Government Donor and NGO	Number of beneficiaries Economic impact for other area Spared effect

(3) 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 Interim Report (III)

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.