Provisional Translation

Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique

AGRICULTURAL DEVELOPMENT MASTER PLAN FOR THE NACALA CORRIDOR

Provisional Draft

Ministry of Agriculture and Food Security

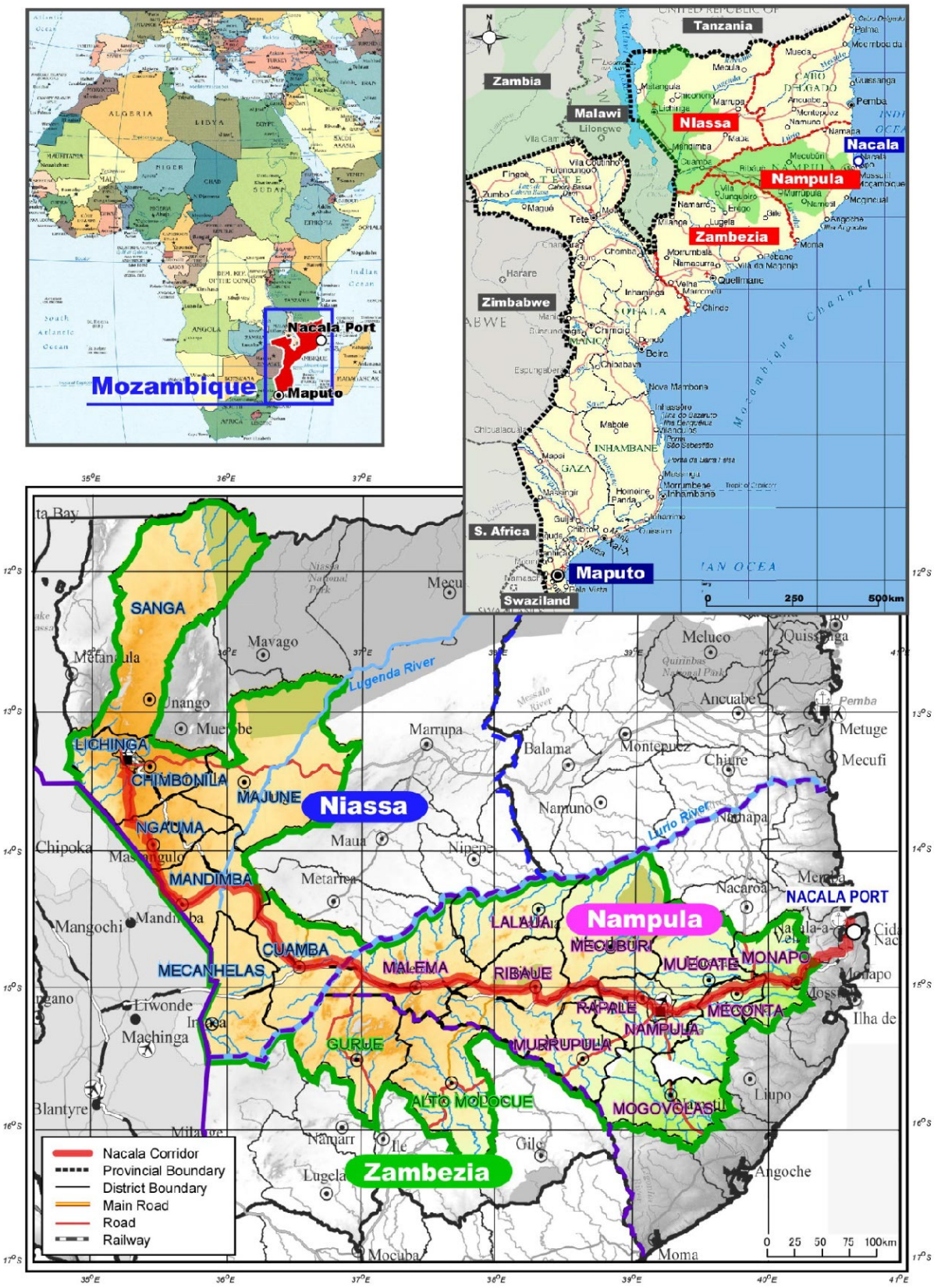
Preface

The Agricultural Development Master Plan for the Nacala Corridor is being formulated through the study of nineteen districts in three provinces of the Nacala Corridor Area located in northern Mozambique. The Master Plan aims to improve the livelihood of inhabitants, especially small scale farmers in the Nacala Corridor and to contribute to socio-economic development in the area.

In its study, challenges of the area were extracted from information of the agricultural and social conditions at the macro level. At the same time, micro-level information was collected through interviews with rural communities, agricultural organizations, and so on. Through cross-verification of the challenges and countermeasures from the macro-level analysis and the current conditions based on the micro-level information, accuracy of the study was improved.

Moreover, numerous comments and advice obtained in dialogue with stakeholders were considered in the study.

This draft of the Master Plan is formulated through the integration of comprehensive micro-level data, micro-level data, and results of dialogue with stakeholders. And this Master Plan draft is a draft for discussions that will further foster the development of the Master Plan.



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ABBREVIATIONS

ABC	Brazilian Cooperating Agency
ADVZ	Zambezi Valley Development Agency
AfDB	African Development Bank
AIDS	Acquired Immune Deficiency Syndrome
AIFM	Integrated Assessment of Forests in Mozambique
AMODER	Association of Mozambique for Rural Development
AMPCM	Mozambican Association for Promotion of Modern Cooperative
ANE	National Agency for Roads
ARA	Regional Water Management Agency
ARA-CN	Regional Water Management Agency - North Central
ARA-N	Regional Water Management Agency - North
ARM	Agricultural Reserchers Meeting
ASANANI	Integrated Water Supply and Sanitation Project for Niassa and Nampula Provinces
ASF	African Swine Fever
AWC	Available Water Capacity
BAGC	Beira Agriculture Growth Corridor
BDS	Business Development Service
BOM	Banco Oportunidade de Moçambique, SA
CARE	Cooperative for Assistance and Relief Everywhere
CDF	Community Development Fund
CDN	Northern Development Corridor
CENACARTA	National Center for Cartography and Remote Sensing
CEPAGRI	Center for the Promotion of Agriculture
CFF	Fruit Research Center
CFS	The Committee on Wold Food Security
CGIAR	International Center for Agricultural Research
CIF	Cost, Insurance and Freight
CLUSA	Cooperative League of the USA
CoC	Chamber of Commerce
CPI	Investment Promotion Centre
CSO	Civil Society Organization
CSR	Corporate Social Responsibility
CTA	The Confederation of Economic Associations of Mozambique
CWB	Climatic Water Balance
DAC	Development Assistance Committee
DAP	Diammonium Phosphate
DE	Economics Directorate
DFID	Department for International Development, United Kingdom
DIF	Development Initiative Fund
DNA	National Directorate of Water
DNAIA	National Directorate of Environmental Impact Assessment
DNAPOT	National Directorate of Land Planning and Management
DNEA	National Directorate of Agrarian Extension
DNSA	National Directorate of Agrarian Service
DNSV	National Directorate of Veterinary Service
DNTF	National Directorate of Land and Forestry
DPA	Provincial Directorate of Agriculture
DPASA	Provincial Directorate of Agriculture and Food Security

DPCA	Provincial Directorate for the Coordination of Environmental Affaire
DPIC	Provincial Directorate of Planning and International Cooperation
DPOPH	National Directorate of Land Planning and Management
DPTC	Provincial Directorate of Transport and Communications
DUAT	Land Use Rights
EAPF	Family-based Agricultural Exploitation
EATTA	East Africa Tea Trade Association
EIA	Environmental Impact Assessment
EP	Primary Education
ESG	Secondary Education
ESMI	Mother and Child Health Care
FAO	Food and Agriculture Organization
FAOSTAT	Food and Agriculture Organization Statistic
FDA	Fund for Agriculture Development
FDD	Fund for District Development
FFS	Farmer Field School
FINNIDA	The Finnish Department for International Development Cooperation
FIPAG	Water Supply Investment and Assets Fund
FOB	Free on Board
F/S	Feasibility Study
FUNAB	Fundo Nacional do Ambiente (National Environment Fund)
FUNDAG	Fundação de Apoio à Pesquisa Agrícola
FUNAE	Energy Fund
GAPI	Office to Support Small-scale Investment
GAZEDA	Cabinet of Accelerated Economic Development Zones
GDP	Gross Domestic Product
GEF	Global Environmental Fund
GIS	Geographic Information System
GMO	Genetically-Modified Organisms
GOM	Government of Mozambique
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
HCB	Cahora Bassa Hydro Power Plant
HIV	Human Immunodeficiency Virus
IAM	Cotton Institute of Mozambique
ICM	Cereals Institute of Mozambique
ICT	Information and Communication Technology
IFDC	International Fertilizer Development Center
IFZ	Industrial Free Zone
IIAM	Agriculture Research Institute of Mozambique
INAM	National Meteorological Institute
INCAJU	Institute for Promotion of Cashew Nuts
INE	National Statistics Institute
INFATEC	Training Institute of Land and Cartography
INGC	National Institute of Disaster Management
INIR	National Institute of Irrigtaion
INNOQ	National Institute of Standards and Quality
IPEME	Institute to Promote Small and Medium Enterprise
IPEX	Institute of Export Promotion
iTC	Community Land Initiative
JICA	Japan International Cooperation Agency

LCCS	Land Cover Classification System
M&E	Monitoring and Evaluation
MASA	Ministry of Agriculture and Food Security
MCA	Millennium Challenge Account
MEHD	Ministry of Education and Human Development
MFC	Mozambique Fertilizer Company
MGCAS	Ministry of Gender, Children, and Social Welfare
MIC	Ministry of Industry and Commerce
MICOA	Ministry for Coordination of Environment Action
MINAG	Ministry of Agriculture
MISAU	Ministry of Health
MITADER	Ministry of Land, Environment, and Rural Development
MOP	Ministry of Planning
MOPHRH	Ministry of Public Works, Housing, and Water Resources
MPD	Ministry of Planning and Development
MT	Meticais
MTC	Ministry of Transport and Communication
NGO	Non-Governmental Organization
NPK	N: Nitrogen、P: Phosphoric acid、K: Potassium
O/M	Operation and Maintenance
OECD	Organization for Economic Co-operation and Development
OMM	Organization of Mozambican Women
PAPA	Action Plan for Food Production
PARP	National Action Plan for the Reduction of Poverty
PDC	Cashew Master Plan
PDEA	Agriculture Extension Master Plan
PDUT	District Land-use Plan
PE	Primary Education
PEDEC	Project for Nacala Corridor Economic Development Strategies
PEDSA	Strategic Plan for Agricultural Development
PEMA	Strategic Plan of Agricultural Mechanization
PNISA	National Investment Plan for the Agricultural Sector
PPP	Public-Private Partnership
PPPP	Public-Private-Population Partnerships
PROMER	National Program for Rural Market Promotion
PRONEA	National Program for Agricultural Extension
ProSAVANA	The Triangular Cooperation Program for Agricultural Development of the African Tropical Savannah in Mozambique
ProSAVANA-PI	The Project for Improving Research and Technology Transfer Capacity for Nacala Corridor Agriculture Development in Mozambique
ProSAVANA-PEM	The Project for Establishment of Development Model at Communities' Level with Improvement of Rural Extension Service under Nacala Corridor Agricultural Development in Mozambique
"rai"	Responsible Investment for Agriculture and Food Systems
RRIP	Rural Roads Implementation Program
SDAE	District Services for Economic Activities
SDC	SwissAgency for Development and Cooperation
SDPI	District Service of Planning and Infrastructure
SEA	Strategic environmental assessment
SETSAN	Technical Secretariat for Food Security and Nutrition
SEZ	Special Economic Zone
SIDA	Swedish International Development Cooperation Agency

SIMA	The Agriculture Market Information System
SME	Small and Medium Sized Enterprises
SMS	Short Message Service
SNS	National Health Service
SPER	Provincial Agricultural Extension Services
SPFFB	Provincial Service of Forest and Wildlife
SPGC	Provincial Service of Geography and Registry Cadaster
SU	Sanitary Units
SWOT	Strengths, Weaknesses, Opportunities and Threats
TA	Technical Assistance
TIA	Agricultural Survey
UBS	Seed Processing Unit
UCASN	Union of Peasants of South Niassa
UNAC	National Union of Peasants
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UPCN	Provincial Union of Farmers for Peasants in Niassa
USAID	United States Agency for International Development
VAT	Value Add Tax
VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
WAISIS	Water Service and Institutional Support Project
WB	World Bank
WFP	World Food Programme
WHO	World Health Organization
ZAEN	National Agro-Ecological Zoning

CHAPTER 1 INTRODUCTION

1.1 Development in the Nacala Corridor according to PEDSA

The tropical savannah area in northern Mozambique is considered to have potential for agricultural production due to adequate annual rainfall of around 800 to 1,200 mm and vast arable land. However, agricultural production is not well-developed in this area and many small-scale farmers carry out subsistence agriculture applying traditional and extensive agricultural techniques. Meanwhile, due to a rapidly increasing population, there is an estimated 3.0% of annual increase in demand for food. Therefore, fields for cultivation and a better livelihood are required.

The strategic policies for the development of the agricultural sector in Mozambique are based on (i) Agenda 2025, (ii) the Strategic Plan for Agricultural Development (PEDSA 2011-2020), (iii) the Government's Five-Year Program, and (iv) the National Action Plan for the Reduction of Poverty (PARP). In addition, there are also individual development plans for the provinces and districts. With all these plans in existence, coordination between the central and local governments is an important requirement.

The vision of PEDSA is a prosperous, competitive, and sustainable agriculture sector that is capable of providing sustainable responses to food security and nutrition challenges and can target global agriculture markets. PEDSA's general objective is to contribute to food security and farmers' income in a sustainable and competitive manner, assuring social and gender equality.

PEDSA defines four pillars to achieve its vision and objective, namely:

PILLAR I: AGRICULTURAL PRODUCTIVITY: Increased agricultural productivity, production and competitiveness, contributing to food security and adequate nutrition.

PILLAR II: MARKET ACCESS: Services and infrastructure for better access to markets, and a development framework directed towards agricultural investments.

PILLAR III: NATURAL RESOURCES: Sustainable and integrated use of land and water resources, forests, and fauna.

PILLAR IV: INSTITUTIONS: Strengthening agricultural institutions.

To allow the implementation of PEDSA, the National Investment Plan for the Agricultural Sector (PNISA), together with a program of policies and institutional reforms for the agricultural sector for the mid-term, was launched in 2013.

Six development corridors were established for the implementation of the PEDSA and PNISA. These are: Maputo, Limpopo, Beira, Zambeze Valley, Nacala, and Pemba-Lichinga.

The Nacala Corridor is one of six corridors identified for implementing the PEDSA. For this purpose, a Triangular Cooperation Programme for Agricultural Development of the Tropical

Savannah in Mozambique (ProSAVANA), adapted to the specific agricultural characteristics of this region, has been established.

1.2 Location and Extent of the Nacala Corridor Area

The Nacala Corridor is located in the northern part of Mozambique. It starts at the Nacala Port at the coast of the Indian Ocean connecting Mozambique to Malawi and Zambia. The Nacala Corridor in Mozambique has a total length of more than 700 km.

The Triangular Agreement signed by government representatives from Mozambique, Japan, and Brazil, on September 17, 2009, determined that the ProSAVANA Study Area would be the Nacala Corridor. In an agreement signed on December 3, 2012, the three parties reconfirmed that the ProSAVANA is located between the parallels 13°S to 17°S, including the Provinces of Cabo Delgado, Nampula, Niassa, Zambezia, and Tete. In the scope of this agreement, the parties defined 19 districts in Nampula, Niassa and Zambezia provinces as the study area for the Programme.

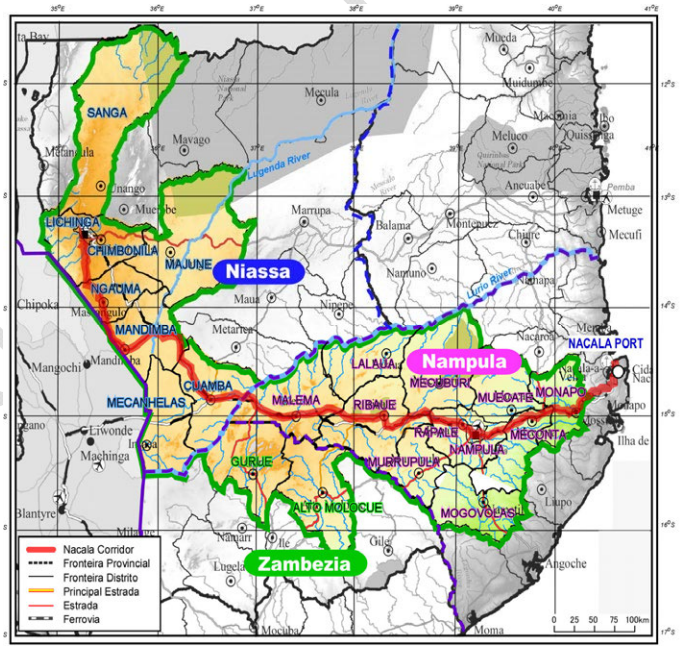


Figure 1.2.1 Location of the Study Area

Hence, the study area for the formulation of the ProSAVANA Master Plan comprises 19 districts located along the Nacala Corridor affected by the development of the corridor, which means improving railway and road networks from Nacala Port to Malawi and Lichinga in the provinces of Nampula, Niassa, and Zambezia. In Zambezia Province, two districts in the north, strongly connected to the Nacala Corridor, have been included in the study area.

Nampula Province:	The districts of Monapo, Meconta, Muecate, Mogovolas, Rapale (Nampula), Murrupula, Mecuburi, Ribaue, Lalaua and Malema.
Niassa Province:	The districts of Chimbonila (Lichinga), N'Gauma, Mandimba, Cuamba, Sanga, Majune and Mecanhelas.
Zambezia Province:	The districts of Gurue and Alto Molocue.

The Study Area has an extent of 107,002 km^2 and an estimated population of about 4,287,415[1]. The Master Plan is formulated to generate a new development model, taking into consideration

[1] 2011 National Statistic Institute (INE) Population Census estimate

environmental and socio-economic aspects aiming at a rural and regional market-oriented agricultural development with a competitive advantage. The study area of the Master Plan consists of 19 districts to establish a development model; the Mozambican government will promote the adaption of the model to the other districts located between 13 to 17 degree in the future.

1.3 Agricultural Development to Improve Livelihoods of the People in the Nacala Corridor

The tropical savannah of northern Mozambique, where the Nacala Corridor is located, includes vast areas of arable land with relatively fertile soil and a consistent rainfall. These areas offer a high potential for expanding agricultural production. Productivity and production in Mozambique varies throughout the northern, central and southern regions, mainly because of climate and soil characteristics; they are comparatively lower in the southern region than in the northern and central regions of the country.

The northern region is a potential food producer to supply the south, including the capital, Maputo, where current demand for food is high. This means that the increase in agricultural production in the north will significantly contribute to national food security. Therefore, the dynamic promotion of agricultural development in that region will be essential to achieving food security and the socio-economic development of the country.

The total gross regional domestic product (GRDP) of the three provinces in the north of Mozambique, Niassa, Cabo Delgado, and Nampula, where agriculture is the basis of the economy, accounts for 27.2% (2011) of the national gross domestic product (GDP[2]). This demonstrates the significant economic importance of the northern region. However, GRDP per capita is about 60% of the national average, and the people of the northern region need dynamic and accelerated development to reach the same development level as the other regions.

The definition of family farming varies throughout the world and is flexibly employed according to national criteria and cultural traditions. Within this diversity of meanings, Food and Agriculture Organization (FAO) defines family farming as “All family-based agricultural activities linked to different areas of rural development. Family farming is a way to organize agriculture, silviculture, fisheries, and aquaculture, managed and operated by a family and predominantly dependent on family labor, including women and men.”[3] Family farming has become the main method of food production, playing an important socio-economic, environmental, and cultural role.

In Mozambique, family farming is classified as Family-based Agricultural Exploitation (EAPF) and defined as "a holding in which at least 75% of the agricultural labor force is provided by the

[2] INE, 2011
[3] http://www.fao.org/family-farming-2014/home/what-is-family-farming/en/

farmer household, without payment." The total area of EAPF covers all owned plots (fields) that are engaged in full use, as well as fallow land with fruit trees or private pastures, kitchen gardens and other small plots (usually not considered fields because of their small size) around the house and is an autonomous management unit where almost all decisions are made by the head of the household

The majority of people living in the northern region are small-scale farmers[4], mainly engaged in traditional subsistence family farming, characterized by the practice of shifting cultivation.

Shifting cultivation is a practice used by farmers for the natural restoration of soil fertility. However, the high population growth in the country has led to an increase in the demand for land. The intensive use of soils without the proper soil management results in a shorter period of fallow, turning soil fertility, productivity and food security of these farmers in challenges to be faced.

To reverse this scenario it is necessary to introduce new cultivation systems and techniques to increase agricultural production and productivity. The introduction of a competitive and market-oriented agriculture sector requires the elimination of constraints and the sustainable use of the existing potential of the northern region. This will contribute to meeting the growing demand for food resulting from population growth, creation of wealth, and the improvement of living conditions.

Increased and stable agricultural production is important for achieving poverty reduction, to attain food security and to improve the nutritional food intake of the rural population, where the main source of livelihood is derived from farming. The formulation and application of an appropriate development approach, consistent with existing agricultural conditions in the rural areas, is critical for the fight against poverty and attaining food security.

The approach should include improving access to agricultural input, developing production infrastructure, strengthening farmers' organizations, and improving the capacity of the public and the private sectors to provide agricultural research and extension services, as well as financial services. In addition, the development of social infrastructure is important, as are the formulation of agricultural development models specific to the natural, economic, environmental, social, and cultural conditions in the northern region.

Socially vulnerable groups such as young people and households headed by women should be particularly taken into account. The introduction of appropriately adaptive cultivation techniques and the development of farmers' capacity, with the support of the relevant government entities and NGOs (Non Governmental Organizations) and in cooperation with the private sector, are important elements to increase agricultural production and productivity and to

[4] 80% of employed population in 10 districts in the study area is engaged in agriculture, forestry and fishery sector in 2011 (source: Base de Dados Territoriais, INE 2011)

promote market-driven crop diversification. In this respect, close cooperation between the public and private sectors for the agricultural development and modernization is very important.

1.4 Guiding Principles of the Agricultural Development Master Plan

The guiding principles of the Agricultural Development Master Plan for the Nacala Corridor form the foundation for the formulation of the basic approach and strategies for agricultural development in the Nacala Corridor. The seven guiding principles are;

(1) Inclusive, dynamic, sustainable and balanced development of the Nacala Corridor, with emphasis on family farming

The Master Plan aims to develop and coordinate synergies to promote partnerships in on-going development initiatives along the Nacala Corridor, intended to boost agricultural development in the region. Agricultural development will be largely focused on small farmers who are in need of increasing agricultural productivity, improving market access and the sustainable use of natural resources. The small-scale farmers represent the majority of the population in the Nacala Corridor, and who will contribute to the development of the entire region.

(2) Socio-economic and cultural development of communities and the improvement of living conditions of the population in the Nacala Corridor

In addition to economic development, including natural resources and infrastructure, socio-cultural development related to education, health, gender, water supply, and other social infrastructure, institutional development, and capacity building of human resources should also be considered. It is therefore expected that the development will be comprehensive, including economic, social and cultural aspects.

Agricultural development will also contribute to social development by promoting food security, malnutrition mitigation, income generation and poverty reduction in rural areas, in addition to other cross-cutting issues.

(3) Development of supply chains on the basis of agro-ecological potential and improvement of market access conditions

The region of the Nacala Corridor presents agro-ecological conditions that vary considerably along its length. The traditional agricultural practices and the existing business patterns in the region indicate that farmers have some knowledge and apply techniques relating to the management and sales of crops.

Based on the current cropping/farming systems and the analysis of the potential of each ecological zone, the Master Plan recommends interventions based on good farming practices and the availability of adequate technology to support farmers' decision making.

The Master Plan will also consider strengthening the supply chain for potentially high value

crops in each zone, but ensuring the right of the farmers to choose the crops they want to grow. The promotion of food/commodity processing for trade and industry and improving market access for local farmers will be emphasized.

(4) Promoting the protection of the rights of the use of communal land

In the context of increasing demand and rising food prices worldwide, pressure by transnational developers of land has increased in recent years. Land-use conflicts regarding agricultural development have been reported, even attracting the international community's attention. Such land-use conflicts occur when large investors, such as multinational corporations or foreign governments, promote agricultural development by purchasing or borrowing farmland in other countries. To mitigate the issue of land-use conflict, the Government of Mozambique is promoting the distribution of land titles to communities and farmers based on the National Land Policy, Land Law (law no. 19/97) and its regulation (decree no. 66/98), as well as the PEDSA and PNISA. This effort is supported by initiatives such as the internationally practiced "Responsible Investment for Agriculture and Food System (rai)".

The formulation of the present development plan introduces measures to assure that the proposed interventions benefit farmers and their families, and considers measures to protect the local population against threats. Therefore, the present plan emphasizes the prevention of land-use conflicts and assuring stable means of living and subsistence.

(5) Promoting technological innovation and the dissemination of new technologies to increase production and productivity, supported by training systems for farmers to increase their capacity of informed choice, learning and adaptation of technology

Agricultural development in the Nacala Corridor Area requires the implementation of supporting measures to improve the family farming practiced by 99% of the farmers in the region[5]. In this context, family farming has a fundamental role in eradicating poverty and hunger, assuring food and nutritional security, improving means of living, natural resources management, and environmental protection.

The Agricultural Development Plan was formulated to promote the enhancement of the existing farming technologies and the living conditions of the Nacala Corridor population, through the use of agricultural inputs and promotion of commertial agriculture, as well as conservation agriculture.

[5] In Niassa, 99.7% of farm-households are classified as small scale, while the rates in Zambezia and Nampula are both 99.9%, according to criteria of INE, (Source Agricultural Census 2010-2011)

(6) Promoting collaboration between the public sector and all other sectors involved in the agricultural development, including Public-Private-Population Partnerships (PPPP) to improve efficiency and reduce costs in the supply chains

The Government has supported family farmers to overcome several challenges the agriculture production process faces, and it will actively continue to provide such support. Private sector interventions efficiently and effectively contribute to overcome challenges to the supply of agricultural inputs, including the use of certified seed, market access, and financial services. It is therefore essential that there is constant coordination between the Government and the private sector to address these challenges.

In this context, one of several actors working in the field of social and economic development is the United Nations Development Programme (UNDP), which states, "The private sector plays an important role as the engine of economic growth and job creation, providing products and services, generating tax revenues to finance essential social and economic infrastructure, and also contributes through the provision of new and innovative solutions that help tackle development challenges"[6].

The formulation of an agricultural development plan, therefore, will support and stimulate local agribusiness (with domestic, regional, and international linkages whenever possible), as well as establish public-private-population partnerships (PPPP) to promote and foster agricultural development.

The implementation of the Master Plan of Agricultural Development in the Nacala Corridor will stimulate increased agricultural production through cropping diversification, among others. Moreover, rural infrastructure such as roads, warehouses, and support systems to promote and sustain local agribusiness will be developed. In this context, effective mechanisms of conflict prevention and resolution will be important to improve the business environment, and participation of civil society, including farmers' representatives, is necessary.

(7) Environmental considerations for the development of agricultural activities

To achieve sustainable development of rural areas, interventions promoting environmental conservation are essentials, Population and economic growth in the Nacala Corridor increase the pressure on natural resources, causing deforestation, soil erosion and degradation, among others. The Master Plan shall therefore consider measures to mitigate negative impacts on natural resources and the overall environment. Based on this precondition, the Master Plan advances, promotes and supports environmental protection through interventions emphasizing natural resource conservation, including forest development in vulnerable areas.

[6] http://www.undp.org/content/undp/en/home/ourwork/partners/private_sector.html

1.5 Master Plan Formulation Methodology

The formulation of the Master Plan started in 2012 and involved a technical team that consisted of experts in various fields from the Ministry of Agriculture and Food Security of Mozambique (MASA). It also included the Provincial Directorates for Agriculture and Food Security (DPASAs) of the Provinces of Nampula, Niassa, and Zambezia. Technical Assistance (TA) was provided by the governments of Japan and Brazil. A local company was subcontracted to conduct specific surveys of farmers' organizations and agricultural trade.

The Study for the preparation of the Master Plan was conducted using several approaches on existing conditions and agricultural potential and constraints in the Nacala Corridor. The Study Team reviewed and analyzed existing reports, plans, regulations, documents and primary data provided by MASA, DPASAs, District Service for Economic Activities (SDAE) and other public and private organizations.

The PEDSA, PNISA and other relevant primary-level plans and policy documents of the Government of Mozambique were collected and analyzed. The statistical data of provinces and districts was collected from MASA, National Statistics Institute (INE) and three DPASAs in Nampula, Niassa and Zambezia.

The experts based their work on existing studies of agriculture and rural areas, and on interviews conducted at government and private sector institutions, local communities, NGOs, and other civil society organizations.

In addition to the analysis and review of the above enumerated documents and information, fieldwork was carried out to better understand the prevailing conditions. During this fieldwork, members of the Study Team visited all districts within the Study Area several times and conducted interviews at SDAE, individual farmers, and private companies.

As part of the scope of the Study, a survey of farmers' organizations was conducted to obtain information about their organizational structure, functions, and legal and financial conditions. Farmers' organizations in 14 districts [7] were identified, with interviews conducted at three federations, 35 forums, and 144 individual organizations (associations and

Source: JICA Study Team

Figure 1.5.1 Identified Six Zones in the Study Area

[7] The study area in 2012 consisted of 14 districts; currently there are 19 districts

cooperatives), giving a total of 196 farmers' organizations. In order to enhance the collected information and obtain more, first-hand detail, four workshops were organized with representatives of the farmers' organizations at district level forums.

A survey on agricultural trade was also prepared and conducted to collect information on agricultural production, consumption, sales, and percentages of losses by small-scale producers; trading conditions of agricultural products in the region; as well as processing and other related activities.

Existing data in the Geographic Information System (GIS) and other data collected during the study provided by Mozambican and international institutions, such as FAO, were compiled in a database. The data and information was analyzed by using GIS to better understand the distribution of natural resources and land use, and to evaluate agricultural potential.

As part of the scope of the Study, zoning based on a survey of agricultural potential, population density, other social indicators, and infrastructure in the Nacala Corridor was conducted, and six zones were identified, described in Section 2.13. A SWOT analysis (SWOT = Strengths, Weaknesses, Opportunities and Threats) was performed for each zone and, based on the analysis, the potential trend for agricultural development was presented and discussed.

The Global Model for Rural Development in the Nacala Corridor, which aims to improve the living standard of the population in the region, was prepared based on the information derived from the above-mentioned works.

Based on the work described above, a Concept Note was prepared as a basis for discussions and to get new ideas, comments, and suggestions for the direction of the Master Plan. For this purpose, separate meetings with stakeholders including local farmers, private sector companies, NGOs, and other civil society entities were conducted. At each meeting, the Study Team presented the study progress, and stakeholder participants made their comments and gave suggestions and opinions.

CHAPTER 2 ANALYSIS OF PRESENT CHALLENGES TO AND POTENTIAL OF AGRICULTURAL DEVELOPMENT

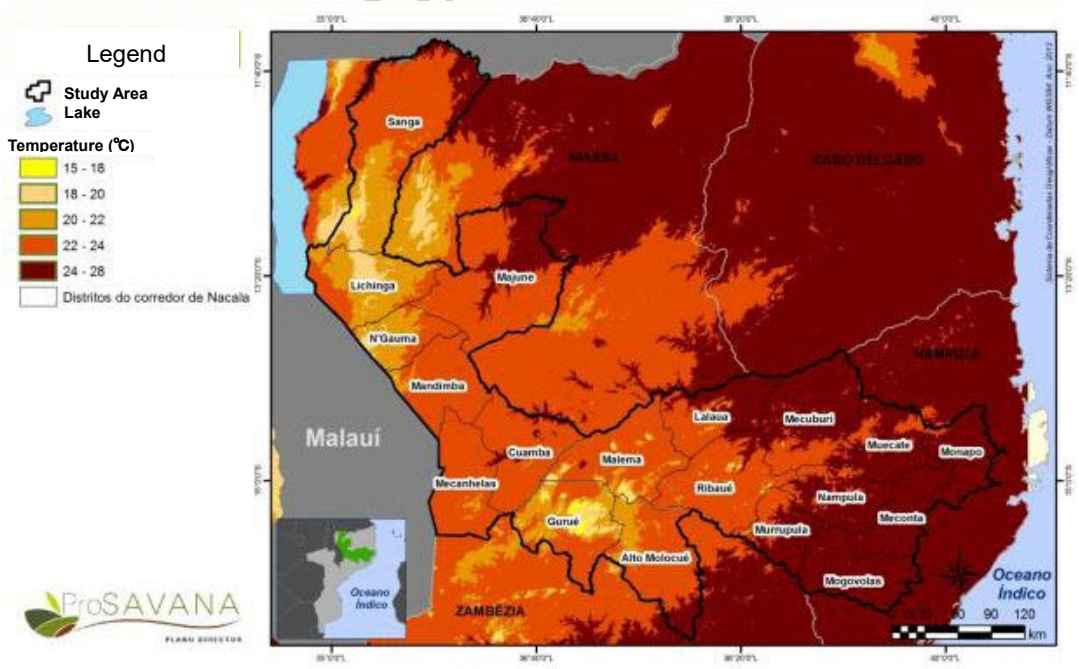
This chapter presents the results of the analysis of existing challenges and potentials for agricultural development in the Nacala Corridor Area based on the understanding of present conditions obtained from several field surveys and research of literature conducted by the various experts of the Study Team since 2012. Detail and their back ground data is also described in Annexes and data book.

2.1 Natural Conditions

2.1.1 Climate

(1) Precipitation and Temperature

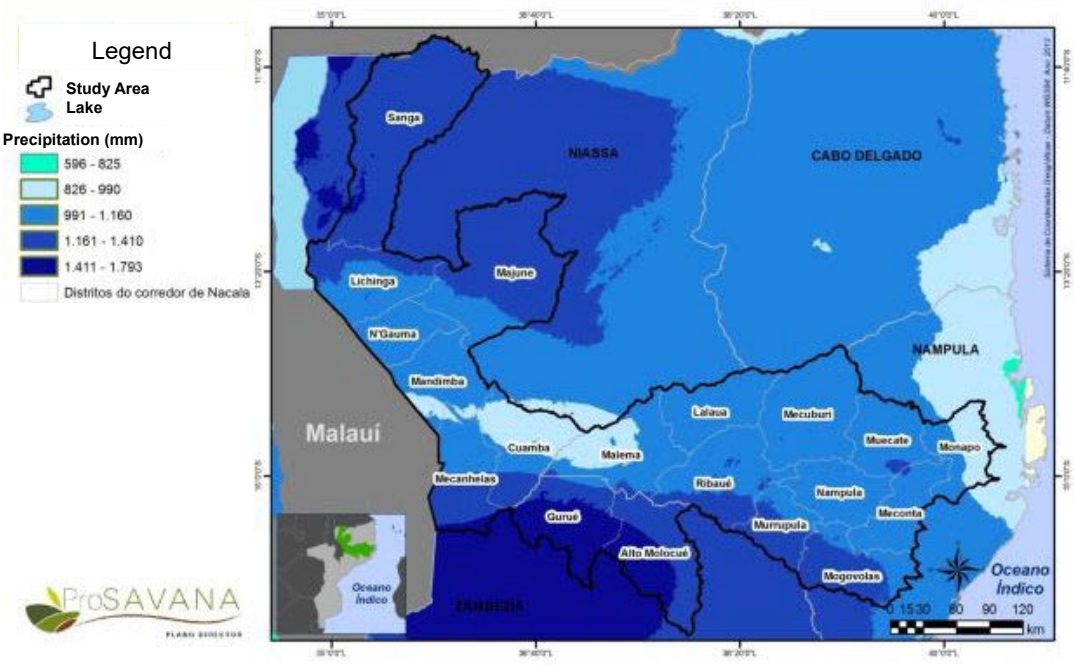
The mean annual temperatures in the Study Area vary from 24 to 28ºC in the eastern (coastal) area, represented by Monapo and it declines to from 22 to 24ºC in the western (inland) area, represented by Cuamba. In the high land area of Lichinga, the mean annual temperature goes below 22 ºC. The mean maximum and minimum temperature is from 32 to 33ºC and more than 20ºC in the eastern area and from 28 to 29 and from 15 to 16ºC in the western area. Lichinga has cooler climate due to the high elevation, which is below 27ºC for maximum and below 16ºC for minimum.



Source: JICA Study Team

Figure 2.1.1 Annual Mean Temperature

The rainy season continues from November to April and the dry season is from May to October. According to the isohyetal map of annual precipitation shown in Figure 2.1.2, the mean annual precipitations ranges from 1,000 to 1,200 mm over most of the Study Area. There are also areas with precipitation of 800 to 1,000 mm in Monapo, part of Malema and Cuamba and areas with precipitation over 1,400 mm in Gurue and Alto Molocue. Some mountainous areas in Gurue have annual precipitation exceeding 1,600 mm.



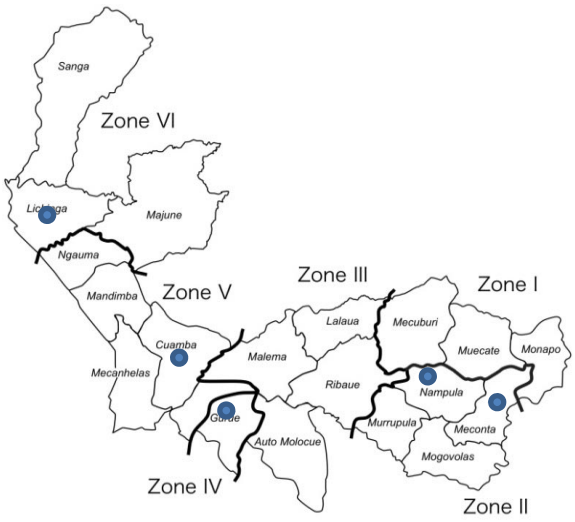
Source: JICA Study Team

Figure 2.1.2 Annual Precipitation

(2) Climatic Water Balance (CWB)

Based on the Available Water Capacity (AWC) of 100 mm, per data provided by the National Meteorological Institute (INAM), the Climatic Water Balance (CWB) was calculated for five locations in the Study Area along the Nacala Corridor at Meconta, Nampula, Gurue, Cuamba, and Lichinga,

The CWB was calculated using the methodology established by Thornthwaite and Mather (1955), by applying precipitation and evapotranspiration data to compute real evapotranspiration as well as water deficit and surplus.

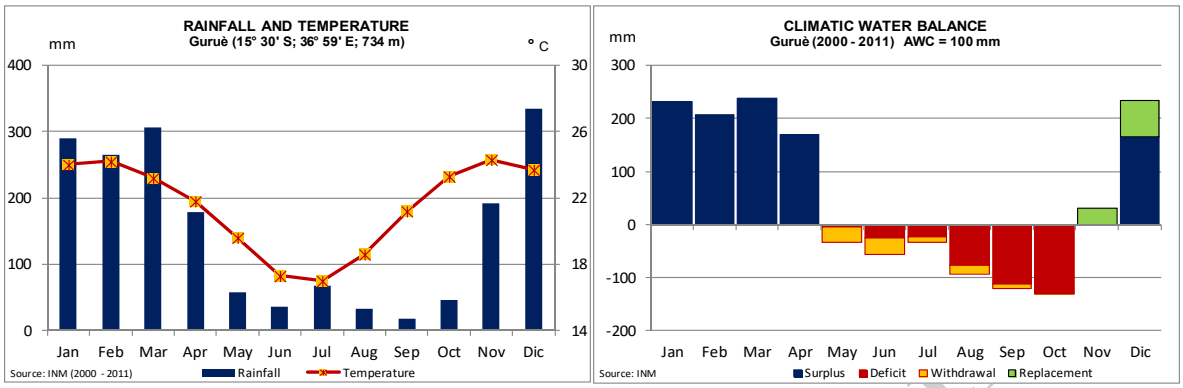


Source: JICA Study Team

Figure 2.1.3 Five Locations of the CWB Calculation

The computation shows that among these five locations, Gurue has a six-month water deficit and the other locations have insufficient water for seven months. The period with water surplus

in the soil is five months in most of the Study Area, meaning that there are only five months of water availability in the soil for crop cultivation, which is considered sufficient to grow most annual crops.



Source: JICA Study Team

Figure 2.1.4 Temperature, Rainfall and CWB of Gurue

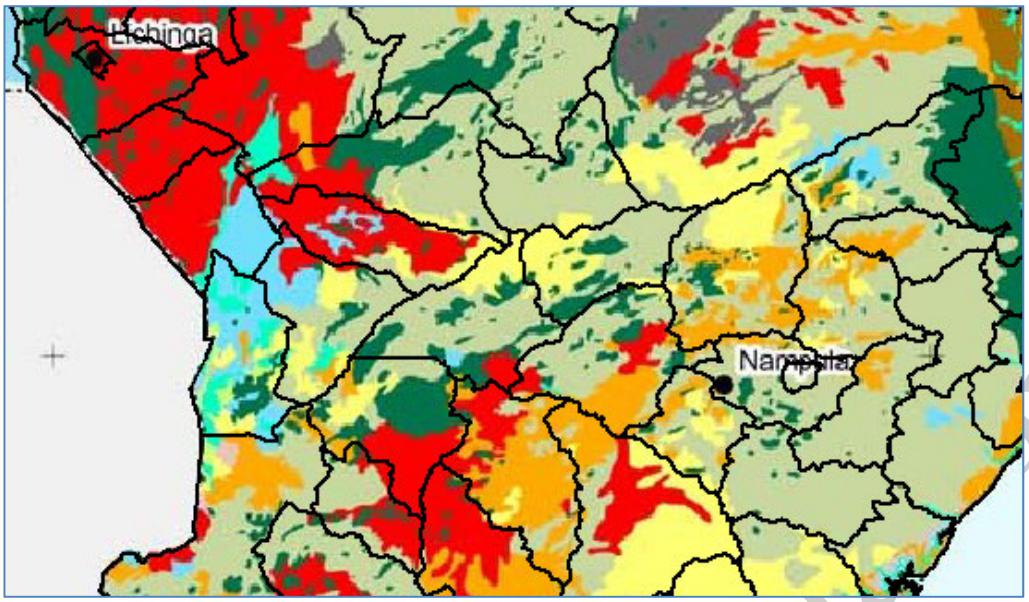
However, with considering the crop calendar (refer to Figure 2.4.1), it can be said that the five-month period gives relatively little flexibility to farmers to carry out agricultural activities, including sowing, allowing very little labor force adjustment. A longer period with availability of water would allow larger areas to be farmed, the labor force to be optimized, and the application of more flexible production systems.

Moreover, beginning of rainy season is not stable in recently due to effect of climate change. Therefore, some practice needs farmers to maintain their flexibility for cultivation.

2.1.2 Soil

Comparing the scale, applied soil classification system and published year, the use of the 2010 soil map elaborated by FUNDAG/(Fundação de Apoio à Pesquisa Agrícola) Agriculture Research Institute of Mozambique (IIAM) seems optimal for the purpose of the present study.

As shown in Figure 2.1.5, major soil types in the Study Area correspond relatively well to the relief. The soils of the Study Area are almost neutral or only weakly acidic, except for several samples in Gurue district with a lower than pH 6, meaning no severe acidity problems. Salinity problem is not reported, either. Nutritional levels of nitrogen, phosphorous and potassium are also reportedly fair to deficient, especially low for potassium. Texture was mostly sandy with a few exceptional clayey soils. Problems of soil erosion reported in several districts of the Study Area are shown in Table 2.1.1.



Source: JICA Study Team (adapted from the "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 2.1.5 Soils in the Study Area

Table 2.1.1 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 constructing barriers.
	Monapo	Gully (Rain, Disordered land use, Human activities)	Constructing 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, Ministry for Coordination of Environment Action (MICOA) 2007"

2.2 Social Conditions

2.2.1 Population

The estimated population of the Study Area is about 4,287,415[8]. Comparison of population density between districts shows that densities ranges from 3.0 (Majune) to 97.2 people/km^2 (Monapo), with an average of 40.1 people/km^2. The average number of members in a family is

[8] 2011 INE Population Census estimate

5.0. The annual population growth rate is estimated to be 3.0% from 2011 to 2030. At that growth rate, the 2030 population density is estimated to be 71.8 people/km^2.

The economically active population in the districts is on average 51.6% of the total population, and 40.4% of the active population is unemployed.[9]

Table 2.2.1 Area and Population of the Three Provinces of the Master Plan

Province			Nampula	Zambezia	Niassa	Total
Whole Province	Area*1 (km^2)		81,606	105,008	129,056	315,670
	Population 2011		4,529,803	4,327,163	1,415,157	10,272,123
	Population density (inhab./km^2)		55.51	41.21	10.97	32.54
Target Area	Area*2 (km^2)		47,288	12,027	47,687	107,002
	Population 2011		2,566,961	670,697	1,049,757	4,287,415
	Population density (inhab./km^2)		54.28	55.77	22.01	40.07
	Share of Province	Area	57.9%	11.5%	37.0%	33.9%
		Population	56.7%	15.5%	74.2%	41.7%

Source: *1 Statistic Yearbook 2010 (INE), *2 National Center for Cartography and Remote Sensing (CENACARTA), others by Census 2007(INE) on Populations are Population Projection based

Table 2.2.2 Population Projection in 2030 and Annual Growth Rate

Province	Nampula	Zambezia	Niassa	Total
Population 2011	2,566,961	670,697	1,049,757	4,287,415
Population in 2030	4,371,233	1,241,132	2,065,288	7,677,654
Annual population growth	2.7%	3.1%	3.4%	3.0%

Source: Population Projection 2007-2040 (INE)

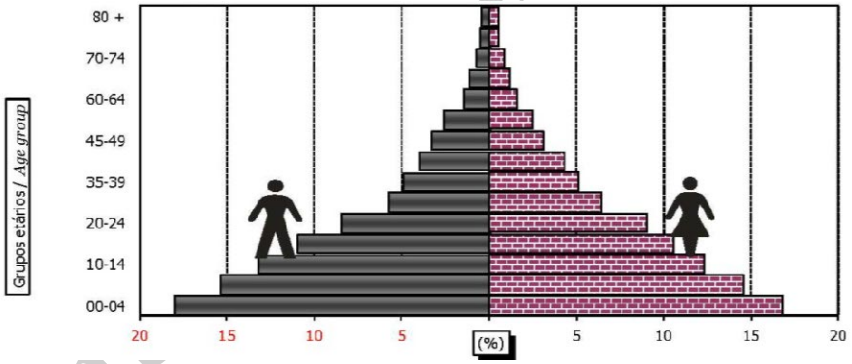


Figure 2.2.1 Population Pyramid in Mozambique (2012)

Source: Annual Statistic 2013 (INE)

2.2.2 Gross Regional Domestic Production

Regarding the economic scale of each province, the GRDP (2011) of Nampula is the highest at 29 billion MT, which is about 15% of the national GDP. The total GRDP in 2011 of the study provinces comprise 27.2% of the whole country, as shown in Table 2.2.3.

[9] Base de Dados Territoriais, INE 2011 (Refer to Annex)

Table 2.2.3 GRDP in the Study Area

Province	GRDP (million MT, 2003 constant prices)				Annual Growth Rate (%)		
	1997	2000	2007	2011	1997-2000	2000-2007	2007-2011
Nampula	10,634.7	13,118.0	22,192.3	29,321.3	7.2	7.8	7.2
Zambezia	7,250.0	8,102.3	13,977.4	18,505.8	3.8	8.1	7.3
Niassa	2,368.3	2,651.9	4,587.0	5,930.7	3.8	8.1	6.6
Total Study Provinces	20,253.0	23,872.2	40,756.7	53,757.8	5.6	7.9	7.2
Maputo city	12,890.9	16,903.0	28,073.0	37,247.5	9.5	7.5	7.3
Mozambique	69,073.7	84,989.3	151,299.9	197,524.4	7.2	8.6	6.9

Sources: INE, 1997, 2000 and 2011

Comparing the GRDP per capita of each province with the GDP per capita of Mozambique (7,333 MT in 2007), that of Nampula is the highest at 5,433 MT. The GRDP per capita of Niassa and Zambezia were 3,780 MT and 3,593 MT, respectively. With these figures accounting for 49% to 74% of the per-capita GDP, economic activities in the Nacala Corridor Area are considered at a low level.

Table 2.2.4 GRDP per Capita in the Study Area

Province	GRDP per Capita (MT at 2003 Constant Prices)		Proportion of GRDP to Whole Country (%)		Annual Growth Rate (%)
	1997	2007	1997	2007	1997-2007
Nampula	3,471	5,433	81	74	4.6
Zambezia	2,341	3,593	54	49	4.4
Niassa	2,929	3,780	68	52	2.6
Maputo city	13,048	25,254	304	344	6.8
Mozambique	4,297	7,333	100	100	5.5

Sources: INE, 1997 and 2007

2.2.3 Poverty

The poverty incidence of Mozambique improved between 1996 and 2003, falling from 69.4 to 54.1%. However, between 2003 and 2009, poverty incidence remained nearly unchanged. The poverty incidence of Zambezia Province increased from 44.6% in 2003 to 70.5% in 2009, the worst in the country. In Nampula Province the situation also worsened, from 52.6% in 2003 to 54.7% in 2009. On the other hand, poverty in Niassa Province decreased significantly from 52.1% in 2003 to 31.9% in 2009. It is assumed that the cause for the deterioration in poverty in 2008 was the decline in the agricultural sector caused by inclement weather. It can therefore be concluded that the stability of agricultural production significantly contributes to poverty reduction in areas where agriculture is the main economic activity.

Table 2.2.5 Trends in 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: MOP, Poverty and Wellbeing in Mozambique, Oct. 2010

2.2.4 Education

The illiteracy rate is high in the three provinces of Nampula, Zambezia, and Niassa, particularly among women, with an incidence close to or higher than 70%.

Table 2.2.6 Trends of Illiteracy Rates 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.

Human resources development is a key element for the development of a region. However, the number of educational facilities is not sufficient, and securing the required number of teachers in rural areas is a big challenge. The number of students per teacher in elementary schools (PE: primary education) in all districts is over 40, higher than the acceptable standard for PE. The same conditions are seen in ESG (secondary education), but rates are lower in urbanized districts such as Nampula, Murrupula, Mogovolas, and Lichinga. The required number of teachers in rural areas must be secured in order to increase the literacy rate.

As the results of surveys in the communities, about half of 150 respondents have literacy skills at a primary school level.

2.2.5 Health

According to data provided by the Ministry of Health, Nampula Province shows that there are 236 Sanitary Units (SU): 169 in rural areas and 63 in urban areas (4 are not accounted for). This is still a very low coverage of the population[10]. The National Health Service (SNS) has 40,744 workers, 40,405 Mozambique nationals, and 339 foreign nationals. In Nampula Province, there are 5,745 national workers in the health service, 2,392 in Niassa Province, and 5,436 in Zambezia Province[11]. In urban zones, 81% of child births are institutional, while only 34% are in rural zones[12]. So, an increase in the number of SUs as well as Mother and Child Health Care (ESMI) doctors and nurses in rural areas is recommended.

Despite the Government's efforts to increase the quality and number of health care staff, budgetary constraints are a continuous challenge to the further development and improvement of the health sector. Investments are necessary to increase the number of sanitary units and technical health care schools to be able to cover the human resources deficit at the SNS.

[10] e-SIP Saúde - Sistema de Informação de Recursos Humanos de Saúde
[11] Relatório Anual da Saúde, DRH/Ministry of Health (MISAU), 2013
[12] World Health Organization: WHO, 2013

2.2.6 Structure of Rural Society

(1) Ethnic composition

The largest tribal/ethnic group in the northern region of Mozambique is the Makua-Lomwe who account for about half the population. Other tribal/ethnic groups in the region are the Makonde who live near the coast and the Yao (Ajawa) living near Lake Niassa in the Niassa province[13].

Many inhabitants in rural areas do not speak Portuguese and communicate in their native languages. The languages of Makua/Emakhuwa and Yao/Chiyao, which belong to the Bantu languages, are dominant, but there are also other languages spoken[14].

Religion in the region is mixed. Islam is common in the northern region, especially along the coast. Many people still exclusively follow traditional animist beliefs and Christianity is also present in the area[15].

(2) Matrilineal family society

In the Nacala Corridor, where the Makua and Ajawa tribes are dominant, matrilineal descent system prevails and the allocation of natural resources is determined by matrilineal descent, where lineage is traced through the female line. In this system, succession and/or inheritance, for example family property and legitimacy, are passed from the mother or maternal uncles to the next generation. The property of a man is therefore inherited, upon his death, by his nephews (sister's sons), instead of his own children[16].

Although the matrilineal descent system is dominate in the northern region, paternal communities can also be seen in some parts of Niassa Province[17].

(3) Governance structure

Rural communities generally have a three-tiered structure regarding community leadership and authority: traditional leaders (known as *Regulos*), wards or neighborhood secretaries, and others who are authorized by local authorities. The local authorities of the state acknowledge these community authorities[18]. The extent of the territories controlled by traditional leaders varies, and do not necessarily correspond to a political-administrative unit, and there is no objective evidence to defining their limits either[19].

[13] http://www.everyculture.com/Ma-Ni/Mozambique.html
[14] Culture Grams 2014, Republic of Mozambique, https://www2.viu.ca/homestay/host/CultureGrams/Mozambique.pdf
[15] ditto
[16] "The Matrilineal Puzzle" Women's Land Rights in Mozambique – Case Study: Niassa Province, Karin Lidström, 2014.
[17] Rainfed Upland Farming in the North-West Mozambique: A Case of villages located near Lichinga City, Niassa Province, YAMADA et al, 2014.
[18] Perfis Distritais, Ministerio da Administracao Estatal, 2005.
[19] STATE RECOGNITION OF TRADITIONAL AUTHORITY, IN MOZAMBIQUE, The Nexus of Community Representation and State Assistance, Nordiska Afrikainstitutet, 2005.

(4) Structure and boundary of traditional society

The traditional rural society generally has three tiers, with respective leadership/authority in each tier. A Regulo's land (Regulado) managed by the first grade leader (Regulo) is the top tier structure of society, while a Regulado comprises several natural villages named "Bairro" or "Povoado" managed by the second grade leader (Cabo)[20]. A Bairro is further subdivided into several settlements called "Aldeai" or "Povoação" managed by the third grade leader (Mwene). A lower-grade leader can be considered an agent or representative of the higher-grade leader in the structure. In reality, the territorial boundaries managed by the traditional leaders are vague, because the territory does not correspond to an administrative unit of government and there is no reliable and objective evidence to define the boundaries. Moreover, the size of territory managed by leaders varies considerably. The title of the leaders (i.e. Regulo, Cabo and Mwene) and their hierarchical order also varies slightly from place to place. In some areas, Mwene is superior to Regulo and/or Cabo.

The authority of the *Regulo* is perpetuated by hereditary passage within a matrilineal family. This status is only inherited by a male member, usually by a son of the sisters (nephew). The traditional leader reserves his authority by handling many issues that affect the lives of community members.

(5) Problem-solving in a traditional society

Traditional leaders play major roles in solving social problems at the grassroots level[21]. The Government leaves initial arbitration of disputes in rural communities, such as access to land and marital discussions, to traditional leaders. Only cases that cannot be resolved within the traditional community are taken to the public administration for resolution[22].

(6) Land management in rural communities

Community authorities such as a traditional leader (chief), ward secretary, and village secretary, are now officially linked to the state's local government authorities and acknowledged as competent representatives of the state. Their roles include the dissemination of laws and mediation and arbitration between state authorities and the communities, ensuring cooperation by the community for the maintenance of peace and social harmony, and participation in the sustainable use and management of natural resources.

In general terms, individual members of the community entrusts traditional leaders the right to coordinate the utilization of land and respect his authority and knowledge. Land use rights awarded according to customary laws to community members are mostly considered as quasi-private property rights, and many kinds of transactions take place under and are supported

[20] Perfis Distritais, Ministerio da Administracao Estatal, 2005.
[21] Importância Actual da Apwiyamwene no Âmbito Tradicional e Político no Distrito de Muecate Província de Nampula - República de Moçambique, Ivanna Marcela Arizcurinaga Zeballos, 2008.
[22] Formas tradicionais de participação comunitária na tomada de decisões, gestão de recursos naturais e resolução de conflitos, Adelino Zacarias Ivala, 2000.

by these rights: not only for the land itself but also for the right to benefit from its flora and fauna[23].

2.2.7 Rural Society

(1) Settlement

Generally village settlements are mainly located along roads (primary, secondary and tertiary roads). In the settlement, people live along roads with their cultivate fields being as far away as 10 km from their residences. In many instances settlements comprise 10 to 30 families/residences.

The settlements are spread widely in the eastern part of the Study Area, with settlements being formed along the main road. People enjoy living along roads due to the availability of grinding mills and public facilities, such as schools and health facilities. In the western part of the area, however, residences are scattered in remote areas and there are areas where settlements are hardly seen. In such areas, influence from the cities varies in each community based on their distance to the main road and convenience of access to it. In addition, the presence or absence of support from outside of the community, mainly from the government and/or NGOs, also affects the degree of relationship with the outside in each community.

The traditional family includes several generations living together under one roof. In many areas, though, this family structure was dismantled by the civil war, which compelled many people to migrate from rural areas to the cities or neighboring countries[24]. In the areas where the effects of the civil war were small, traditional cultures and values remained intact; however, in areas that were strongly affected, like some areas of Niassa Province, old communities were destroyed and traditional cultures and values were lost[25,26].

(2) Means of transport

Walking is the basic means of transport in rural areas, with most individuals carrying luggage on their heads. Recently, the popularity of bicycles has also soared as a means of everyday travel to distant farmlands and to transport products to markets of neighboring villages. Bicycles are commonly used within a range of several tens of kilometers by mainly men as well as some women and have now become an important means of transport in rural areas. Beside bicycles, motorcycles are also sometimes seen in use to transport materials and customers for commercial purposes.

Pickup trucks are frequently used for long-distance transportation. Depending on the region, long-distance services are sometimes provided by large- or medium-sized buses, but services

[23] Determinants of Land Use and Land Access in Post-War Northern Mozambique, Kati Schindler and Tilman Brück, 2006.
[24] http://www.everyculture.com/Ma-Ni/Mozambique.html
[25] http://www.everyculture.com/Ma-Ni/Mozambique.html
[26] Social Capital and Post-war Reconstruction: Evidence from Northern Mozambique, Kati Schindler, 2010.

are significantly influenced by the road condition; and they usually out of service during the rainy season.

(3) Drinking water

Drinking water in rural areas is usually collected with buckets from shallow wells about three to five m deep. The wells are usually located in the center of the garden of the residence and constructed on a small embankment. For relatively large villages, hand pump wells (deep boreholes) for common use are installed in the center of the villages such as in school property. For residents living far from wells and other water sources, water is carried daily by women and girls. Sometimes, water is also collected by digging a trench at the side of a creek and using seepage water as drinking water, while bathing and doing laundry in nearby streams and ponds. Many shallow wells raises concern over water pollution and in areas where it is difficult to secure safe drinking water, diseases such as diarrhea are commonplace.

(4) Fuel

Firewood is mainly used as fuel for cooking and collected by women and girls from surrounding areas daily. Using such firewood in housing provides lighting, while the smoke is also useful for controlling mosquitoes that transmit malaria and other pests. Firewood for home consumption can be collected without permission, while logging and collecting wood for charcoal production requires the consent of the community (information from extension officer). However, massive amounts of firewood and charcoal are brought to the city and sold and it is unclear whether such norms are always complied with. For urban residents, the main fuel is also firewood generally collected from their land (machamba). It is also common to purchase charcoal when necessary. In urban areas such as Nampula city, charcoal is used alongside firewood as a heat source for cooking in many households. Therefore, the production of charcoal in the area surrounding the city is thriving, with products sold directly along roads and brought to the city by bicycle.

(5) Food in daily life

The main diet of small-scale farmers in rural areas is maize or cassava porridge - or dough-like food (chima/sima). For maize, the grain skin is removed by a pestle and mortar after threshing and brought to the mills in the village for milling. Each village has a mill with around one to three milling machines, which provides services for a fee. Dry cassava is ground to a powder with the pestle and mortar in each household, while chima is usually eaten with some meat or vegetable broth. A small deep-fried fish is also served at times. In addition, alternatives to cereal crops such as beans, ground nuts, other cereals (sorghum, millet), banana, sweet potato, taro, yam and amaranth are also eaten and often cultivated in the circumferential area of the residence.

As vegetables, cassava leaves are commonly eaten, along with the leaves of sweet potatoes and pumpkins. While tomatoes are cultivated in many areas, their small fruit means they are

generally limited to personal consumption, except for small amounts sold in garden fronts and village markets to obtain small income. Liquor is also produced from sugar cane. In general, farmers cultivate small amounts of various crops and sell the surplus of major crops for income. Meals are usually taken twice daily; at midday and night. In general, farmers are often seen eating dried cassava, boiled maize and sugar cane. There was no serious lack of food observed in the Study Area.

2.2.8 Gender

(1) Land ownership and production

In northern Mozambique land is passed through matrilineal lines[27]. Women there obtain land more than men through inheritance from matrilineal kin as well as from the local chiefs. However, the average size of plots controlled by women is smaller than men.

(2) Decision making

Women in poor households and those in remote areas have less decision-making power in the context of agricultural production[28]. The decisions on how to use land are often controlled by a woman's husband and her brother even though women inherit land[29]. When men manage plots, they tend to plant more crops than women, regardless of who actually owns the plot.

The women are responsible for the subsistence of the family and the control of food is in their hands. Therefore, when women manage plots, the largest plots and the greatest labor investment are dedicated to food production. A husband has to ask his wife for permission to sell food crops like maize, beans and cassava[30]. They tend to both plant and sell fewer crops, and place less emphasis on more complicated cash crops. When men manage plots, their farm incomes are significantly higher.[31]

Men can more easily access off-farm work than women, which bring higher wage earnings. When men work outside the farm, even seasonally, they tend to leave women in charge of managing their own plots.

(3) Poverty in women-headed household

Women-headed households, particularly widow-headed households, are significantly more disadvantaged in income compared to men-headed households. Widow-headed households have 30% less income than male-headed households[32].

[27] Gender and Power Relations: A Case Study from Mozambique (Ellen Henrikke Aalerud 2010, http://brage.bibsys.no/xmlui/bitstream/handle/11250/187143/ELLEN_THESIS_FINAL.pdf?sequence=1&isAllowed=y)
[28] ditto
[29] Gender, Control, and Crop Choice in Northern Mozambique (Alan de Brauw, 2014, http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/128106/filename/128317.pdf)
[30] Gender and Power Relations: A Case Study from Mozambique (Ellen Henrikke Aalerud 2010, http://brage.bibsys.no/xmlui/bitstream/handle/11250/187143/ELLEN_THESIS_FINAL.pdf?sequence=1&isAllowed=y)
[31] Gender, Control, and Crop Choice in Northern Mozambique (Alan de Brauw, 2014, http://ebrary.ifpri.org/utils/getfile/collection/p15738coll2/id/128106/filename/128317.pdf)
[32] Determinants of Rural Income, Poverty, and Perceived Well-being in Mozambique in 2001-2002

Cunguara and Kelly (2009)[33] analyzed trends in farmers' income for six years and found that poverty in Mozambique had a strong gender dimension, because women-headed households stayed among the poorest during the research period whereas men-headed households improved income over time.

(4) Participating for community network[34]

Whereas women form the majority of members in informal farmers' groups and commodity associations, the leadership is dominated by men and the impact of women's participation in influencing decision-making within these organizations and within local and national policy processes is yet to be seen. Women members' active participation in formal farmers' groups is low. While some research respondents, including some of the women themselves, attributed this to lack of literacy or other education, women are less likely to start to participate actively when they realize that the interests that they share as women are not the focus of these groups.

(5) Women in development

Women's empowerment can also improve economic development; in particular, conditional cash transfer programs have been effective at increasing women's decision-making power.[35] Giving women decision-making power and control over economic resources has empirically showed more investments in and transfers to the next generation.[36]

Literacy and education also increases the capacity to acquire information, which in turn enhances the legal skills of the individuals. Thus education is important for women to relate to their rights and this in turn may enhance their bargaining power. Women with education will possibly have a better understanding of the land law and the family law and can take advantages of this knowledge in bargaining with her husband.

(6) Inherit of land and property for women

In December 2014, new family law was enforced in Mozambique. The new family law is ensuring gender equality between men and women, which is improved from the past family law based on the patriarchal system. In detail, it makes out the equality of marriage, divorcement, parents' rights and asset allocation during marriage, etc. The items of gender segregation, such as plural marriage, succession of property and marriage age were abated in the new law.

Since, the society of northern Mozambique is a matrilineal society, inheritance property is succeeded from mother to daughter. In the matrilineal society, women do not leave their family group. Therefore, women have strong influence on land and property. However, recently, the rule of paternal society has begun to penetrate the matrilineal society and the authority of women has become weaker. Also, most families tend to select their residences by themselves.

[33] Trends in Agriculture Producers' Income in Rural Mozambique
[34] Gender, Control, and Crop Choice in Northern Mozambique (Alan de Brauw, 2014)
[35] ditto
[36] Quisumbing & Maluccio 2003b; Quisumbing & Briere 2000; Thomas 1990

As a result, relationships between the women and their families have become weaker, and their ascendancy of property, which they had before is decreasing. For these reasons, the differences of communities between the paternal society of southern and central Mozambique and the matrilineal society in northern of Mozambique have become smaller.

Here, traditionally and officially, it is recognized that children have inheritance rights. The succession of property is managed by men and women equally in Nampula Province because of the culture of matrilineal society. The inheritance rights of children usually become operative when he/she becomes an adult. Before that, the responsible person of family group (men) brings up and manages of his/her property. However, in Mozambique, once a girl has her first menstrual period, it is recognized that she has become an adult, meaning that thirteen-fourteen year old girls are mature enough to get married and become child-bearers. On the other hand, a girl who faces succession has two disadvantages. One disadvantage is that it is said that girls at such age are too young to inherit property. The other disadvantage is that her inheritance right has not been approved because of her gender, despite be coming of age. Especially, girls who do not have brothers are at an increased risk of losing all her parents' property.

2.2.9 Youth

Mozambique's population growth rate is very high (average annual growth rate of 2.6%, 1995-2010[37]). According to the present youth policy (2013) of the Government, "youth" is defineded citizens from 15 to 35 years old. The percentage of the youth in population is high and this trend of population growth is expected to continue in the future (refer to 2.2.1 Population).

This means that the demographic dividend (or demographic bonus)[38] in Mozambique is large. This tends to indicate that there is great potential to achieve a future of economic growth and a possibility for a more dynamic utilization of labor force. However, it is estimated that there are 300,000 new entrants into the labor market every year in Mozambique[39] and this factor results in a challenge to job creation, especially for urban youth employment.

According to the statistics of INE, the unemployment rates from 2010 to 2013 were stable at around 14 % as shown in Table 2.2.7.

Table 2.2.7 Unemployment Rate of Youth Total (modeled ILO estimate)

(Unit: % of total labor force ages 15-24)

Year	2010	2011	2012	2013
Mozambique	14.2	14.2	14.2	14.3

Source: INE

[37] INE
[38] The growth rate of the labor force is higher than the population growth rate
[39] Mozambique - Labor Market Profile 2014, Danish Trade Union, Council for International Development Cooperation.

The two sectors that traditionally generate significant employment for youth are agriculture and small- and medium-sized enterprise (SME) sectors. Small - scale agriculture represents the biggest employment source in Mozambique, with over 80% of the economically active population involved in this sector[40].

Conversely, when labor opportunities are lacking in rural areas, younger generations are likely to flow to urban areas seeking jobs, whereupon slums form in urban areas, widening the gap between rich and poor and causing security to decline. With this in mind, it is important to encourage labor-intensive industries in rural areas. The Government of Mozambique has implemented a number of challenges for younger generations. However, many subjects relate to young people in the urban areas, those related to the rural areas has been less. In this regard, CTA (The Confederation of Econimic Associations of Mozambique) mentioned that it would be necessary to promote entrepreneurship among youth, particularly in the provinces. In October 2013 the parliament of Mozambique approved a new youth policy, which includes prioritizing technical and vocational education as well as fostering employment and entrepreneurship.

2.2.10 Human-Wildlife Conflict

The conflict between humans and wild fauna is a serious problem, not only for residents that are directly affected, but for all those intervening in fauna management. In particular, these conflicts are growing and causing socio-economic damage to those residents living in rural areas. In the last four decades, the animal populations have decreased in general, while the human population has grown significantly. This has resulted in the occupation of areas previously free of human presence. After the signing of the Mozambique Peace Agreement, thousands of displaced or refugee citizens from the neighbor countries returned. Unfortunately, the resettlement processes were carried out in consideration of human convenience in many zones in the country, while ecological aspects, such as ecosystem degradation and animal migration routes, were not taken into account.

The occupation of previously unoccupied areas and the routes of wild fauna have somehow reduced natural habitat of the wild fauna, bringing together as consequence, the competition for the scarce resources of water and food and on the other hand the vegetation by herbivores and prey to carnivorous.

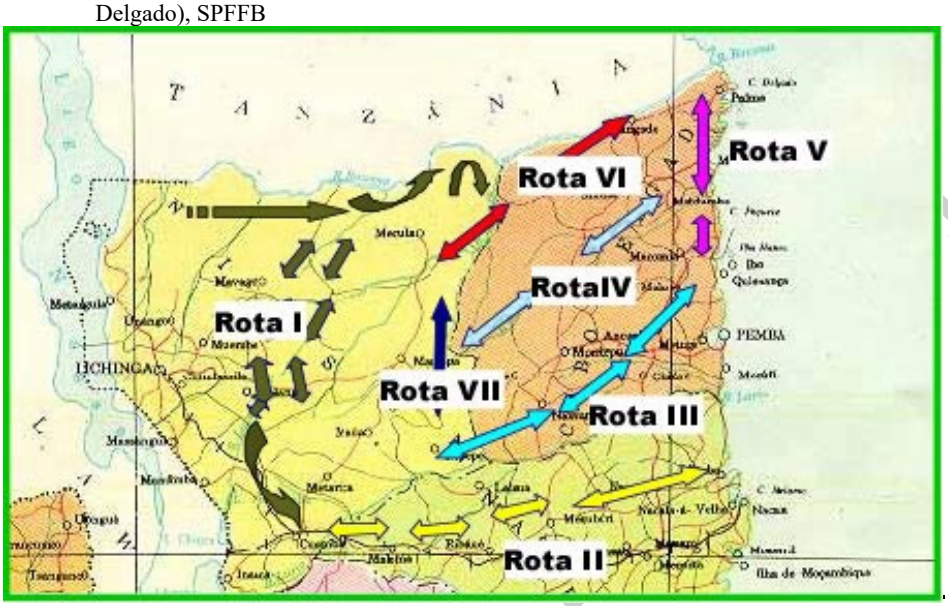
In this situation, in order to survive, wild fauna has been obliged to venture in the farmers' plots where herbivores eat maize and cassava while carnivorous like lions eat cattle and attack humans.

[40] FAO/ILO 2012

Table 2.2.8 Conflicts Occurring in Districts Near the Nacala Corridor

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

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



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

Figure 2.2.2 The Routes of Wild Fauna (Elephant)

2.3 Land Use and Coverage

2.3.1 Present Land Use and Potential Farming Land

(1) Present land use

The present land use in the Study Area was estimated based on the land cover map prepared by the Integral Assessment of Mozambican Forest (AIFM) Project in 2007. The AIFM aimed to evaluate the extent and composition of forest resources in the entire country. The AIFM Project produced a land cover map at a scale of 1:1,000,000 based on the interpretation of satellite imagery (LANDSAT 5TM of year 2003-2005). The FAO/ United Nation Environment Programme (UNEP) standard definitions of the Land Cover Classification System (LCCS) were approved and adopted with some modifications to suit the national conditions and requirements.

More recently, the National Agro-Ecological Zoning (ZAEN) Program conducted by MASA in 2012-13, identified and classified the land cover for the preparation of agro-ecological zoning for agricultural development.

The area of classified land coverage in the Study Area was estimated by AIFM Project and by the ZAEN Program and is summarized below:

Table 2.3.1 Land Use in the Study Area

Classification of land use		AIFM (2003-05)		ZAEN (2012-13)
		Area (000ha)	. (%)	. (%)
Agricultural land	Arable land[1]	3,745	35	-
	Grass land [2]	1,070	10	-
	Total agricultural land	4,815	45	46[3]
Forest		5,778	54	50
Others		107	1	4
Total area[3]		10,700	100	100

1 Arable land: Including field crops, shifting cultivation and tree crops according to the AIFM Project land use map
2 Grassland: Including grassland, shrub land, and thicket land, according to the AIFM Project land use map
3 Cropped land + potential farmland
Source: Estimated by JICA Study Team (from the land use map of the AIFM and ZAEN)

(2) Farm land potential

According to the analysis of the collected information, it is estimated that out of the Study Area's total of 10,700,000 ha, the potential land for agriculture is around 3,222,000 ha, as shown in Table 2.3.2

Table 2.3.2 Potential Agricultural Land in the Study Area

Land Classification	Area (thousand ha)
1. Uncultivable area (partly covered by forest vegetation)	2,775
1.1 Conservation area	936
1.2 Steep slopes, bare land (rocky), barren zones, towns, etc.	1,839
2. Cultivable area (exclude the uncultivable areas)	7,925
2.1 Forest vegetation area*	3,910
2.2 Non-forest vegetation area	4,015
2.2.1 Existing DUAT (Land use right) /concession area, other than community DUAT (outside of forest vegetation area)	793
2.2.2 Potential farmland area	3,222
Total	10,700

Note: *The forest vegetation area shown in this table includes only the present land use of forests within the cultivable area. The conservation area, steep slopes, bare land (rocky), barren areas, towns, etc. are not included.
Source: JICA Study Team (modified AIFM Land Cover Map by CENACARTA, and DUAT data by National Directorate of Land and Forestry (DNTF) and Provinces)

However, not all of the potential land can be used for agriculture because it includes communal lands (used for firewood, herb collection, hunting, fishing, etc., estimated to be ten percent (10%) of the potential farming land) and land with poor soil. Therefore, the approximate figure of the actual potential land for farming in the Study Area can be estimated to be as small as 2.0 to 2.5 million ha[41] when the communal lands and the non-suitable lands with poor soil are deducted from the 3.2 million ha of the potential land, assuming that the present forest vegetation area is maintained and not counted as new land for farming development.

According to the ZAEN Program conducted by MASA between 2012 and 2014, unused available arable land is estimated at 1.5 million ha, including some areas in the Study Area. Study results indicate that the eastern districts of Nampula Province have only a few areas for

[41] Including the present cultivated area

farmland expansion, while the districts in Niassa Province still have a considerable potential for the development of land for agriculture.

Hence, the annual cultivated area is estimated to be about 930,000 ha in the Study Area based on the number of farm households (about 692,000) and their average cultivation area of 1.34 ha/household. Furthermore, the total area of fallow land is estimated to be 1.86 million ha, or twice the cultivated area. In total, the farmland area, which consists of cultivated and fallow lands, is estimated to be about 2.8 million ha.

These calculations imply that the present farming area, including fallow land, may exceed the area of actual potential land for farming. It can be concluded that the area of actual potential land area for farming is almost entirely used because of the predominant practice of extensive farming. This conclusion is also shown by population density of the Study Area (40.1 people/km^2) which is close to the allowable limit for the practicing extensive farming on a sustainable basis. It also should be concluded that due to the high population pressure the region is rapidly losing its potential for extensive farming.

Nevertheless, there are still opportunities for developing cultivated area if farmers change their cultivation system from extensive to intensive farming.

The actual potential land for farming is estimated at 2.0 to 2.5 million ha with the total number of farming households slightly exceeding one million in 2030. This figure imply that small-scale family farmers will remain the overwhelming majority in 2030, and medium to large-scale farming will not be a much prevailing farming practice, even in 2030. Considering this situation, this Agricultural Development Master Plan should forecast the development of such family farmers.

Table 2.3.3 Characteristics of Small and Medium Farmers (2010)

District	Rural Population	Num. of Farm Household	Ave. Family Size (Head)	Total Culti. Area (ha)	Ave. Culti. Area (ha/hh)
Monapo	285,816	55,898	5.1	78,823	1.41
Muecate	105,350	20,529	5.1	18,067	0.88
Mecuburi	172,639	29,497	5.9	56,344	1.91
Meconta	129,895	33,968	3.8	44,502	1.31
Mogovolas	242,768	61,712	3.9	61,718	1.00
Nampula	243,908	73,914	3.3	51,744	0.70
Murrupula	140,685	30,582	4.6	23,550	0.77
Ribaue	156,754	36,028	4.4	52,966	1.47
Lalaua	81,685	15,744	5.2	28,342	1.80
Malema	126,408	33,587	3.8	70,203	2.09
A. Molocue	252,537	59,500	4.2	120,796	2.03
Gurue	177,296	58,000	3.1	73,667	1.27
Cuamba	123,638	42,079	2.9	64,387	1.53
Mecanhelas	199,884	40,147	5.0	50,188	1.25
Mandimba	138,673	30,165	4.6	42,838	1.42
N'Gauma	81,314	15,537	5.2	11,188	0.72
Majune	34,287	12,787	2.7	17,648	1.38
Lichinga	110,703	24,167	4.6	41,088	1.70
Sanga	59,711	18,000	3.3	17,642	0.98
Total	2,863,951	691,841	4.2	925,700	1.34

Source: INS District Statistic 2012 (* 2011) based on Agricultural Census 2010/2011

2.3.2 Current Forest Situation

(1) Forest Distribution

Table 2.3.4 shows the distribution of forests in the Study Area. The definition of forests here is given as "stands of trees with canopy cover exceeding 10% and height exceeding 5m" according to the AIFM. The figures exclude mangroves, regularly flooded woodlands, tree plantations or tree crops. Forests affected by the prevailing extensive cultivation are also excluded in line with the AIFM classification.

Table 2.3.4 Distribution of Forests in the Study Area

District	Territory Area (km^2)	Forest Area (km^2)	Percentage of Forest (%)	Population Density (hab./km^2)
Monapo	3,528	739	20.9	97.2
Muecate	4,121	2,034	49.4	25.6
Mecuburi	7,216	3,254	45.1	23.9
Meconta	3,690	1,966	53.3	47.3
Mogovolas	4,728	312	6.6	70.0
Nampula	4006	631	15.8	199.1
Murrupula	3,104	876	28.2	51.2
Ribaue	6,271	2,295	36.6	35.1
Lalaua	4,548	1,958	43.1	18.0
Malema	6,075	4,541	74.7	30.0
Alto Molocue	6,363	1,975	31.0	50.3
Gurue	5,664	2,387	42.2	61.9
Cuamba	5,363	3,900	72.7	40.3
Mecanhelas	5,029	2,545	50.6	41.0
Mandimba	4,698	2,484	52.9	33.9
N'Gauma	3,016	1,972	65.4	27.0
Majune	11,341	10,852	95.7	3.0
Lichinga	5,695	3,165	55.6	50.7
Sanga	12,545	9,893	78.9	5.1
TOTAL	107,001	57,780	54.0	40.1

Source: JICA Study Team

A general tendency toward decreasing forest cover with increasing population density is observed. Looking at the Study Area from west to east, some typical relations among geographical locations of forests, communities and river courses are described as follows:

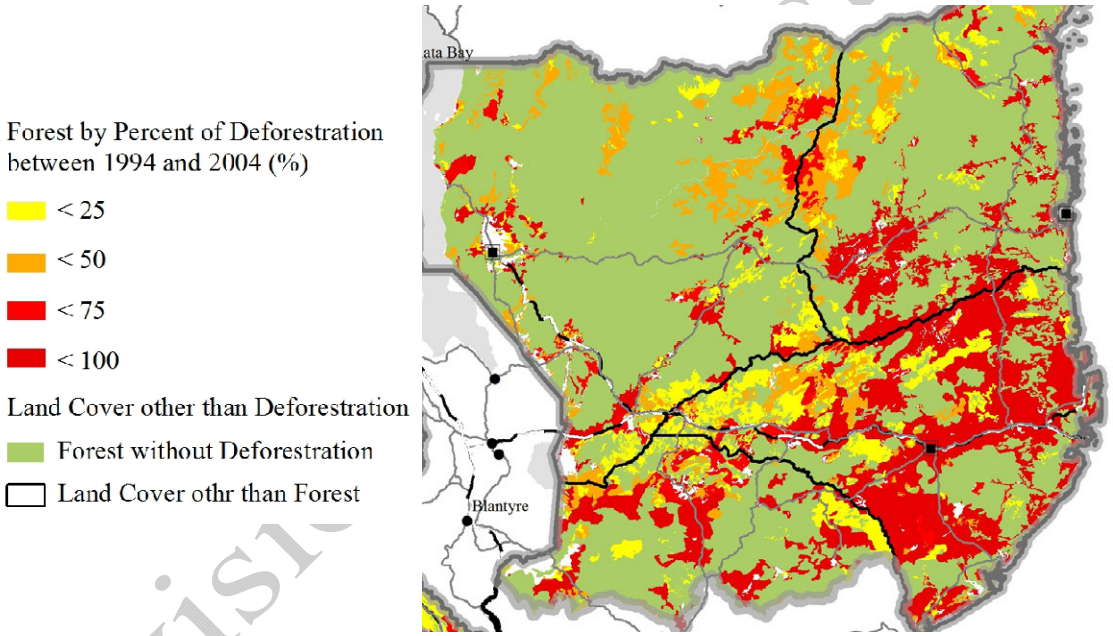
- In Lichinga and N'Gauma districts, perennial rivers remain surrounded by massive forest stands but numerous communities exist within or on the edge of forest stands;
- In Cuamba and Gurue districts, forest stands around perennial rivers become less massive and are replaced by fallow land or agricultural fields. Communities tend to be located on agricultural fields as well as inside forests;
- The prevailing extensive cultivation dominates along perennial rivers. Communities are also concentrated in the cultivation areas as well as those of shrubs or grassland; and
- In Muecate and Monapo districts, perennial rivers mostly traverse agricultural fields and have little interaction with forest stands. Communities are also concentrated in agricultural fields.

The apparent encroachment of the remaining forests by communities in western and central parts of the Study Area, as well as fragmentation of forest stands in the upper catchments of perennial

rivers in central and eastern parts of the Study Area, are particularly worrying factors for sustainable development of the Nacala Corridor.

(2) Deforestation

Annual deforestation rates were mathematically estimated by AIFM based on an exponential regression model between population density and percentage of forest area during the period 1990 to 2002, the results of which were 1.18, 0.71 and 0.22% per annum for Nampula, Zambezia and Niassa provinces respectively. The situation in Nampula province is particularly worrying with considering elevated magnitudes of deforestation during the period 1994 to 2004[42] (Refer to Figure 2.3.1). It should be noted that deforestation has been occurring even within legally protected forest reserves. Forest fires associated with the prevailing extensive cultivation, forest clearances to reclaim farmland, excessive or illegal logging, encroachment by increasing the demand for firewood and charcoal and insufficient reforestation are principal factors contributing to deforestation.



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

Figure 2.3.1 Deforestation around the Study Area

2.3.3 District-Level Land-Use Plan (PDUT)

The District Land-Use Plan (PDUT in Portuguese: Plano Distrital de Uso da Terra) establishes the spatial structure of the district as well as the standards and rules to be observed. Mozambican citizens, like any investors, must respect PDUT with environmental responsibility. Any license, work or land-use against PDUT will be punished and fined and such works can be compulsorily terminated or removed by the authority. PDUTs remain legally valid for 10 years, but can be altered, reviewed or suspended when justified.

[42] The Project for Nacala Corridor Economic Development Strategies (PEDEC)

Only six districts in the Study Area possess ratified PDUT, while the other districts are finalizing or commencing elaboration, as shown in Table 2.3.5.

Table 2.3.5 Status of PDUT by Districts

Province	District	Status of PDUT as of April 2013
Nampula	Monapo	Ratified: Effective till 2022
	Muecate	Finalizing
	Mecuburi	Finalizing
	Meconta	Finalizing
	Mogovolas	Ratified: Effective till 2021
	Nampula (Rapale)	Finalizing
	Murrupula	Ratified: Effective till 2021
	Ribaue	Finalizing
	Lalaua	Finalizing
	Malema	Finalizing
Zambezia	Alto Molocue	Ratified: Effective till 2020
	Gurue	Starting elaboration from 2013
Niassa	Cuamba	Not started
	Mecanhelas	Starting elaboration from 2013
	Mandimba	Starting elaboration from 2013
	N'Gauma	Not started
	Majune	Ratified: Effective till 2022
	Lichinga (Chimbonila)	Finalizing
	Sanga	Ratified: Effective till 2022

It is worth mentioning that all PDUTs propose an increase in forest coverage or at least maintenance of actual forest areas.

2.4 Agricultural Production and Farm Management

2.4.1 Farmland Area and Farming Systems

(1) Traditional farming system

Family farmers in the Study Area practice small-scale farming, carried out with family labor, which is occasionally supplemented by seasonally hired workers employed under a traditional system. It is generally accepted that this type of farming system in the country is mainly practiced due to a lack of the means for cultivation. The average farm size in the provinces of Nampula and Zambezia, with the highest population density in the country, is 1.25 ha and 1.29 ha respectively, significantly smaller than the national average of 1.47 ha. In Niassa Province, with a lower population density, the mean farm size is 1.82 ha, much larger than the national average.[43] It can therefore be concluded that, currently, population pressure is a main factor for the practice of small-scale farming in the Study Area.

Many farmers shift their farmland every three to five years, when soil fertility of the cultivated land is deteriorating. Hence to attain cultivation sustainability, farmers require fallow areas two to five times larger than the actual area planted, to allow soil fertility of the now unproductive land to recovery for a period of 10 to 15 years.

[43] INS District Statistic 2012 based on Agricultural Census 2010/2011

In the interview survey of 32 farmers, six farmers had stopped shifting lands: all three farmers from Monapo and one farmer each from Rapale, Malema and Cuamba. Five farmers were shifting between two fields every several years, while three farmers had used the same field for more than 10 years. Soil fertility may be the determining factor for the period of shifting, since all farmers, except for one, stated that their reason for shifting fields was due to decreasing soil fertility. The only farmer who stated otherwise, from Rapale, cultivated two lands simultaneously because he did not want to lose the land to others who might have mistaken his land for unused land and occupied it.

(2) Improving farming practice

As mentioned earlier, a substantial number of family farmers will face difficulties in continuing shifting cultivation practices on a sustainable basis and forest degradation have been observed in many districts. It says that continuing the existing trends may trigger environmental degradation, as experienced in other parts of the world[44]. Farmers in the Study Area have reached an important point to consider applying improved practices to use their lands more sustainably and intensively. However such information is not explained broadly among farmers.

In order to disseminate transition of the present extensive cultivation practices to improved farming practices, comprehensive supports of the Government are required. Meantime, the following benefits can be expected for farmers from adopting the improved farming practice:

i) Increased crop productivity through intensive farming practices;
ii) Expansion of actual planted area per household by re-utilizing reserved fallow land; and
iii) Environmental conservation to protect agricultural production.

In order to archive the transition, voluntary action of farmers is essential with the full supports from the Government, NGOs and other civil society organizations. Such change can only be possible through demonstrating improved and efficient farming practices that allow sustainable use of natural resources for profitable agricultural production. And adopting, the different types of assistance to family farmers to encourage and support farming practices - including improved cultivation techniques, better market access, their appropriate use of input and capacity development of all stakeholders.

2.4.2 Cropping Technology

(1) Productivity of Crops

Family farmers produce crops mainly for their own consumption and thus practice subsistence agriculture, which is characterized by low income earnings and little profit. Usually their cultivation areas measure one to two ha and revolve around the production of staple food crops

[44] Refer to1) FAO Forest Department, Forest and the crisis in Africa – Changes in shifting cultivation in Africa, http://www.fao.org/docrep/r5265e/r5265e06.htm, 2) Rajiv Ranjan and V.P. Upadhyay, Ecological problems due to shifting cultivation, htttp://www.iisc.ernet.in/currsci/nov25/articles 12,htm, etc. for India

such as maize, cassava, sorghum, groundnuts, and several types of beans, usually in a mixed cultivation setting in the same field.

Farmers cultivating larger areas of around five ha practice diversified production and grow cash crops such as cotton, tobacco and vegetables using irrigation, in addition to crops for their own consumption. However, farmers with more than five ha represent only six percent of the family-farming sector in Mozambique[45].

One of the main problems of agriculture in Mozambique is low productivity. The productivity of major staple crops in the Study Area, and in relatively more advanced countries, such as Brazil, South Africa, and Kenya are shown in Table 2.4.1. The table shows that farmers in the Study Area still have a lot of room for improvement for productivity of many crops.

Table 2.4.1 Productivity of Crops in the Study Area and in other Countries in 2010

Crops	Productivity (ton/ha)				
	Study Area	Mozambique	Brazil	S. Africa	Kenya
Maize	1.3	1.7	4.4	4.7	1.6
Cassava	7.2	7.8	13.7	N/A	5.3
Sorghum	0.9	0.6	2.3	2.3	0.7
Paddy, rice	1.0	1.1	4.2	2.6	4.2
Groundnuts, with shell	0.7	0.4	2.7	1.5	1.0
Beans	0.7	0.3	0.9	1.2	0.6

Source: Provincial Directorate of Agriculture (DPA) Nampula (Study Area) & FAOSTAT (Mozambique, Brazil, S. Africa and Kenya)

The low productivity is caused by a combination of various factors, including farming practices with its low use of inputs, and other farming practices such as stubble and vegetation burning for land preparation.

The small farmers' strategy of extensive agriculture with limited inputs and low returns is understandable given irregular rainfall and insecure land tenure. The strategy is based on the possible expansion of the cultivated area to suit manpower availability, and to increase agricultural production with a view that there are still large tracts of land that may be incorporated into the cropping system. However, such preferable surroundings for continuing traditional practices are vanishing now.

(2) Cropping Calendar

The cropping system of farm households in the Study Area is characterized by traditional crop management and land use such as mixed cropping with low use of agricultural inputs.

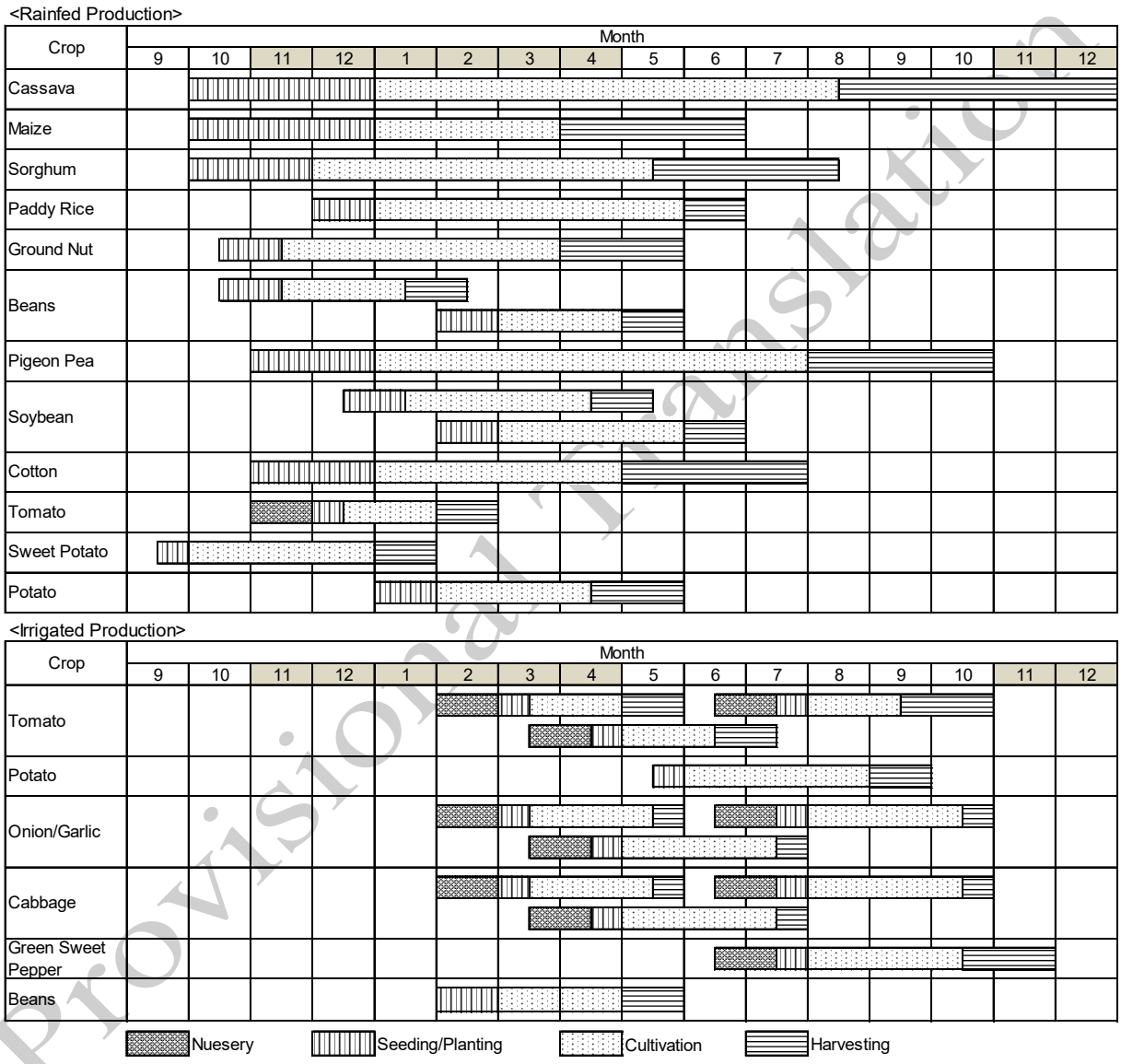
In Mozambique, the cropping calendar is divided into two seasons, namely First and Second seasons. During the First Season, seeding is done at the beginning of the rainy season (November-January) to exploit the rain (November-April) for agricultural production. Conversely, planting in the Second Season is done after the rainy season in areas where water

[45] INE, Agricultural Survey (TIA) 2009/2010

sources are available. Manual irrigation is commonplace while some farmers use small irrigation pumps.

In generally, farmers primarily produce food crops on their farms in the First Season because it is essential for their survival. Farmers who can access to water resources borrow nearby or community fields to produce vegetables in the Second Season.

Crop calendar for major crops in the Study Area is shown in Figure 2.4.1 below.



Source: JICA Study Team based on data from DPAs and field observation

Figure 2.4.1 Crop Calendar in the Study Area

(3) Applied Practice and Utilization of Agricultural Input

Via field survey, it was observed that most subsistence farm households had only family labor power to work on the land, using basic tools like hoes, machetes and axes. Seeds used for planting were usually produced in their latest harvests, either from their own land or acquired

from neighborhoods. The application of inputs like improved seeds, fertilizers and pesticides is practically negligible, as shown in Table 2.4.2 below.

Table 2.4.2 Farm Households using Farm Inputs in 2012 (%)

Province	Inputs (%)		
	Maize seeds	Fertilizers	Pesticide
Nampula	4.3	1.9	11.0
Zambezia	7.9	0.1	1.1
Niassa	4.6	8.6	6.6
National	8.7	2.8	6.3

Source: Agricultural Survey (TIA) 2012, MASA

Most farmers do not buy chemical fertilizers, because they lack financial support for preparation of cultivation, applying of fertilizer do not give good benefits because of its high cost and other various risks on farming.

When cultivating cash crops, the situation is different. Many farmers use inputs, even at a minimum level, for vegetables, cashew nuts, etc. While for cotton and tobacco, a commercial or industrial company provides necessary inputs for production. Farmers are also able to expect technical orientations from the company's staff.

Farmers, in general, are aware of effect of fertilizers that can boost crop productivity. Even though among the limited number of farmers who use fertilizers, few do so correctly, may because of weak technical orientation from agricultural extension service and their limited experiences.

In order to improve their farming practices and increase production, it is necessary to ensure that farmers can access and use the agricultural inputs in a proper manner.

2.4.3 Agricultural Production by Districts

(1) Production by Districts

Agricultural production in the Study Area varies according to location, with both food and cash crops planted according to the optimal climatic conditions for each crop. Table 2.4.3 shows the five year (2006/07–10/11) average of the planted area of major crops in the Study Area. As for the planted area, the main crop in the Study Area is cassava, totaling 389,515 hectares in 19 districts. Cassava, which is a major diet of Mozambicans, is classified as an easy crop even under disadvantageous cultivating conditions. Accordingly, it is easily adaptable to the soil and climatic characteristics of Mozambique, with an effective yield and a high concentration of carbohydrates. After cassava, maize ranks second with 329,947 hectares, followed by sorghum in third place with 141,894 hectares. The planted area of cassava exceeds that of maize in districts in Nampula province, while the situation is reversed in districts in Zambezia and Niassa Provinces.

Table 2.4.3 Planted Area of Major Crops by District

(Average: 2006/07- 2010/11) (Unit: ha)

Crops	Monapo	Muecate	Mecuburi	Meconta	Mogovolas	Nampula	Murrupula	Ribáuè	Lalaua	Malema
Maize	15,573	6,237	13,218	13,090	9,951	12,047	7,539	16,692	12,502	19,173
Cassava	47,360	24,646	28,701	30,709	44,033	37,785	28,820	29,098	16,420	24,666
Sorghum	13,912	1,975	8,944	7,670	6,058	12,118	7,540	11,563	10,610	11,271
Millet	1,523	125	565	360	852	307	566	848	746	935
Paddy	2,344	1,239	1,742	2,473	4,291	3,280	4,786	805	1,364	840
Beans	6,052	3,428	4,745	6,991	5,642	7,328	5,303	8,398	4,302	10,937
Ground Nut	6,363	7,976	3,850	16,986	16,172	11,779	5,596	4,338	3,512	8,521
Sunflower	504	0	185	656	471	0	421	844	0	854
Sesame	5,520	813	1,930	7,021	1,320	1,060	1,256	963	2,778	984
Soybean	0	0	0	0	0	0	185	625	0	605
Sweet Potato	523	73	336	126	366	515	781	316	531	450
Potato	0	0	0	0	0	0	0	7	0	13
Vegetables	98	14	26	298	34	310	332	271	23	285
Cashew (shell)	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cotton	28,229	3,776	8,904	6,208	2,010	275	4	2,145	8,712	5,535
Tobacco	0	0	368	0	0	24	150	2,669	1,732	2,058

Crops	Alto Molócuè	Guruè	Cuamba	Mecanhelas	Mandimba	Ngaúma	Majune	Lichinga	Sanga	**Total**
Maize	33,760	26,833	51,012	19,154	21,409	9,280	6,135	20,072	16,269	**329,947**
Cassava	31,083	22,461	7,287	3,778	5,830	1,570	1,362	955	2,949	**389,515**
Sorghum	8,683	6,893	18,477	9,895	3,299	645	1,753	0	589	**141,894**
Millet	0	600	57	549	778	203	54	0	0	**9,068**
Paddy	1,215	620	2,447	2,228	1,364	614	409	0	211	**32,272**
Beans	8,428	9,783	13,940	5,696	6,653	5,445	2,962	11,733	8,791	**136,557**
Ground Nut	5,642	4,100	1,181	1,022	709	345	959	328	317	**99,696**
Sunflower	1,675	0	0	NA	0	0	NA	0	NA	**5,610**
Sesame	140	275	0	NA	0	0	NA	0	NA	**24,059**
Soybean	210	1,025	0	NA	0	0	NA	0	NA	**2,650**
Sweet Potato	2,500	3,333	228	51	568	132	306	183	203	**11,521**
Potato	50	510	0	2	0	113	13	571	371	**1,649**
Vegetables	540	920	108	65	2,083	177	82	114	271	**6,050**
Cashew (shell)	NA	NA	NA	NA	NA	NA	NA	NA	NA	**NA**
Cotton	1,675	0	0	NA	0	0	NA	0	NA	**67,473**
Tobacco	723	520	0	NA	0	0	NA	0	NA	**8,244**

Source: DPAs of respective provinces, INCAJU Nampula (Cashew)

(2) Localities of Crops

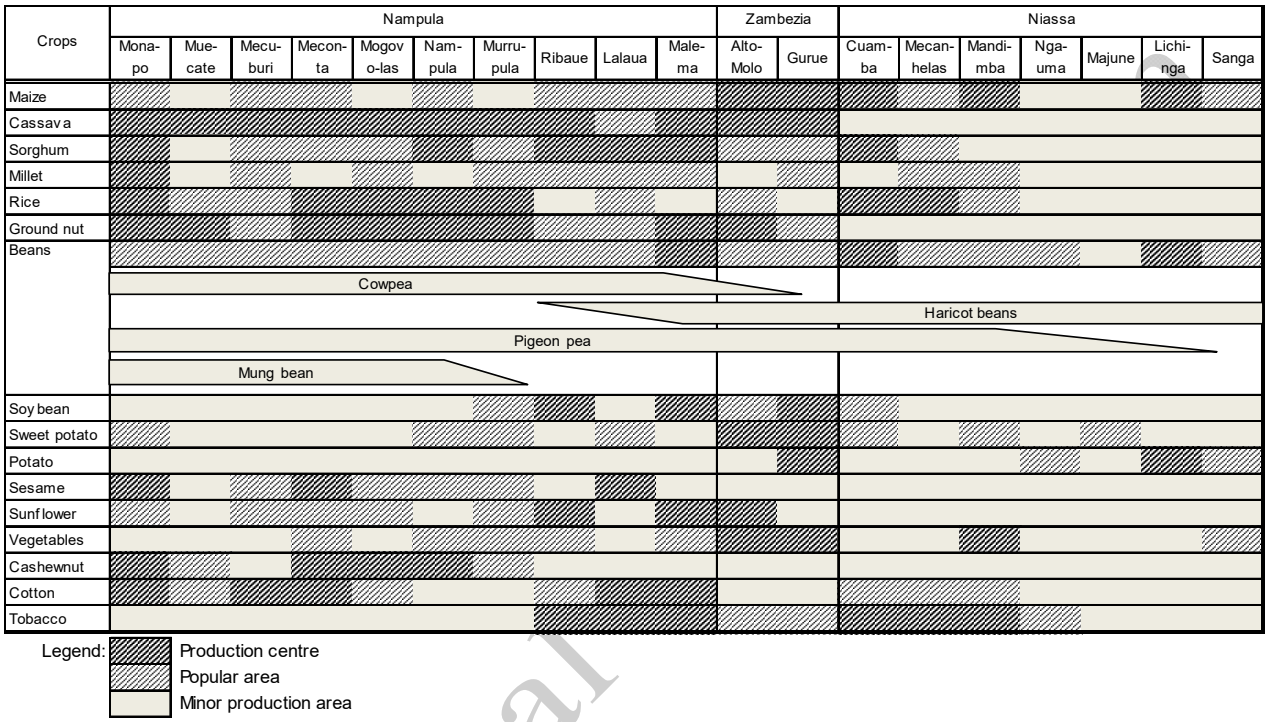
Familiar crops in the Study Area vary according to the locations involved. The crops gradually change from east to west, mainly in accordance with the climatic and altitude conditions in the area. Figure 2.4.2 shows the popularity of crops by districts.

The Study Area is broadly divided into three parts in terms of staple food crops production and consumption such as 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 high cassava production, while the other crops are placed in the supplementary position (Cassava dominant area). Conversely, the western part is characterized by high maize production (Maize dominant area) and the middle area by the production of several staples: not only maize and cassava, but also sorghum, rice (paddy), etc. (Mixed area). There are actually transition areas between the three areas.

In addition, several kinds of beans and pulses are also important crops in the area and haricot beans, cowpeas, mung beans and pigeon peas are popular among farmers. As with staples, the popularity of those crops varies according to the locations. Groundnuts, which is also an important crop, is mainly grown in the eastern part of the area. While soybean has attracted

considerable attention in recent years as the chicken industry has grown, its production remains limited, mainly within the middle area.

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



Source: JICA Study Team based on data from DPAs and field observation.

Figure 2.4.2 Localities of Crops in the Study Area

2.4.4 Food Security

Regarding major food crops, the area has a certain level of surplus for major food crops every year, except for rice and wheat (Refer to Table 2.4.4) according to the estimation based on the related data, such as per-capita consumption, seed requirement, post-harvest losses, population and production in the Study Area.

Table 2.4.4 Estimate of Food Demand and Supply in the Study Area (2011)

(unit: ton/year)

Crop	Production	Demand	Balance
Maize	378,400	206,000	172,400
Cassava	1,616,500	1,131,800	484,700
Sorghum	82,400	77,400	5,000
Beans	75,400	46,400	29,000
Groundnuts	46,000	36,800	9,200
Rice (paddy)	36,000	206,000	-170,000
Wheat	0	94,100	-94,100

Source: JICA Study Team

The supply capacity of each district, it is necessary to consider that much of this production is marketed not only to the Study Area, but also to other regions of the country. Historically, it is said "food production is in surplus in the North and Central regions in Mozambique", in contrast with the southern regions where food production is in deficiency. Accordingly, the surplus of the northern districts is often marketed to the southern part of the country or neighboring countries.

2.4.5 Prices of Agricultural Products - Farm gate Price

Surplus production, usually staples, is commonly marketed by middlemen who buy from producers on farms and/or in local markets and resell them in nearby towns. It was conducted the following three surveys concerning farmers' sale price for major crops in the Study Area till July 2012:

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

Table 2.4.5 shows the integrated result of the surveys, with prices actually varying with locations and seasons.

Table 2.4.5 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)	1.0	0.8 - 1.5	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)	4.1	3.5 ' 4.9	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	Mung bean	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: JICA Study Team

The profit margin of the middlemen is generally considered high, while diversifying marketing channels provides a good opportunity for farmers to increase their bargaining power. In the Study Area, many farmers currently have limited alternative channels to market their products. A fair and competitive market should be created by allowing access to diversified players (e.g. farmer associations/cooperatives, private traders, processing companies, etc.).

2.4.6 Promising Crops

Promising crops in the Study Area were evaluated based on their supply and demand. Firstly, 24 crops cultivated in the Study Area were selected and analyzed based on seven criteria as shown in Table 2.4.6.

Table 2.4.6 Analysis of Selected Crops

Crops	IIAM/ PEDSA Priority in Study Area	Commonly Grown in the Study Area	Potential Productivity	Farm-Gate Price	Nutritional Contribution (cal/capita)	Market Demand	Cluster/ Agro industry	Total Score
Maize	3	3	1	0	3	3	3	16
Cassava	3	3	1	0	3	0	3	13
Sorghum	1	3	1	1	1	0	0	7
Millet	1	0	0	3	0	0	0	4
Paddy (Rice)	1	1	1	0	1	3	1	8
Wheat	3	0	1	0	1	3	0	8
Ground nuts	3	3	1	1	1	1	1	11
Haricot beans	3	3	0	3	3	1	0	13
Cowpeas	1	3	0	1	3	1	0	9
Mung beans	1	0	0	3	0	1	0	5
Pigeon peas	1	0	0	3	1	1	0	6
Soybeans	3	0	1	3	3	3	3	16
Sweet potatoes	1	0	3	0	1	0	0	5
Potatoes	3	0	3	1	1	1	1	10
Vegetables	1	0	3	3	0	1	1	9
Sesame	1	1	0	3	0	1	0	6
Sunflower	0	0	0	1	1	1	1	4
Cashew nuts	1	3	0	3	0	1	1	9
Bananas	0	1	3	1	1	1	0	7
Sugarcane	0	0	3	0	3	0	3	9
Castor oil seed	0	0	0	3	0	0	1	4
Jatropha	0	0	1	3	0	0	1	5
Cotton	3	1	1	3	1	1	3	13
Tobacco	3	0	1	3	0	1	1	9

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

Promising crops, with higher scores, are the following:

(1) Basic food crops: maize, cassava, haricot beans, groundnuts, cowpeas;
(2) Market-oriented crops: soybeans, cotton, potatoes, vegetables, cashews, sugarcane and tobacco.

Cost-benefit calculations for major crops were made based on available data from the DPASA of Nampula Province and from other sources collected by the Study Team. As the available data is limited, the Study Team made calculations for a limited number of crops as shown in Table 2.4.7.

Table 2.4.7 Balance of Promising Crops

Crop	Farming Practices (yield)	Production Costs (MT/ha)							Sales (MT/ha)	Balance (MT/ha)
		Labor	Tractor	Seeds	Fertilizer	Pesticides	Other	Sub-total		
Maize	Present (1.3 t/ha)	2,360	0	175	0	0	0	2,535	5,460	2,925
Cassava (dry)	Present (2.2 t/ha)	2,040	0	500	0	0	0	2,540	5,280	2,740
Sorghum	Present (0.9t/ha)	2,480	0	84	0	0	0	2,564	4,410	1,864
Rice (paddy)	Present (1.0t/ha)	2,880	0	1,080	0	0	0	3,960	4,200	240
Haricot beans	Present (0.7 t/ha)	2,720	0	1,020	0	0	0	3,740	13,650	9,910
Ground nuts (with shell)	Present (0.7 t/ha)	2,120	0	520	0	0	0	2,640	4,130	1,490
Soybeans	Present (0.75 t/ha)	3,520	0	540	0	0	0	4,060	9,075	5,015
Cotton	Present (0.5 t/ha)	4,660	0	188	0	340	1,775	6,963	7,500	537
Sesame	Present (0.6 t/ha)	3,400	0	51	0	0	0	3,451	13,800	10,349
Potatoes	Present (13.8 t/ha)	3,080	0	4,667	12,000	0	0	19,747	66,240	46,493
Tomatoes	Present (7.1 t/ha)	4,720	0	3,000	4,800	0	7,523	20,043	50,410	30,367
Onions	Present (10.0 t/ha)	5,120	0	12,960	9,600	0	7,523	35,207	150,000	114,797
Cabbage	Present (12.0 t/ha)	3,720	0	2,400	7,200	0	7,523	20,843	105,600	84,757
Cashew nuts (Annual average)	1.05 ton/ha	3,525	67	34	0	1,441	686	5,753	13,397	7,645

Source: JICA Study Team

As a result, the following crops showed significant benefits: onions, cabbage, potatoes, tomato, sesame, haricot beans, cashew nuts and soybeans. In contrast, rice, cotton, and others showed low returns. Here, most of the basic food crops are produced without agricultural inputs such as improved seeds, fertilizers, pesticides and others; therefore, improvements in their profitability can be expected by applying such inputs in a proper manner.

On the other hand, as a subprogram of the Agricultural Research Program in PNISA 2013 -2017, (MASA, 2012.), fruticulture focuses on the strategies of small producers orient to market as well as financial profitability. Considering the above, a training center for tropical fruits will be created in Namialo that aims to achieve the promotion of technical development by agricultural research systems.

2.4.7 Animal Husbandry and Inland Fisheries

Animal husbandry in the Study Area is characterized by extensive breeding except for the intensive poultry industry, which uses input and advanced technology in its production system. Breeding methods are quite rudimentary, resulting in low yield and production. Over the last three decades, there has been a significant expansion in sheep and goat herds, and increased

meat production between 1984 and 2001. However, cattle and swine meat production shows no growth. Even after Mozambique's pacification, production has remained stagnant.

Only very limited farmers as of 5,960 grow cows, less than one percent of the total, in the area. According to data from the DPASA, only during the last few years has there been a slight upward trend in growth in animal husbandry activities. There are a number of factors contributing to the low level of development of the cattle/beef industry.

Table 2.4.8 Number of Cows in the Study Area by District

District	Number of cows	Number of farms	Cows per farm
Monapo	1,159	137	8.46
Muecate	377	73	5.16
Mecuburi	441	116	3.80
Meconta	700	134	5.22
Mogovolas	12,973	3,552	3.65
Nampula	5,620	234	24.02
Murrupula	1,771	480	3.69
Ribaue	2,822	124	22.76
Lalaua	81	18	4.50
Malema	748	82	9.12
Alto Molocue	680	96	7.08
Gurue	2,656	102	26.04
Cuamba	877	109	8.05
Mecanhelas	3,544	486	7.29
Mandimba	425	69	6,16
N'Gauma	3,132	24	130.5
Majune	33	10	3.30
Lichinga	229	53	4.32
Sanga	2,421	61	39.69
Total	40,689	5,960	6.83

Source: JICA Study Team based on INE home page at http://196.22.54.18/home_page/

(i) The occurrence of tsetse flies, which cyclically transmit bovine *trypanosomiasis* in the region. However, this fact was not considered in recent surveys conducted in the Nampula district (Cattle Raising Provincial Services of Nampula, 2007 and 2008).

(ii) Cattle have low productive potential because they are genetically heterogeneous with severe inter-breeding among the Creole race, Zebu, and dairy breeds.

(iii) The native pastures of the Tropical Savanna are nutritionally poor, resulting in low animal support capacity, not exceeding 0.2 head/ha during the dry season.[46]

(iv) Management conditions are extremely precarious, with scattered pastures and no fences to protect animals while they are grazing.

(v) There are almost no basic support systems for livestock farmers, such as animal quarantine, veterinary services, artificial insemination, etc.

The significant development of small ruminants is explained by the fact that these animals are more resistant to the protozoan that causes *trypanosomiasis*, in addition to the relative ease of their management. In the case of swine, the occurrence of the endemic African Swine Fever (ASF), a difficult-to-control, highly contagious viral deadly disease is the restrictive factor in Mozambique, as well as throughout Africa. ASF is present in the Study Area and it causes severe financial losses to farmers.

The recent development of the poultry industry is an indication that constraints are gradually being solved. Agribusiness companies with vertical and intensive farming systems, while providing products to the market, such as chicks and feed, actively promote their activities and

[46] www.cnpgc.embrapa.br/publicacoes/doc/doc70/capacidade.html

allow small producers to enter the production system. This development drives the demand for feed and raw materials, and is expanding the cropping area of soybeans and maize.

Freshwater fishery mainly focuses on integrated systems of fish farming for food security. Fish is a highly valued food and is a major source of animal protein. It is estimated that about 3.5% of the animal protein intake of the population in Mozambique is derived from fish and fish products.[47] However, at present the level of aquaculture development in Mozambique is still unable to remedy the food shortage in fish, ensure food security, or contribute to the balance of payments.

The main constraint to freshwater fishing in the Study Area is the low potential in existing rivers and other water bodies in the area, with the exception of Lake Niassa. There is potential to develop aquaculture in ponds and reservoirs that have been or will be developed for irrigation purposes.

Table 2.4.9 Number of Goats, Sheep, Pigs and Poultry in the Study Area by District

Districts	Goats	Sheep	Number of Pigs	Poultry
Monapo	37,887	985	13,512	348,393
Muecate	22,244	572	10,824	116,073
Mecuburi	36,255	845	13,992	134,709
Meconta	27,943	1,714	7,090	124,207
Mogovolas	71,842	21,793	11,248	238,328
Nampula	66,628	9,860	17,269	370,765
Murrupula	33,596	9,143	9,488	116,259
Ribaue	17.969	938	21,921	144,646
Lalaua	6,190	403	4,777	58,714
Malema	17,104	1,320	20,109	160,823
Alto Molocue	18,724	3,264	36,129	252,711
Gurue	18,731	1,399	26,228	255,255
Cuamba	16,574	2,671	8,622	131,753
Mecanhelas	26,260	3,778	11,978	140,295
Mandimba	12,046	1,382	948	105,540
N'Gauma	13,503	1,569	324	44,452
Majune	1,230	142	105	24,368
Lichinga	15,231	2,934	1,812	76,487
Sanga	8.560	2.293	419	31,831
Total	442,015	64,714	216,795	2,875,609

Source: JICA Study Team based on INE home page at http://196.22.54.18/home_page/.

The fishing sector has problems such as insufficient logistical infrastructure for refrigeration and transportation of products to the consumer market. Moreover, the lack of infrastructure to support the development of small-scale aquaculture does not encourage the involvement of the family sector in this activity, such as in stations/centers for the production of fingerlings and juveniles.

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

2.4.8 DUAT and Land Issues

(1) Legal Land System

According to the Constitution of the Republic of Mozambique, land is state property and cannot be sold, alienated, mortgaged or confiscated. The Constitution also declares that all Mozambican people have the right to use and benefit from land, under the conditions

[47] Fishery Country Profile: The republic of Mozambique / FAO 2007

determined by the State. Land use rights (DUAT) can be given to natural persons as well as legal entities.

The Land Law and its regulations provide that land use light can be acquired by means of: (i) customary occupation by a local community and/or individuals, (ii) good-faith occupation for at least 10 years, or by (iii) inheriting from individual nationals. In these cases, cadastral registration or property registration are not mandatory but voluntary. DUATs acquired through occupation or inheritance are recognized and protected by the State.

It is also legally recognized that communities in rural areas participate in the management of natural resources and settlement of conflicts, using their customary norms and practices for these purposes. Communities also take part in the DUAT entitlement, in order to confirm if the land in question is free of any occupants, prior to the confirmation by local administrative authorities. DUAT obeys the principles of co-entitlement, and members of the community may request individual titles after the breakup of their land from communal areas. The use of land is free of charge for family farming and for the use of local communities.

(2) Community Land Delimitation

Several communities engaged in delimitation of land as a means of proclaiming and visualizing their DUATs obtained through customary (traditional) occupation (Refer to Table 2.4.10 below), though this initiative does not legally impede the development of economic activities therein if there is consensus. Important observations by Ministrry of Agriculture (MINAG, at that time) /National Directorate of Land and Forestry (DNTF) on the experience of community land delimitation from 2000 to 2010 included the following: (i) Weak capacity of the government in budget allocation; (ii) Huge difference in areas (from 300 to 364,000 ha); (iii) Weak capacity of service delivery; (iv) Overlap of DUATs.

Table 2.4.10 Community Land Delimitation at Province Level, as of March 2010

	Nampula	Niassa	Zambezia	Total Mozambique
Number of Delimited Communities	94	8	73	231
Number of Communities in Process	3	2	18	92
Approximate Area of Delimited Communities (ha)	734,000	342,000	3,620,000	7,044,000
Number of Cases < 1,000 ha	10	0	0	15
Number of Cases 1,000 to 10,000 ha	70	1	45	154
Number of Cases 10,000 to 100,000 ha	17	8	42	122
Number of Cases > 100,000 ha	0	1	4	32

Source: MINAG/DNTF "Balanço dos 10 anos de delimitação de terras comunitárias (March 2010)"

Communal land delimitation is progressing slowly, despite being promoted by MASA, NGOs and donors[48]. Also, DUAT entitlement by individual farmers or rural households is still unusual[49]. Underlying reasons may include: (i) limited dissemination of the land law among rural communities and farmers (ii) there is no compulsory system of land registration, and (iii)

[48] MINAG/DNTF "Balanço dos 10 anos de delimitação de terras comunitárias (March 2010)"
[49] MASA "PNISA 2013-2017"

little perception of the urgent need for DUAT entitlement in areas where land has not yet become a cause of conflict.

The existence of communities or individuals who have acquired the right of land use without owning the property title is a concern, as their rights remain invisible and there is the need to assure their protection against and the prevention of conflicts, particularly given the current trend of population growth and the increasing number of investment projects.

To cope with such challenges, Ministry of Land, Environment, and Rural Development (MITADER), the newly created ministry in charge of land issues from January 2015, launched the "Terra Segura" program in April 2015, which aims at entitling DUAT for five million Mozambicans, including individuals, associations and communities, in the period of five years until 2019. Principal beneficiaries of this program will be non-registered, non-certified DUAT holders through customary or good-faith occupancy in rural areas.

(3) DUAT for investment

Investment projects to be implemented on a plot of land by a corporate entity cannot start before acquiring a DUAT, through application to the State. The DUAT remains provisional for two years until authorization of the "exploitation plan" of that plot of land, and a granted DUAT by this way is valid for up to 50 years and renewable for the same period. According to the Land Law, investors must hold at least two community consultations during the process of applying for a DUAT, with the participation of the District Administrator, a representative of the Geography and Cadaster Service, members of the local consultative councils, community members, and DUAT holders or occupants of neighboring lands. The consultations should theoretically allow for clarification of the availability of the requested area, as well as the definition of the partnership terms between the investor(s) and the community members. The conversion process from provisional DUAT to definitive DUAT requires the demarcation of the requested area and registration in the cadaster.

(4) Conflict between investment projects and local communities

In spite of these legal stipulations, several cases of conflicts between investors and local communities related to large-scale agricultural or forestry projects, around the Nacala Corridor, have been reported[50].

The main reasons[51] may be: (i) insufficient community consultations in terms of true representation of participants, openness and transparency of meetings, clear records and information gaps between investors and communities; (ii) insufficient agreement and/or incomplete implementation of the compensation and resettlement plan; and (iii) weak capacity

[50] Justiça Ambiental and UNAC "OS SENHORES DA TERRA: Análise Preliminar do Fenómeno de Usurpação de Terra em Moçambique (March 2011)", among others.

[51] The refer to Annex 3.12.2

of local government institutions in terms of budget, number of trained staffs, equipment and skills, to supervise law enforcement and provide solutions to the parties in conflict.

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

Table 2.4.11 Land Conflicts in the Nacala Corridor in relation to Investment Projects

Investment Project	Location (Province)	Area (ha)	Details of Conflicts	Measures
Commercial Farm	Zambezia	10,000	- 240 farmers who have lived in the concession area and who have not been re-located. - Only 500 out of 10,000 ha of the concession area was 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 had 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 of the land was utilized by local communities to cultivate food crops. - 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 (outside the delimited area) of local farmers. - The investor ran into a serious conflict with communities.	- A continuous dialog involving concerned stakeholders has been engaged in to mediate the conflict.
Commercial Farm	Niassa	16,000	- Though no conflict has yet been reported as the project remains in the preparatory stage, the investor is anxious about 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

It should be pointed out that Land Law and its regulations are still deficient in some key definitions about community consultations, more specifically the lack of rules of prior announcements, duration and place of consultation meetings, as well as the lack of grievance mechanisms for consultation results. Moreover, the "investor-community partnership terms" are not a legally binding contract, and no sanctions are in place in the event that investors or communities or both sides do not respect the promises made. Such structural weakness will need to be addressed in accordance with the "Guidelines for Strengthening of Land Tenure Security of Rural Communities and Partnerships between Communities and Investors", which was approved by the Land Consultation Forum created in 2010 as a mechanism of dialogue between the Government of Mozambique and civil society on the policies and laws pertaining to land issues. The guidelines recommend 10 principles and 11 directions to be followed by all the actors involved in the management and administration of land.

Table 2.4.12 Recommended Principals and Directions in "Guidelines for Strengthening of Land Tenure Security of Rural Communities and Partnerships between Communities and Investors"

Principles	Directions
1. Human Dignity, Social Stability and Right to Progress 2. Law and Order, Transparency and Responsibility 3. Justice and Equity 4. Gender Equality 5. Holistic Vision of Land and other Natural Resources 6. Consultation and Participation 7. Exceptionality of Community Resettlement 8. Fair Compensation for Expropriation and Resettlement 9. Procedural promptness 10. Corporate Social and Environmental Responsibility	1. Protection of Rights 2. Zoning and Land-use Planning 3. Economic Valuation of DUAT 4. Social Preparation and Technical/Legal Assistance for Rural Communities 5. Consultation and Rural Communities' Prior and Informed Consent in the Decisions about Award of DUATs 6. Negotiation and Formalization of Partnerships 7. Prevention of Conflicts and Access to Justice 8. Intra-Community Good Governance 9. Independent Follow-up and Monitoring of Consultations, Partnerships and Resettlements 10. Fair and Timely Compensation 11. Investment and Rural Development

Also, it is expected that local government institutions, especially the SDAE, will play a more effective leading role in collaboration with traditional local authorities, in order to facilitate the relationships between communities and investors and maintain good communication and coordination with the goal to eventually provide land conflict arbitration. However, most SDAEs face difficulty in adequately managing their small budgets, and their staff has little experience and knowledge to cope with such situations, resulting in the urgent need for capacity building[52].

2.5 Support Services to Farmers

2.5.1 Agricultural Research and Extension

(1) Agricultural research

The IIAM has two zonal research centers covering the Study Area: the North Eastern Center (IIAM CZnd) in Nampula and the North Western Center (IIAM CZnw) in Lichinga. The centers are expected to be the leading players in development of adaptive agricultural technology in the Study Area. However, both centers face the following challenges:

i) Shortage of qualified/experienced staff with proper scientific and/or administrative knowledge due to low incentives provided by the Staff Management System, including the salary scale;
ii) Low financial resources and high dependency on donor funding;
iii) Inconsistent budget disbursement system not attuned to the main period of research (cropping);
iv) Deficient research infrastructure and equipment;
v) Weak research management;
vi) Inflexible research planning and inadequate priority setting; and

[52] MASA " PNISA 2013-2017"

vii) Poor coordination with Cotton Institute of Mozambique (IAM), Institute for Promotion of Cashew Nuts (INCAJU), universities, and agricultural extension services.

In April 2011, MASA, Japan International Cooperation Agency (JICA), and Brazilian Cooperating Agency (ABC) started a technical cooperation project, named the Project for Improving Research and Technology Transfer Capacity for the Nacala Corridor Agricultural development in Mozambique (ProSAVANA-PI), and aimed at strengthening the operational capacity in the northeast and northwest zones of the IIAM. The objective of the project is the development and transfer of appropriate agricultural technology for the Nacala Corridor.

(2) Agricultural extension

Prior to its independence, agricultural extension in Mozambique focused on commercial and export cash crops, such as cotton, tobacco, and sugarcane, which were mainly financed by the corresponding crop sectors. With the liberalization of the economic system in 1987, a public extension system was established, with the main objective of providing assistance and strengthening the predominant family farmers.

The SDAE became responsible for agricultural extension services at the field level after decentralization of the extension services management. Before 2000/2001, the extension services at the district level comprised a team with one extension supervisor and eight extension workers, operating at the administrative post level. However, the organization of the extension services was modified after 2000/2001, when supervisors were assigned to each district (e.g.SDAE), drastically reducing the staff numbers, leaving only an average of five to six extension workers by district.

The Agriculture Extension Master Plan (PDEA 2007-2016) approved in 2007, was the result of a process of consultations and dialogue with the actors involved in the delivery of extension services, particularly those who are expected to directly or indirectly benefit from the services provided. The Agriculture Extension Master Plan provides a comprehensive guiding framework for the delivery of agricultural extension services in the country. The plan's framework, components, and sub-components are summarized below:

A. Development of Delivery of Agricultural Extension Services
   A.1 Re-orientation and support from the public sector
   A.2 Promotion and support from the private sector and NGOs

B. Development of Demand for Agriculture Extension Services
   B.1: Farmers' organization and training
   B.2: Group, associations and entrepreneurial development

C. Agriculture Extension Services Supply
   C.1: Agriculture extension services supply at provincial level
   C.2: Agriculture extension services supply at the district level

In 2008, the Government launched the National Program for Agricultural Extension (PRONEA:2012-2016) aiming to achieve higher turnover and improving the food security of subsistence family farmers through a consistent increase of production efficiency. It is one of the programs/projects of the PDEA, covering 42 districts in the country. The role of agricultural extension services envisaged in PRONEA is there not only to assist subsistence family farmers with a transfer of technology, but also to facilitate agricultural innovation by stimulating interactive learning between all actors in agribusiness, or in the agricultural value chain, such as farmers, communities, public and private extension workers, NGOs, service providers, agro-industries, and so on. PRONEA covers 11 out of the 19 districts in the Study Area.

Namely: Monapo, Meconta, Nampula, Ribaue, Malema, Alto Molocue, Gurue, Cuamba, Mecanhelas, Mandimba, and N'Gauma.

PRONEA (2012–2016) has three major components. These are:

(i) Supply-side Development:

Empowering extension staff not only of the public sector, but also of NGOs and the private sector, including procurement of equipment necessary for these services

(ii) Demand-side Development:

Empowering individual farmers and farmers' organizations through training and participatory seminars:

- Grouping/organizing and empowering farmers' organizations
- Farm enterprise development
- Special attention to vulnerable farmers, including female farmers

(iii) Providing Agricultural Extension Services

Providing better extension services at the provincial and district/local levels by the public and private sector, and NGO staff

2.5.2 Supply of Agricultural Inputs

Limited access and use of improved, adaptive technologies is the cause for low productivity. Most inputs such as fertilizers, certified seeds, pesticides, and herbicides are imported and costly because they are rarely used. Domestic demand for these inputs is low because lack of knowledge about their use and insufficient purchasing power of family farmers.

Low sales and high handling costs resulting from the small market cause high retail prices of agricultural inputs. Another problem is access to bank loans. Banks in the country have a conservative approach to credit targeting of small- and medium-scale agricultural enterprises, according to dealers and shop owners. Even if they could access credit, high interest rates commonly exceeding 25% per annum present a difficult challenge. Furthermore, there are only a limited number of companies dealing in agricultural inputs in the country, and they dominate the market. The low competitive structure leads to high costs of inputs in the agricultural

production value chain. Undeveloped market infrastructure is another critical cause for high costs.

(1) Seeds

1) Supply Side

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 2.5.1. The seeds produced were mainly cereals and beans seeds. There was no production of certified seeds of vegetables in Mozambique.

Table 2.5.1 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	-	-
Groundnuts	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/National Directorate of Agrarian Service (DNSA), MINAG

Table 2.5.2 shows that around 10,000 ton of certified seeds were sold in 2011. The gap between the seeds produced and sold must be complemented by the import, while PANNAR (Seed Company) exports its products to neighboring countries 2,500-3,000 ton/year. The amount of imported seeds is unknown. In order to cover wider farmer to use seeds, its production becomes important.

It is estimated that the seeds of maize, wheat, horticultural crops (vegetables) and potato might be major imported one. 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, and etc.

Table 2.5.2 Estimates of Certified Seed Sales in Mozambique in 2011

Company	Type of Seeds	Quantity (tons)
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		9,939-10,444

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

2) Demand side

Only a few farmers use quality seeds in Mozambique. Table 2.5.3 shows that about 10 % of farm-households used improved seeds for maize, which is the most popular crop among farmers in Mozambique, in 2007, 2008 and 2012.

It was confirmed through its field survey in 2012 that out of the 32 farmers, all but three farmers use their own seeds or exchanged/purchased seeds from neighbors. Farmers basically purchased vegetable seeds from shops, extension workers or neighbors, but some farmers also used self-collected vegetable seeds. Few farmers obtained seeds of maize or soybean from the local government or NGOs and returned double the weight of the seeds after harvesting. Four of the farmers said they purchased seeds because they eat all produces and cannot stock some for seeds.

Seeds of cotton and tobacco are provided for a price from a contracted company together with other necessary inputs (e.g. fertilizers and pesticides).

Reasons for the low utilization of improved seeds are high prices, poor or unstable quality, delays in delivery by the government due to small production volumes, small variety of the seeds, seeds not meeting farmers' expectations/demands, etc. It is necessary to strengthen the production of improved seeds especially in the region.

Table 2.5.3 Share of Farm-households using Improved Maize Seeds (%)

Province	2007	2008	2012
Niassa	5	5	5
Cabo Delgado	7	4	7
Nampula	6	4	4
Zambezia	11	8	8
Tete	24	13	21
Manica	20	29	11
Sofala	8	14	11
Inhambane	5	3	4
Gaza	5	13	7
Maputo	14	17	7
National	**10**	**10**	**9**

Source: TIA 2012, MASA

(2) Fertilizer

1) Supply side

In contrast to the seed business, the fertilizer business in Mozambique is totally operated by the private sector. All fertilizers used nationally are imported from other countries. Only a fertilizer blending company: MFC (Mozambique Fertilizer Company) is in operation in Chimoio. MFC even exports a modest amount of its products to neighboring countries, mainly Malawi. MFC's market share is expected to be about 50% in Mozambique.

The imported fertilizers are distributed through about 250 agro-inputs dealers who are scattered nationwide. Table 2.5.4 implies that their high profit margin is the cause of the high retail price of fertilizers in Mozambique. According to several agro-input dealers, the reasons for the high profit margin are "low handling amount due to low demand" and "high financial burden for keeping the stock".

Table 2.5.4 Price Structure of Urea in 2011

Kind of prices	Price (US$/ton)	% at Retail price
Free on Borad :FOB (at Saudi Arabia)	449.0	43.9
Cost, Insurance and Freight:CIF (at Beira)	623.8	61.0
Ex-factory (at Chimoio)	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 (WB), April 2012

According to the "National Fertilizer Strategy (2012)", "the fertilizer subsidy program prepared and implemented" is proposed together with other eight strategic actions for the program. The Government of Mozambique with International Fertilizer Development Corporation (IFDC) introduced a voucher system in four provinces on a pilot basis funded by European Union (EU) and FAO in 2009/11. The system targeted 25,000 farmers. They received NPK (N: Nitrogen、P: Phosphoric acid、K: Potassium), urea and maize or rice seeds and paid approximately 30% of the cost by voucher with the balance supported EU/FAO[53]. An evaluation of the subsidy program and several analyses[54] were conducted. Now, farmers are waiting the affordable price of the fertilizers.

Compering with neighboring countries, the retail price of urea in Mozambique is higher than US$760/ton in Zambia, US$960/ton in Tanzania and US$757 in Kenya which are introduced government subsidies at 75%, 50% and 40% respectively[55].

2) Demand side

a) Consumption

It is estimated that only around 30–50 thousand tons of chemical fertilizers were used per year in 2006 - 2010 as shown in Table 2.5.5, mainly to tobacco and sugarcane. Few fertilizers were used on cotton, although it remains an important cash crop. Fertilizers popular among farmers in the country are NPK (12-12-12 & 12-24-12), Urea, Diammonium Phosphate (DAP) and CAN.

Table 2.5.5 Estimated Chemical Fertilizer Consumption in Mozambique

(Unit: tons/year)

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

Several sources suggest that the lack of demand among farmers for fertilizers is due to limited access to input credit and high price of fertilizers in Mozambique. There is no government program to distribute subsidized fertilizers, although the government has provided seeds and farm machinery through Action Plan for Food Production (PAPA). Subsidized fertilizers are distributed together with other inputs only by NGOs and donor supporting projects.

It was confirmed through its field survey about the use of fertilizers in 2012 that, 21 of the 32 sampled farmers answered "Do not use" and four farmers answered "use fertilizer only for vegetables". Farmers who used fertilizer purchased it from Provincial Directorate of Agriculture (DPA), NGOs and cotton companies. One farmer purchased fertilizer from other farmers who

[53] IFDC, Mozambique Fertilizer Assessment , Oct 2012
[54] Michael L. Carter et.al, Subsidies and Persistence of Technology Adoptiion: Field Experimental Evidence from Mozambique, Jun. 2014
[55] World Bank, Agribusiness Indicators Zambia, Dec. 2012/Tanzania, Nov. 2012/Kenya, Jan. 2013dtorio

cultivate cotton or tobacco, while another two farmers in Niassa province purchased Malawi[56] fertilizer in the market in Lichinga.

Only one farmer in Rapale of Nampula claimed that he started settled farming and that he kept the soil fertile through crop rotation under the guidance of the DPA, but in actuality he had obtained free fertilizer.

b) Simulation 1: Fertilizer use for maize

The use of fertilizers for maize, since the object of the simulations of fertilizer use was not to evaluate farm management, they were conducted under simple assumed conditions. The results of the simulations show that under the present price structure, most family farmers do not get the expected returns from investing in agricultural inputs. Therefore, it can be assumed that market conditions, under the applied assumptions, are not sufficient to assure a high enough turnover for family farmers to use these inputs/services.

A profit-loss simulation of fertilizer application for maize, one of the main crops in the Study Area, was conducted for three scenarios. In order to simplify and easily identify the effects of fertilizer applications, the study considered maize cultivation as a single crop, although it is usually part of a mixed cropping system on family farms. Net profit was calculated for the three scenarios reflecting different prices for fertilizers. Table 2.5.6 shows the results of the simulations.

Table 2.5.6 Profit/Loss of Fertilizer Application for Maize

Price of Fertilizers	Net Profit (MT/ha)		
	Scenario 1	Scenario 2	Scenario 3
Current price (100%)	2,925	-1,253	597
90% of the current price	2,925	-598	1,907
80% of the current price	2,925	57	3,217
70% of the current price	2,925	712	4,527
60% of the current price	2,925	1,367	5,137
50% of the current price	2,925	2,022	7,147

Notes:
1) Scenario 1: No input (no fertilizer use, yield: 1.3 ton/ha)
2) Scenario 2: Medium input (Urea: 50 kg/ha and NPK: 100 kg/ha, yield: 2.5 ton/ha)
3) Scenario 3: High input (Urea: 100 kg/ha and NPK: 200 kg/ha, yield: 4.5 ton/ha)

Source: JICA Study Team

The simulation results indicate that the net profit in scenario 3 (high level input) would exceed scenario 1 (no input) only when 80% of the current cost of fertilizers is considered, while profit in scenario 2 (medium level input) would not exceed scenario 1 even considering the reduction of 50% of the current cost of fertilizers. The simulations clearly show the reason why the majority of family farmers do not apply fertilizers to major crops. Therefore, it is necessary environment that is easy to obtain fertilize for farmers.

[56] Subsidy system of Malawi is explained in Annex 3.8.4

(3) Agricultural Chemicals (Pesticide)

Like seeds and chemical fertilizers, very few farmers use pesticide (i.e. insecticides, fungicides and herbicides) in Mozambique as shown in Table 2.5.7.

According to FAOSTAT, the annual pesticide use was around 900-1,000 tons in 2006-2010, except in 2007. Since there is no national production of pesticide, all pesticides used were imported.

As result of field survey, the trend for applying agro-chemicals, such as pesticides and herbicides, is similar to that of applying fertilizer. 18 of 32 sampled farmers answered "Do not use". 12 farmers answered "use agro-chemicals for vegetables" and two farmers answered that they used it for cotton.

Table 2.5.7 Ratio of Farm households using Pesticide (%)

Province	2005	2006	2007	2008	2012
Niassa	7	11	3	8	7
Cabo Delgado	11	17	10	11	23
Nampula	10	4	3	3	11
Zambezia	1	2	1	0	1
Tete	7	9	13	7	2
Manica	2	1	1	4	3
Sofala	8	9	6	0	5
Inhambane	1	1	1	2	5
Gaza	3	1	3	3	1
Maputo	6	7	8	7	5
National	**5**	**5**	**5**	**4**	**6**

Source: TIA 2012, MINAG

(4) Agricultural Machinery

1) Supply side

a) Supply of Tractors

Since the tractor hire service is poorly developed in Mozambique, some large-scale farmers provide a custom land preparation service after they have completed all land preparation works in their own fields. A limited number of farmers' associations also provide a tractor hire service after obtaining the tractor through donor or government supporting programs, including the Fund for District Development (FDD).

Table 2.5.8 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

Tractors are imported by individuals and private companies who are mainly sales agents/dealers for major international tractor makers (i.e. John Deere, Massey Ferguson and New Holland). Since private sector demand remains low and some regular users import tractors on their own, a substantial portion of the tractors imported by major distributors in 2008-2010 went to the public sector.

b) Simulation 2: Tractor hire services

The Strategic Plan of Agricultural Mechanization (PEMA), with the objectives to increase production and productivity by means of better-quality agricultural operations and energy saving throughout the agricultural production and processing cycle, was endorsed in July 2012.

Based on PEMA, PNISA indicates four intervention areas: (i) the development of a network of services for mechanized farming, (ii) establishing institutions for agricultural development, (iii) the development of human and material capital, and (iv) the reorganization of production areas.

A profit-loss simulation was carried out for tractor hiring services (4WD tractor with 70HP), as such services would be the most practical way to utilize farm mechanization in the Study Area. The net profit of the services was calculated for two scenarios, which considered interest rates for five-year loans, and for three cases, which considered the number of tractor operating days per year.

In the scenario of a business loan (to start the tractor hiring service) with a ten percent (10%) interest rate, which is a subsidized rate, the owner/provider of the tractor hiring service would incur a loss if the tractor operated less than 45 days per year. Even after increasing the number of operating days to 60, the owner could not expect any profit until the fifth year of operations, earning only about MT 310,000 of accumulated profit after ten years of operating his business. Taking into consideration the CWB described in section 2.1.1, the ideal sowing period of most crops is limited to about one month per year in most places. Therefore, services cannot be provided for a period more than 60 days per year, and, as such, limits the return of investment. It is also an indication that the business is high risk, even if the provider gets a subsidized loan with a 10% interest rate. The simulation shows that the business may be feasible if the owner of a tractor hiring service can obtain an interest free (0%) loan and is able to provide the tractor hiring services for more than 45 days per year.

2) Demand side

Family farmers mainly have two types of demand for machinery: tractors for plowing and construction machines for forest reclamation.

The demand for plowing machinery is high due to the shorter preparation period for crops. Farmers must prepare the land after the first rains because the soil is too hard to plow manual before the rains. Usually this preparation period is short, lasting only 1.5 to 2 months from the middle of October to the end of November. Farmers believe that if they have a tractor, they can work more efficiency and prepare a larger area.

In the farmers' economic survey of 40 farmers in Nampula, it showed that the farmers were willing to use tractors to introduce new cash crops or to expand food crop production in unused lands. Therefore, a study on tractor services is warranted to study appropriate fees for the services, results of utilization of tractors, and the offset of the costs for labor, which may increase in the near future. Some companies already provide tractor services for their out-growers.

One of the major constraints to the introduction of mechanization is the lack of an adequate supply chain. Service providers selling the spare parts do not yet exist in the districts and no networks are yet in the area. There are three corporate farms in Gurue District and they

cooperate only when their tractors break down and are in need spare parts, because procurement of spare parts takes time.

2.5.3 Agricultural Loans and Credits

Financing for agricultural production and agribusiness operations in Mozambique is limited, with serious constraints both in short-term lending for agricultural crop production during a season, and for longer-term agribusiness investment. The share of commercial bank lending to the agricultural sector decreased by 30% from 2008 to 2010, declining from 9.5% to 6.5% of total lending in the Mozambican economy, despite the fact that the total volume of lending for agriculture increased by nearly 20% in 2009 and 30% in 2010.

Interest rates of commercial banks are too high to be absorbed by agricultural businesses, making access to credit very difficult, resulting in a slower growth of income and profits in the agricultural sector contrary to other sectors, such as trade, which have a faster return on investment.

Regarding agricultural credit for family farmers in rural areas, access to formal credit is extremely limited because of insufficient coverage of bank branches at the district level, the limited experience of micro-finance institutions in granting agriculture credit, high interest rates, and collateral requirements. It has been observed that some financial institutions are restrained to grant loans to the agricultural sector, because they generally consider activities in that sector risky. Low productivity and production often limits the family farmers' capacity to repay credit. For this reason, family farmers are not considered as target clients by commercial banks.

To tackle these challenges, the Government, with the support of partners in development, is implementing a variety of mechanisms that can be used to promote agricultural credit, such as guaranteed funds, district development funds, subsidies, and catalytic loans. Although the success has been achieved by these financial schemes in extending credit to small and medium farmers and entrepreneurs, surveys show that a large portion of these schemes remain underutilized.

For example, the FDD has been mobilized with the amount of the fund available to each district is about seven million MT. The budget has been used mostly for agriculture and small-scale industries, aimed at producing food and creating jobs. However, its repayment has been very poor, usually less than 20%. An alternative for the efficient use of the FDD would be, for example, a source for soft loans as proposed above, and transferred to private financial institutions as a trust fund.

Table 2.5.9 Financial Institutions for Agricultural Development in the Study Area

Type	Name of Scheme	Target Group	Study Area	Interest rate to end-users
Public Scheme	FDD	Small and medium scale farmers and other rural economic activities	All Mozambique	5% per year
	Fund for Agricultural Development (FDA)	Small and medium scale farmers	All Mozambique	10% per year
	Development Initiative Fund (DIF)	Medium scale farmers, agribusinesses, and associations	All districts in the Study area	10% per year
Micro finance Banks	Banco Oportunidade de Moçambique, SA (BOM)	Farmers and farmers' groups	Nampula, Zambezia, etc.	3% per month
	Banco Pro Credit, SA*	Small and medium scale business	Nampula, Zambezia, etc.	3%/month (Individual)
Microfinance Operators (NGO)*	Associação Moçambicana para o Desenvolvimento Rural (AMODER)*	Agribusiness, trade and commerce, other services: rural enterprises	Nampula, Niassa, and Zambezia	4% per month (individual)
	Kulima*	Agribusiness including farmers, particularly women	Zambezia	3% per month (individual)
	OPHAVELA*	Population not having access to Formal banking services	Nampula	10% per month

Source: *Financing Mozambique: http://www.financingmozambique.com/?_target_=funding-sources-by-type
Others by JICA Study Team

In the Nacala Corridor, opportunities for family farmers to access credit are poor, resulting in low agricultural productivity because prevailing practices of extensive farming have been applied over many years. In order to transform the prevailing extensive cultivation system, an accessible and affordable financing mechanism for the agriculture sector needs to be introduced targeting small- and medium-scale producers and entrepreneurs.

2.6 Farmers' Organizations

2.6.1 Legislation and Development Plan for Farmers' Organizations

The Government and other agriculture sector stakeholders have acknowledged the crucial role of farmers' organizations since Mozambique's independence in 1975. Accordingly, the Government has played an important role in the formation of farmers' organizations through MASA. Under the Law of Associations (Law 8/91), free association and registration of several forms of association is provided, and it is an important framework for the association's movement. Many farmers' organizations were established in the country within this legal framework. The Government, however, improved the legislation with the approval of Decree Law 2/2006 that simplifies and decentralizes the registration process of agricultural associations at the district level. This new legal framework allows the establishment of a large number of associations.

2.6.2 Present Situation of Farmers' Organizations

(1) General Situation

There are more than 4,000 farmers' associations in the family-farming sector in the country who face various kinds of constraints to optimizing production, such as leadership, access to financing, and technical capacity.

The promotion, strengthening, and expansion of the farmers' association movement in northern Mozambique started in 1996 with the assistance of the Cooperative League of the USA (CLUSA) Program in Nampula Province and the support of several donors, international agencies, and NGOs. From 1999 on, the CLUSA expanded their support to the province of Zambezia, and in 2000 it further broadened its operations to the south in Niassa province, in partnership with the União dos Camponeses Sul de Niassa or Union of Peasants of Southern Niassa (UCASN) and Oxfam. This intervention combined with the National Union of Peasant (UNAC) initiatives resulted in the creation of the UPCN (União Provincial dos Camponeses de Niassa or Provincial Union of Peasants of Niassa) with support of the Swedish Cooperation Center. Based on the first results of interventions from 1996 to 2000 obtained by CLUSA, many NGOs, such as World Vision, CARE, OIKOS, Oxfam, OLIPA, KULIMA, and agriculture departments like Provincial Agricultural Extension Service (SPER)/ DPASA, have incorporated the promotion of associations as part of their extension services.

Almost all farmers' organizations in Mozambique received support from NGOs, donors, and the MASA, at least during the initial phase of their formation process. Many farmers' organizations were created with the support of NGOs, and many still continue to rely on this support for the development of their activities. In this context, the sustainability of these farmers' organizations may be questioned as many of them cease to operate when the NGO support ends. Additionally, some farmers' associations were established only for the purpose of obtaining government support through the DPASA, such as agricultural equipment and inputs from MASA's PAPA. The main constraints of the farmers' organizations are (i) weak management capacity, (ii) weak internal governance, and (iii) accountability. In addition, the relationship between the association and their superior forum, the forum and their superior union/federations is weak.

(2) Result of Inventory Survey

In the Study, an inventory survey of farmers' organizations was carried out[57] (the survey covered the original targeted 14 districts only, since the additional five districts were defined after the Survey). The objective of the inventory survey was to identify the present condition and the problems on management as well as the development of each farmers' organization. The number of associations, federations and forums in the Study Area identified in the survey is shown in Table 2.6.1 and Table 2.6.2.

[57] "Inventory Survey of Farmers' Organization in 14 Districts of Nampura, Zambwzia, and Niass Provinces" conducted by SOCIEDADE COOPERATIIVA DE DESENVOLVIMENTO E RERVIÇS, MIRUKU Lda., Nampula, Mozambique

Table 2.6.1 Number of Farmers Associations in the Study Area by Districts

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 survey area, there are 1,377 farmers' associations in total. A half of the total is legal organization. The rates of organized farm household are quite low, two to eight percent according to the districts, except for Gurue district with 17.8%. The rates in Nampula province, in Zambezia province, and in Niassa province are 5.0%, 12.8% and 5.2%, respectively. The average rate of the 14 districts is only 6.4%.

The survey has revealed the best practice and failure cases of farmers' association as follows.

Best practice of the organization activity and its success factors

- Conservation of agricultural products, such as maize, beans, and other grains by using storage;
- Increase production by use of some plants leaves and animal excrements as fertilizers;
- Mitigate losses by use of some plant leaves as pesticides to combat some pests;
- Good collaboration between the unions, negotiating and managing contracts for market intermediation; and
- Increasing market access by training associations in access to information.

Case of failure of the organization activity and its failure factors

- Failure in fulfillment of a production 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.

Table 2.6.2 Number of Farmers Association Federations/Forums in the Study Area by Districts

Source: JICA Study Team

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	
					Male	Female			Male	Female
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***

2.6.3 Business Challenges to Farmers' Organizations

Many NGOs in the Study Area have been working together with farmers' organizations for more than 15 years. During that time, members of the farmers' organizations were trained to improve their farming practices, as well as improving their skills in leadership, literacy, conflict resolution, meeting facilitation, setting agendas, democratic governance practices, and business skills.

Despite all these efforts, there are few or no farmers' organizations considered successful from an economic point of view. Several international NGOs who provide support to farmers' organizations have often been criticized for being more concerned with farm production than with marketing. This situation restrains both farmers' organizations and individual farmers as they lack the capacity to establish good links with markets. The situation leads to a lack of business sustainability. In order to foster the situation, some NGOs take an approach to achieve results quickly through the provision of inputs without preparing the farmer to cope with market-related business challenges. However, in recent years, some agricultural production companies and NGOs have started new businesses with a group of voluntary farmers. They emphasize activities focused on purchasing and marketing, and this new business model is achieving successful results.

2.6.4 Support to Farmers' Organizations

The General Law of Modern Cooperatives (Law No. 23/2009) was approved in September 2009, and enacted in March 2010. It provides a well-defined legal framework for organizing farmers' cooperatives based on a clearly defined purpose. The new Cooperatives Law emphasizes that cooperatives are organizations of people with an economic vision.

The dissemination of this legislation among farmers and their organizations still is a great challenge, especially in districts and rural areas. The creation of new modern cooperatives within the framework provided by the new Cooperative Law can be an option towards building a sound basis to establishing commercial relations between farmers' organizations and markets.

To support farmers in the organization of modern cooperatives, it is necessary to overcome the following constraints: (i) lack of access to improved inputs, (ii) poor technology and management skills, and (iii) limited business opportunities.

2.7 Irrigation

2.7.1 Irrigation Development Challenges

In the Study Area, although large-scale irrigation farming can be observed in enterprise farms producing cash crops, the scope remains very limited. Most irrigation is performed on small areas of farmland via small-scale irrigation systems. Small-scale irrigation directly withdraws water for irrigation using manpower or pumps from rivers or ponds, small dams constructed on small rivers/streams, or small reservoirs excavated in the farmland. Following the collapse of state farms, the irrigation areas were distributed to small-scale farmers. Meanwhile, small-scale irrigation is also gaining popularity along rivers or near lakes and marshes for cultivating valuable vegetables, where in those areas manual irrigation is carried out using watering cans or small mobile pumps.

Substandard construction of hydraulic structures is frequently observed in the Study Area, and some concrete dams built by DPASA/MASA are damaged and have collapsed due to water leaking and scoring under the foundations. The causes may be considered that investigation, design of the dam bodies and foundations as well as quality management during the construction stage. From a technical perspective for the construction of hydraulic facilities, it was observed that construction companies have insufficient technical skills and experience in building hydraulic structures. In addition, even though the DAPSAs maintain inventories and databases of irrigation systems, they are not updated and do not cover all systems and exclude many scattered small systems. It is necessary to improve their databases in order to strengthen the DPASAs' capacity to manage irrigation systems.

Most small farmers cultivate vegetables, such as onions, tomatoes, carrots, cabbages, spinach, kale, garlic, peppers, etc., with irrigation over part of their farmland, while the majority of the land, which is used for food crops such as cassava and maize and cash crops such as tobacco and cotton, is farmed through rain-fed cultivation. The laborious work involved in manual irrigation limits the irrigation area of each farm household and hinders their efforts to expand their irrigation areas. Even though demand for mobile pumps is high among small irrigation farmers, very few farmers possess their own pumps due to lack of financing to procure pumps and to repair or re-construct irrigation facilities. The cultivated vegetables are brought to local markets by farmers, some of whom bring them to large town markets, such as Nampula.

However, most small irrigation farmers cite difficulties to access markets, including transporting and distributing products, along with financial issues, as major challenges with irrigation farming.

2.7.2 Land Suitability for Irrigation Development

There are extensive tracts of land suitable for irrigation development in the Study Area. According to a study done by the Regional Water Management Agency in the north-central (Administração Regional de Águas-Centro Norte, ARA-CN)[58], Class 1 (high potential) and Class 2 (moderately suitable) areas were estimated respectively at 949,000 ha and 624,000 ha within the jurisdiction of the ARA-CN, which excludes all districts in the Niassa Province, other than the Cuamba District. Those areas are considered suitable for irrigation development as land and water resources are available, and irrigated agriculture is economically feasible. Highly or moderately suitable areas for irrigation are distributed throughout the Study Area with Malema showing the highest potential followed by Monapo.

- Need to develop and update the inventory and database of irrigation systems to allow for proper management by government administrations
- Insufficient basic data for irrigation planning and development, such as agro-climate and hydrological data

2.7.3 Potential for Irrigation Systems Rehabilitation

Previously developed irrigation systems cover 7,100 ha of the Study Area. Among these, only 43% are presently in use because of malfunctioning equipment and facilities or abandonment.

Even in areas with operational irrigation systems, the canal networks are inoperable, while irrigated and non-irrigated land is mixed and scattered, like a mosaic. The areas that are not in use can be potentially considered for irrigation development through rehabilitation and reconstruction of canal networks and rearrangement of irrigation plots.

2.7.4 Water Resources Availability

After the 1990s, the hydraulic observation network started to malfunction and was, in part, abandoned; hence, available river discharge data, necessary to assess the hydraulic conditions in the Study Area, is seriously limited. Based on the analysis conducted by the Study Team, it was concluded that both the specific discharge and the outflow volumes are relatively lower in the eastern districts of Monapo, Muecate, and Meconta; whereas, higher runoff was observed in the eastern districts of Ribaue and Malema as well as Zambezia and Niassa provinces.

According to the studies conducted by the ARA-CN and the Regional Water Management Agency in the north (ARA-N), the estimated surface water potential at all areas of the

[58] Study for the establishment of ARA- C-N, 2006, National Directorate of Water (DNA), Study for the Establishment of ARA- N, 2006, DNA

jurisdiction of these administrations are approximately 25,000 million m^3/year and 24,400 million m^3/year, while water demand is 405–560 million m^3/year and 160 million m^3/year, respectively[59]. These regions have considerable potential for water resource development with quite a large available volume that is much higher than the estimated water demand, even if 30% of the runoff would be kept for ecological flow and conservation purposes. These conditions are similar to those in the Study Area.

Nevertheless, it is important to consider seasonal river flow variations during the year, and from one year to another. In the Study Area, river flow is high from January to April, corresponding to 70% of the annual runoff. Although water quantity is not a constraint for water resource development, intake and storage facilities should be installed to cope with the unequal water distribution over time.

Because the flow of the river water is uneven and unstable, the capacity to store water is a limiting factor for utilizing the abundant water in the area. The major water storage facilities in the Study Area are the Nampula Dam (Monapo River, Nampula District), the Cuamba Dam (Mepopole River, Cuamba District), and the Locomue Dam (Lucheringo River, Lichinga District), with a combined total storage capacity of 8.8 million m^3. Besides the above-mentioned major dams, there are other hydraulic structures for irrigation, which are mostly small-scale facilities.

Assuming that total demand for irrigation water is 10,000 m^3/ha/year, the storage capacity of the irrigation facilities is estimated at 71 million m^3 for an area of 7,100 ha. However, only 45% of the estimated potential of water storage for irrigation is utilized, because of the conditions of the facilities. The maximum storage capacity is estimated at 80 million m^3. This figure is significantly lower than the potential water resources of the Study Area, estimated at 20,000 million m^3. It can be said that water resources in the Study Area are presently largely untapped.

Development has been observed in some river basins such as the Monapo River Basin in Nampula Province. With an increasing demand for water in urban and rural areas because of population growth, small horticulture irrigation systems along the river, and industrial development, there is a concern that the balance of water resources and water demand would become a serious problem in the future. Thus, the establishment of a proper water resource management system is urgently needed, as well as a water allocation plan for river basins.

2.7.5 Rain-fed Crop Cultivation Assessment

The conditions for rain-fed crop cultivation were assessed from the perspective of water deficits of crops such as maize, beans, soybeans, potatoes and cotton in the selected districts of Chimbonila, Cuamba, Malema, Nampula, and Meconta. The assessment was carried out using data on average precipitation from 1998/99 to 2010/11. The water deficit of crops during the

[59] Study for the establishment of ARA- C-N, 2006, DNA, Study for the Establishment of ARA- N, 2006, DNA

vegetation period was estimated at 2-14% for maize during the initial and late stage of growth. This deficit ratio can be reduced to less than 6% by choosing the appropriate seeding time in the districts of Lichinga and Nampula. The evaluation revealed that beans can be cultivated without water stress except for in the eastern area (represented by Meconta). The water deficit for soybeans is estimated at 0-7%, and was observed in the late stage of vegetation in April. Even though maize and soybeans are cultivated with a small degree of water stress under average conditions, it is considered that the unevenness of rainfall, both during the year and from year to year, affects the growth of these crops in the Study Area. Thus, supplemental irrigation is expected to contribute to increasing and stabilizing the productivity of crops.

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

2.8 Value Chain and Market Demand of Major Agricultural Commodities

2.8.1 Challenges to and Potential of Value Chain Development of Agricultural Products

(1) Maize

Maize is one of the staple food crops in Mozambique, and it is also important as animal feed. According to estimates made by the Study Team, the local demand of maize for human consumption will increase to 460,500 tons by 2030 in the Study Area. Demand for maize should increase considerably because of the development of the poultry industry and increase of demand from national and international markets.

(2) Cassava

Northern Mozambique is an important area for both cassava production and consumption. In 2011, production of raw cassava in the Study Area was 1,616,500 tons.

Fresh cassava is extremely perishable and it cannot be stored for a long period, so it must be dried. The cassava flour price increases during the rainy season due to a shortage of dried cassava. Cassava sold in the market is usually dried during the dry season and stored for the rainy season. Cassava can be kept in the ground to be harvested throughout the year; however the drying process is difficult during the rainy season

It is expected that there will be a continuous increase in the demand for cassava because it is a staple food, and it is also used for the production of flour, chips, and bread, as well as for animal feed, bio-fuel, and starch. Currently, the beer industry in Mozambique uses around 40,000 tons of fresh cassava per year.

(3) Groundnuts and beans

Groundnuts and beans, especially haricot beans, have a high demand in the domestic and international markets. Farm gate prices of these products are very high, 22 MT/kg and 19 MT/kg respectively in 2012, providing a high profit margin for the producers.

These products are highly competitive in markets, even in Maputo with added transportation costs. One of the main constraints in development of this produce is storage losses and damage caused by insects, fungi, and rodents.

(4) Soybeans

In 2011, Mozambique imported 52,000 tons of soybean oil and 110,200 tons of soybean cake, as well as 12,800 tons of poultry meat. Import volumes of these products tend to increase over the years. Nonetheless, the domestic poultry industry is on the rise, led by strong domestic demand. According to a report compiled by the Agriculture Promotion Center (CEPAGRI) of the Ministry of Agriculture for a workshop on July 16, 2012, demand projections for soybeans for the poultry industry alone in 2020 is 131,000 tons.

Poultry farmers prefer domestic soybeans because they may purchase small quantities, about 50-100 tons, which is suitable for their production scale. The minimum acceptable quantity for importing soybeans is 500-1,000 tons, which means that farmers would need suitable warehousing and bear its cost for storage. There are other difficulties and issues with importing soybeans, such as production planning that could be compromised because of late delivery. Moreover, large financial resources are required for the purchase of large quantities of soybeans, which may result in cash flow constraints for local poultry farmers. For such reasons, the demand for domestic soybeans has increased to replace the imported product.

Post-harvest losses of domestic soybeans correspond to more than 20% of the production according to the results of the Study Team survey. This is mainly caused by poor drying and storage conditions. The price of domestic soybeans can currently compete with that of the imported product, but the quality is slightly inferior. It is necessary to rehabilitate the main access roads, including rural roads, for the efficient distribution of the product. Likewise, suitable storage facilities are required to ensure uniform product quality.

(5) Cashew nuts

Cashew nuts are a competitive product on the international market. The Cashew Master Plan 2011-2020 was endorsed in 2011, with the aim to increase cashew nut production by about 80% over ten years and to strengthen national cashew processing capacity. During the last decade, a number of cashew processing factories have started operations in this sub-sector. Mozambique has a processing capacity of about 40,000 tons for raw cashew nuts, of which 65% is located in Nampula Province. The increasing number of cashew nut processing factories means an increase in demand for raw material. The challenges to cashew factories are (i) procurement of good quality raw cashew nuts and (ii) a stable supply volume.

The cashew value chain extends from domestic to foreign markets. The domestic value is estimated at only 18% of the total value. The other 82% originates from foreign markets. Out of this, 42% is generated in the roasting/salting/packaging process, and 40% is generated in the trading and retailing process. The low rate of added value of the domestic process is another constraint.

(6) Vegetables

Vegetables produced in the Study Area, such as tomatoes, onions, and potatoes, have high potential. The demand for vegetables comes from family kitchens and hotel services, and an increase in demand is expected in areas close to the Nacala Port and urban areas. There is a high demand for products such as tomatoes and potatoes in highly populated areas such as the cities of Nampula and Nacala; therefore, there is great potential for the substitution of imports of such products.

(7) Sesame

Sesame provides high profit margins for producers. The farm gate price of sesame is around 23 MT/kg. Export of sesame for the confectionary and organic product market in Mozambique reached about 39,400 ton in 2009 but decreased to about 25,800 tons in 2011 (FAOSTAT, 2011). The main challenge is to control the harmful insects that damage the product.

(8) Poultry

Demand for poultry is growing in the domestic market. According to estimates by TechnoServe, the consumption volume of poultry will reach 137,000 tons in 2020. Investment in poultry farms has increased in response to this high demand in the domestic market. However, domestic supply of feed (i.e., soybeans and maize) is not stable throughout the year; therefore, poultry farms have to rely on imported feed. However, as described in the soybeans section, the volume of one lot of the imported product is often too large because of lack of adequate storage facilities, and payment is required two to three months before delivery, which causes cash flow problems to small producers. This increases operational costs, causing financial difficulties. A large volume of the local product and a stable supply of feed are required for the sustainable development of the domestic poultry industry.

(9) Tea in Gurue

Tea production and processing is mostly concentrated in the highlands of Zambezia Province, in particular in the Gurue region, which is located at favorable natural conditions for tea growing. Tea production and processing is the most important industry, which produces 7,000 tons of tea annually and creates employment of 4,000 workers in Gurue region. Chá Gurue is one of the most internationally recognized brands, and now 85% of its products are exported. Recently, Chazeiras de Moçambique started processing and bringing tea bags to the market.

Presently, tea production has been reduced to 900 kg/ha/year from 2,000 kg/ha/year, as a result of:

1) Deteriorated tea trees, which were planted more than 70 years ago; and
2) Reduction of tree density (normally 15,000/ha), due to poor maintenance.

Urgent countermeasures are required for revitalization of the tea industry and regional economic development by replanting high quality trees and renovating tea processing plants.

2.8.2 Commercialization of Agricultural Products

(1) Regional Level Commercialization

The northern region, including the Nacala Corridor Area has valuable natural resources such as coal, natural gas, soil, water, and also the natural deep-sea port of Nacala. The agriculture sector is expected to play an important role in the economic development of the region and in supplying food and raw materials to other sectors. The development of the Nacala corridor should also boost the development of other regions, particularly through the creation of job opportunities and the provision of services.

Inadequate transportation infrastructure (roads and railways) and poor management skills (sea port) are observed in the Study Area. These issues cause higher transportation costs for agricultural products and commodities, which in turn reduces the competitiveness of regional agriculture and related industries. Furthermore, poor access to the road network in rural areas also limits agricultural trade.

Farmers' farm management decisions are based primarily on supply-oriented marketing. This is due to limited resources available to the farmers, such as land and financing as well as limited access to market information. Few interventions were made to improve the quality of agricultural products by the Government, such as dissemination of quality standards for agricultural products. This issue with quality is also considered a constraint to promote commercialization of agricultural products.

The potential market of agricultural products is expected to experience increasing demand for variety and volume of produce due to population growth in the Study Area and in the northern region as a whole. Malawi is a potential market for maize and vegetables in areas along its border with Mozambique.

The National Institute of Standards and Quality (INNOQ), established under the Ministry of Industry and Commerce in 1993, has developed and published more than 600 national standards for trade, which also includes food crops such as maize, wheat, cashews, and bananas. It is expected these standards is contribute to increasing the quality of the agricultural products from the region and thereby increase the competitiveness of the products in domestic and international markets. Additional standards for agricultural products are expected to be formulated in collaboration with MASA and INNOQ.

(2) Marketing of farmers

Farmers usually determine the production of cash crops contingent on the presence of a reliable crop buyer in the area. In fact, the production of cash crops in the Study Area is concentrated in several specific areas, where commercial or industrial companies specialized in such crops promote production.

Fewer income generation opportunities exacerbate poverty in rural portions of the Study Area. Many farmers are unable to accumulate a product surplus due to their limited farming scale and low productivity. PEDSA 2011-20, MASA indicates that fewer than 10% of farm households sell their surplus nationally.

Crops marketed by farmers mainly comprise their staple foods. The percentage of crops marketed for production is relatively high in the Study Area. According to the trade inventory survey, 66% of cassava and maize produced in the area are marketed, which implies that many farmers often sell crops when they have a surplus, when needing cash to repay debts or on emergent occasions (e.g. illness, education, etc.).

Marketing of surplus production is usually via middlemen, who buy directly from producers at the farm gate or at local markets for resale in cities nearby. Because of such occasional interactions with the markets, farmers' bargaining powers are not strong and the profit margins for middlemen are commonly regarded as relatively high.

For example, in the four communities in Rapale district, farmers get their main income from selling basic crops and vegetables. In these communities, vegetable cultivation is mainly carried out by the men, while both men and women sell the products to the markets. The distances from three of the communities to major markets are about 10 to 15 km; therefore, the male farmers go to markets by bicycle, female farmer use minibus. The other community is located 30 km from the nearest market. Farmers in that community go to the local market once a week by minibus.

2.8.3 Agro-Processing

(1) General situation

Small-scale agro-processing such as rice, maize and cassava mills dominates the country. Mills are located in and around the center of districts and cities and provide milling service to customers, while in rural areas, instead of buying raw materials to sell milled products, millers only provide a milling service. The Study Area is a major national agricultural production area and there are about 200 processing companies, encompassing small- to large-scale operators, in Nampula province. Mills for maize and cassava prevail in small- to medium-scale processing factories, while cashew and cotton factories have large-scale processing capacity.

(2) Maize and cassava processing

Maize and cassava are milled to flour in small-scale mills in district capitals and relatively large towns for personal consumption of producers and for retail purposes at local markets. There are

very few medium-scale maize and cassava flour processors that started as small-scale processors because of poor business management capabilities and difficulties in accessing credit for investment. Low quality of maize and cassava due to poor post-harvest handling (drying and storage) of raw materials is also a constraint for processors.

At the same time with several challenges in maize and cassava processing industry, it can be noted as development potential that there is year-round high demand for good quality maize for flour and feed, and that new market opportunities are expected for cassava-processed products such as bio-ethanol and other industrial materials.

(3) Cashew processing

Nampula province is a major cashew nut producer in Mozambique. Many cashew processing factories are allocated to the eastern districts of the province. Those processing factories have constraints on their operation such as: 1) the low operation rate of the facility due to lack of materials, 2) insufficient volume due to difficulties in the replacement of cashew trees, and 3) low quality of raw materials resulting from poor pest control on cashew trees. Based on the Cashew Master Plan 2011-2020 (PDC), the Government and partner institutions together with the private sector started to increase processing capacity, quality improvement, research, extension (such as the provision of 21.3 million seedlings), and institutional strengthening of the cashew production sector.

(4) Others

The processing of soybeans is considered as one of the high potential processing industries because the production of soybeans for import substitution still does not meet the domestic demand for edible oil and animal feed.

Trading quality standards for agro-processing of several products have been established by the INNOQ. It will contribute to increase quality of agro-processing products of the country so as to enhance its competitiveness in the domestic and internarial market.

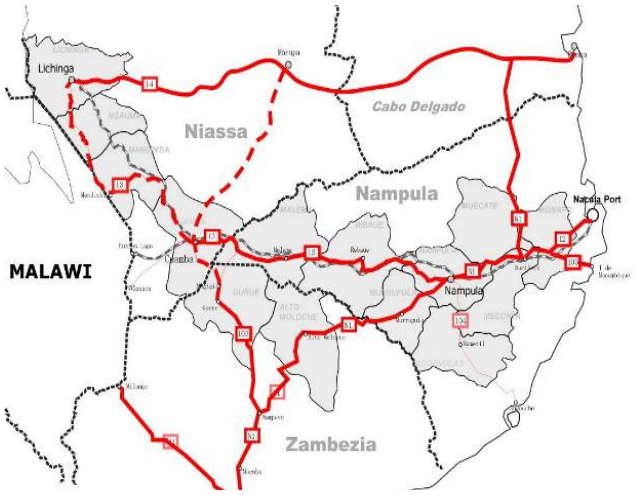
2.9 Logistics Infrastructures

2.9.1 Transportation

(1) Road transportation

High transportation costs reduce competitiveness of the Study Area's agricultural products (prices) in the main consumption areas such as the central and southern regions of Mozambique. The high transportation costs arise from (i) a shorter life span of equipment and high fuel consumption caused by poor road conditions, (ii) higher operational costs as a result of longer transportation time and poor road conditions, and (iii) a low level of competition among transportation service providers (haulers) because there are only a few providers based in the Study Area.

Rehabilitation of the national road network should contribute to the improvement of issues (i) and (ii) above. Regarding issue (iii), in order to promote the participation of new transportation service providers in the area, particularly for hauling of agricultural products, the volume of traded goods should increase to make the business of transporting to/from the area more attractive to service providers. It would also reduce the cost of agricultural input.



Source: JICA Study Team

Figure 2.9.1 Future Road Network

In addition to the national roads, the poor conditions of rural roads connecting farmland to national roads still remain a major constraint for transportation efficiency for producers and traders. Rural road network planning is urgently necessary, including setting priorities for development based on agricultural production areas to optimize investment.

Many classified roads in the Nacala Corridor Area, including two parallel roads with paved lanes running between Nacala Port, Cuamba, and Pemba-Lichinga, are being rehabilitated with completion expected by 2017. Rehabilitation of the N13 road from Cuamba to Lichinga will be implemented with financial support of the African Development Bank (AfDB) and the JICA.

For the north-south network, roads N1 and No. 103 from Zambezia to Pemba and Magegi are to be rehabilitated in 2014. The rehabilitation and paving of the roads from Magegi to Cuamba, and Cuamba to Marrupa in the Pemba Corridor in Niassa is under discussion. If the aforementioned works are carried out, the city of Cuamba might become a crossing point of the road network in the western part of the Study Area.

Nevertheless, rural areas face difficulty of access. Firstly, road networks are not developed in rural areas, especially in the districts of Sanga (road density: 19 km/km^2), Majune (24 km/km^2), N'Gauma (41 km/km^2), Mandimba (40 km/km^2) and Gurue (40 km/km^2). Moreover, many roads are frequently impassable during the rainy season because of flooding of seasonal rivers and poor drainage systems, making roads inundated, muddy, and slippery on steep, hilly sections.

Increasing the number of access roads where vehicles can travel with less difficulty should be a development priority to reduce most part of the constraints, including high transportation costs, lack of market access, weak bargaining power, large produce losses, and poor access to public services.

(2) Railway transportation

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

The Northern Development Corridor (Corredor de Desenvolvimento do Norte or CDN), the consortium that manages the port of Nacala and operates the northern railway network in Mozambique, has an improvement plan for the North Railway network (hereinafter called the Nacala Railway). Expected transportation capacity of the Nacala Railway after rehabilitation is 29 million tons per year. CDN's expectations of handling capacity are 22 million tons per year, consisting of 18 million tons of coal, two million tons of national cargo, and two million tons of transit cargo. Agricultural products are included in the two million tons of national cargo.

Discussions regarding the rehabilitation of the Lichinga line have not yet begun. If the CDN improves the Lichinga line, the Niassa Province will also have access to mass transportation.

(3) Nacala Port

Nacala Port has advantages because of its natural depth and location close to Asia; it is considered to be one of the more important ports in east Africa.

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

The implementation of the plan will increase capacity of the port by stages up to 250,000 twenty-foot equivalent units (T.E.U.) in 2030. The expected cargo handling volume per year should be 9,972,000 MT/year, 10 times the 995,000 MT handled in 2008.

Nacala Port is operated by the CDN under concession till 2020, extendable for an additional 15 years. Moreover, a new special port for coal transportation is to be constructed in Nacala Velha by the mining company VALE, and an international airport was built in Nacala in 2014.

(4) Transportation services

As mentioned earlier, the low level of competition is one of the reasons for high transportation costs in the supply chain. Currently, private companies that handle a large volume of commodities have their own transportation equipment. Major transportation service providers are based at Nacala Port, while small and medium service providers are located along the corridor.

Once national roads are rehabilitated and agricultural production volume increases, the participation of a larger number of small, medium, and large transport service providers in the corridor is expected.

2.9.2 Storage

(1) Public storage facilities

There is public warehousing in each district of the Study Area, built before independence, which are currently managed by the Cereals Institute of Mozambique (ICM). The storage volume of these warehouses varies from 200 to 5000 metric tons (ton). Almost all are rented out to the private sector for storing agricultural products. Since they were built more than 50 years ago, many of them are too old and require rehabilitation.

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

(2) Private storage facilities

There are two types of storage facilities in the corridor: one is a modern-type warehouse with different capacities; the other is a traditional type, built on a farmer's property. Modern warehouses are mostly for general purpose use. Grain silos for maize and soybeans in the production area are under construction by both the public and private sectors.

In general, small-capacity warehouses (less than 100 tons) are scattered in remote areas and serve as temporary storage sites, while medium-capacity warehouses (100 to 1,000 tons) are located in the district capitals or in adjacent districts at larger collecting sites. Large-capacity warehouses (more than 1,000 tons) are usually located around large consumption zones or shipping sites for long distance transportation, such as Nacala Port and the city of Nampula.

According to the findings of a sample survey conducted by the Study Team, the average capacity of the storage facilities is 374 tons, and the average annual turnover is 462%, assuming a one-week storage period per storage event. The installed capacity of warehouses is used for only 46 weeks per year. This is a quite low-level utilization of the facilities. Shortage of storage facilities is sometimes identified as a constraint for the development of the sector; however, appropriate storage capacities and location are more important for efficient storage management. This is also reflected in the storage costs/fees in the value chain.

Traditional storage facilities, built with local materials, prevail at family farms. However, this type of storage often leads to considerable product loss both in quantity and quality because of the presence of insects, pests, and mold as well as attacks by rodents.

The Ministry of Agriculture and Food Security promotes the use of traditional Gorongosa silos. With the support of the World Food Program (WFP) and funding from Japan, demonstration silos at 569 sites, including 318 sites in the Study Area, were installed by 104 trained promoters as part of a program of value chain improvement, community empowerment, and market linkages from 2008 to 2014.

2.10 Social Infrastructure

2.10.1 Power Supply

To increase the capacity of the Cahora Bassa Hydro Power Plant (HCB), from its current 2,075 MW to 3,320 MW, the construction of the North Central Plant is being implemented. To allow for a stable power supply to the Nacala zone from the HCB, the construction of a 220 kV line from Caia to Nampula is planned to start operation in 2020. Also, distribution transformers in sub-stations Nampula 220 and Nampula Central require modernization as their charge is close to maximum capacity.

Regarding a power supply for rural areas, the Government of Mozambique intends to expand the existing network, first for government administrative posts and later to communities. Currently, a power supply is available in most district centers, but the majority of the rural population does not have an electricity supply. Electrification rates in the Study Area are low; the most common power sources in these areas are fossil fuel and wood. Recently, in some places, solar energy began being used.

2.10.2 Water Supply

In the districts along the corridor, 55.7% of the households use manually operated shallow wells and 29.2% collect water from rivers or lakes. The percentage of households using tap water is only 2.3%. These data show that a potable water supply should be improved in rural areas.

In all cities, the water supply capacity of existing facilities is very limited. The fund for investment of water supply (O Fundo de Investimento e Património de Abastecimento de Água or FIPAG), the water supply authority, is improving the water supply systems in Nacala and Nampula, based on a plan developed by the Millennium Challenge Account (MCA) and the Water Service and Institutional Support Project of the World Bank (WAISIS). At the completion of the project, water supply coverage should increase by at least 70% by 2015. The target year of the feasibility study prepared by MCA is 2019, and it has considered that fulfilling the future need for water depends on the development and exploitation of surface water. In 2008, the Integrated Water Supply and Sanitation Project for Niassa and Nampula Provinces (ASANANI) prepared a feasibility study for Niassa Province, with the target year of 2029, and the detailed design is currently carried out by ASANANI with funding from the AfDB.

Nevertheless, all future water resource development plans require the construction of dams, representing a big challenge to FIPAG.

2.11 Effective Use of Private Sector Resources to Support the Development of Family Farmers

2.11.1 Development of the Agribusiness Sector

The PEDSA emphasizes a value chain enhancement approach for agricultural development whereby additional value for products is generated and market access is improved to create a favorable environment for agribusiness development in which the private sector is expected to play a leading role. However, the investment environment for the agriculture and agro-industry sectors in the Study Area is not very mature yet.

(1) The need to transform the current agribusiness structure

There are about 200 small- and large-scale agricultural processing companies in Nampula province.

The agribusiness is relatively well developed in the Study Area. Processing for industries such as cashew nuts, cotton, and tobacco prevail over other industries, meaning that the industrial structure of agribusiness in Nampula, which is characterized by exporting raw materials to foreign markets, has not significantly changed since it was established during the colonial period. However, the domestic market should be prioritized to allow the development of national industries, and to attend to internal demand. Such reform should create the foundation for a dynamic and comprehensive development of the local economy, allowing generation and strengthening of a variety of agricultural value chains.

(2) Investment Promotion Agencies

The promotion of private initiatives in commercial agriculture and agribusinesses is key for sustainable and inclusive growth of the agricultural sector along with more small-scale farmers in the value chains. To attract foreign and domestic investment to the agriculture/agribusiness sector, two separate government agencies, the Investment Promotion Center (CPI) and the CEPAGRI, have worked on specific investment promotion activities[60]. In relation to the Nacala Corridor area, the Malonda Foundation, a non-profit private entity, has worked in Niassa province since 2005. Moreover, the Institute to Promote Small and Medium Enterprises (IPEME) was established with the aim to promote small and medium scale enterprises.

1) CPI

The CPI, established in 1993 under the jurisdiction of the Ministry of Planning and Development, handles Mozambique's private investment development. As a window for both foreign direct and domestic investment, the CPI provides investment promotion services, e.g. disseminating investment information and consulting on business ideas/opportunities, acting as a "one-stop service" provider for investors.

[60] (Refer to Annex for more detailed information)

2) CEPAGRI

The 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, to maximize the impacts on agricultural development. The CEPAGRI works closely with CPI. The CEPAGRI has four sub-offices in Gaze, Manica, Zambezia and Nampula provinces.

3) Malonda Foundation

The Malonda Foundation was established in 2005 through technical cooperation with the Swedish International Cooperation Agency with the aim of reducing poverty in Niassa province by promoting private investment. Since 2011 the Malonda Foundation has focused particularly on investment promotion activities, providing information on potential investment opportunities in Niassa province through their website and via advisory services to investors regarding the need to acquire the necessary licenses/permissions to start a business[61]

4) IPEME

The IPEME was established in 2008 under the jurisdiction of the Ministry of Industry, to ensure implementation of the Small and Medium Business Strategy. It is able to encourage a favorable business development environment in general for small- and medium-scale businesses.

(3) Impediments for Agricultural Investment

The Government of Mozambique promotes an environment favorable to agribusiness development. However there are some factors[62] impeding private sector investment, as shown in Table 2.11.1.

Table 2.11.1 Key Impeding Factors for Private Sector Investment in Agribusiness

No.	Key Impeding factors	Specific Issues
1	Limited access to infrastructure (electricity, irrigation, storage, and roads)	• Lack of economic infrastructure • Need to set up own infrastructure (electricity lines, access roads, etc.) • Lack of storage specifically constructed for agricultural products
2	Bureaucracy-related limitations	• Inefficient and unclear processes to obtain necessary licenses in starting an agribusiness • Misconduct
3	High financing costs	• High interest rates • Collateral requirements
4	Land issues	• Transparency in the speedy granting process of the DUAT(Land Use Right) • Requirement of community involvement • Overlapping/inadequately documented land ownership claims • Inability to formally transfer land
5	Poor coordination	• Lack of platforms for promotion of agribusiness • Insufficient coordination among public agencies • Insufficient coordination among donors

[61] The Malonda Foundation prioritizes the agricultural, forestry, tourism and mining sectors in terms of investment promotion.
[62] http://www.fao.org/family-farming-2014/home/what-is-family-farming/en/

No.	Key Impeding factors	Specific Issues
		• Low visibility of donor activities at the private sector • Limited coordination amongst sectors
6	Lack of well-qualified human resources	• Limited qualified individuals in the field of management • Limited qualified labor force for basic activities • Need to improve capacity of public institutions
7	Access to and quality of information	• Lack of market information • Inadequate mapping of land potential • Weak research capacity
8	Taxes	• Withholding tax • Customs duties and Value Add Tax (VAT)
9	Policies/Regulations	• Need for focus on implementing policies/regulations • Misdirected incentives • Perceived inequity in incentives for smaller producers • Input market distortion (government intervention) • Inefficiency of justice system
10	Macro-economic policies	• High value of currency • Mining sector has priority over other sectors

Source: Workshop "Stimulating Private Sector Agribusiness Investment in Mozambique," August 2012, CE PAGRI

Among above impediments, following three items are mentioned as major constraints on private sector 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,[63] the survey also indicates that the private sector wants issues of limited transparency in the formulation of policies and the inconsistent implementation of certain regulations, decrees and procedures to be 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[64].

<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 interest rates for commercial bank loans range from 20 to 25% depending on the creditworthiness of the client/project and the quality of the collateral. An additional constraint is the term of the loans. Since many banks do not offer loans for more than five years, this limits the types of investments that borrowers may undertake.

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

An investor must undergo a long and complex process to acquire a DUAT according to the Land Law Regulation (Law No. 19/97 of October 1), which requires the holding of a series of public consultations, the conducting of topographical demarcation and the obtaining of

[63] "Agribusiness Indicators : Mozambique", April 2012, World Bank (WB)
[64] ditto

documents from various government offices, all of which incur costs. Since the Republic's Constitution prohibits to mortgage land, even when a DUAT has been issued, the land cannot be used as collateral for a loan. However, banks do accept farm buildings, warehouse and private irrigation systems as collateral.

(4) Application Procedures for Investment Proposals

With simplified licensing procedures, the Regulation of Investment Law (Decree No. 43/2009 of August 21) stipulates the details for acquiring authorization for both foreign direct and domestic investment. CPI plays a leading role in processing investment proposals and coordinating inter-institutional meetings with relevant ministries and state agencies to authorize the proposal. A decision on approving an investment proposal must be made by the authorities according to the total investment value as summarized in Table 2.11.2 below. An investor receives notification of the screening result within 17 days of the official acceptance of the investment proposal by CPI[65].

Table 2.11.2 Decision-Making Authorities for Investment

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

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

Other licenses required to start business are a DUAT and "an environmental license" with the acceptance of an environmental assessment report. The steps for Authorization 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 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. (Application procedures for those licenses are interrelated with those of investment proposals, as illustrated in Annex)

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

2.11.2 Potential for the Development of Partnership between Family Farmers and Local Agribusiness

Agribusiness in the Nacala Corridor has not yet matured in terms of the number and scale of companies, diversity of businesses and the levels of supply chain establishment compared to the other corridors in Mozambique. However, in recent years, some local agribusiness companies are applying out-grower schemes with family farmers for crop production. The advantage of this system is that they provide technical assistance to family farmers, complementing the efforts of extension services of the public sector. By adopting this system, family farmers should benefit from the assurance of a stable market, obtaining good quality agriculture inputs, and learning better cultivation techniques. The expectation of the private sector with regard to agribusiness is to benefit from the reduction of initial cost of investment and the assurance of a stable volume of produce. The promotion of collaboration mechanisms with family farmers should generate a favorable environment to increase local agribusiness, such as the agro-processing, poultry farming, and corporate farms for the production of crops using the out-grower scheme.

Besides the out-grower scheme, some active farmer associations in the Study Area are independently operating a business, by trading their products on local markets. Such associations show a potential of turning into profit-oriented agribusinesses once their management capacity to effectively produce and market have been strengthened further.

There are a number of positive aspects in promoting local agribusinesses, especially regarding production systems applying the out-grower scheme with local farmers as well as building management capacity at leading associations. Local agribusiness development could significantly contribute to increasing the volume of crop productions in a short period of time, resulting in accelerating the establishment of agro-processing industries at the local level.

2.11.3 Lessons Learned from the Beira Agriculture Growth Corridor and the Nacala Corridor

The strategy for the Beira Agriculture Growth Corridor (BAGC) initiative is to create a collaborative mechanism by which family farmers benefit from the growth of commercial agriculture.

Compared to the Beira Corridor, commercial agriculture has not fully matured in the Nacala Corridor because of limitations in the agribusiness environment, such as accessibility to large markets, availability of inputs at an affordable price, and inadequate infrastructure, particularly the limited rural road networks and the poor conditions of the rural roads. In addition to such limitations, private businesses have faced other challenges to creating new business models that include family farmers in the value chain, such as the availability of affordable loans. In order to address those issues, and taking into account the ongoing initiatives, it is recommended that collaborative work be initiated to develop a sustainable mechanism involving the private sector

in the agribusiness sector and family farmers as partners to improve productivity and capacity, rather than recipients of support, which strengthens the entire value chain.

2.11.4 Pilot Project in Collaboration with Private Sector Partners

(1) Objective and financial mechanisms of the Pilot Project Implementation

During the formulation of the Master Plan, activities to verify possible arrangements for the involvement of the private sector in partnership with family farmers in the production of seed, food and cash crops were carried out by providing necessary agricultural inputs and extension services.

The Ministry of Agriculture mobilized financial resources to support private sector partners in implementing activities under an out-grower scheme. And a Memorandum of Understanding between the Ministry of Agriculture and the Office to Support Small Scale Investments SA (GAPI) was signed for the management of this fund on September 13, 2012. The fund was officially announced as the Development Initiative Fund (DIF).

Lessons learned from these activities were reflected in the Master Plan, allowing for a more realistic implementation of the out-grower production model; it was verified that this scheme generates mutual benefits for both farmers and the private sector.

The importance of introducing a simple credit system to support the efforts of private sector partners for the expansion of business, including the purchase of machinery and facilities, as well as the purchase of family farmer products, was also positively verified.

(2) Lessons Learned from the Pilot Project

1) Contractual arrangements with out-growers including the input supply method

All companies participating in the DIF made a written contract with individual farmers or a group of farmers or farmers' associations, and credit was granted to each company for the purchase of certified seed. Other inputs such as fertilizer, agro-chemicals, and inoculants for the production of soybeans, were provided to a selected group of out-growers, based on the conditions specified in the contract, taking into consideration the characteristics of the crops to be produced. Experience from the pilot project has shown the need for additional efforts to avoid conflicts during the cost deduction process for the recovery of the inputs.

2) Disbursement of the fund

Although it took around two months to complete the loan contract between GAPI and the companies, more time was needed for registration of mortgages at the office of the notary public because of obstacles that hampered the provision of guarantees. The acquired experience shows the need to provide adequate pre-contractual assistance to the companies, particularly the support for issues of property legalization, registration of collateral for the loans, and preparation of the necessary documentation.

3) Extension services for out-growers

Each of the companies involved in the DIF provided extension staff to monitor the farming activities and also provided technical assistance to out-growers. However, some of the companies faced difficulties in providing extension services in farm management, because of the limited number of extension staff for the large number of out-growers. Although increasing the number of extension staff would be a quick solution to mitigate these negative effects, it could also increase the operational costs of the out-grower scheme for crop production. It is critical that the commercial viability of a business be carefully examined in order to determine the appropriate number of extension staff to support out-growers.

Establishing demonstration plots together with organizing a field-day event proved to be an effective approach to demonstrate the results of the different treatments and production methods of different crops, benefiting producers directly involved in the program but also community members who live nearby the demo-plot. During the DIF implementation process, it was found to be necessary to improve the technical knowledge of the extension staff, particularly in areas of management and integrated control of pests and diseases.

4) Crop purchasing and marketing of produce

The most challenging task for companies that applied to the out-grower scheme was to collect and purchase enough produce from out-growers at an appropriate price. The difficulties were observed mainly at the time of price negotiation and delivery of produce.

Building mutual trust between out-growers and a company's extension staff is critical to effectively carry out the out-grower scheme and avoid unnecessary conflicts and side-selling of produce by out-growers.

Finding a good market that offers a good price for crops was a challenge to some of the companies because of their limited experience in the commodity trading, and the small amount of marketable produce. In order to strengthen bargaining power, it is necessary to increase the volume of produce from out-growers. The market of certified seed is not yet developed in the Study Area and seed companies face difficulties in marketing their products, especially because of little appreciation of quality seed value in crop production advantages.

5) Social impact

During the pilot project, positive social and economic impacts were observed as a result of implementing the out-growers scheme with local farmers:

- Increased number of farmers associations and out-grower farmers employed by seed companies: for instance, a seed company increased from four associations (191 ha) during the 2012/2013 campaign, to 14 associations (676 ha) in the 2013/2014 campaign. Another company hired about a 100 farmers (76 ha) during the 2012/2013 campaign, with an increase to 673 farmers (361 ha) in the 2013/2014 campaign;

- The technical capacity of out-growers for seed production improved through extensive technical extension services by company experts. As a result, out-growers now understand the advantages of using certified seed to produce better harvests;
- Job creation was recorded by promotion of seeds production and its extension service, and an increase in job opportunities has been observed;
- Promotion of crop diversification was recorded because of the provision of technical assistance on new crops such as soybeans. Soybeans showed good results because of the technical assistance provided, although it was the first time participating farmers cultivated soybeans (agricultural campaign 2012/2013);
- As a challenge, in some cases, production volume was below expectations because of the quality of the distributed seed, the adaptability of the crop to the soil, and inadequate pest damage prevention. The main cause was the limited number of extension staff or their inadequate technical level; and
- Another challenge is the need to promote a better relationship of trust between farmers and companies, particularly regarding issues concerning the price at the moment of purchase of produce, which will reduce side-selling.

2.12 Summary of Agricultural Development Challenges

2.12.1 Agricultural Development Challenges

The challenges to agricultural development in the Nacala Corridor are outlined in Figure 2.12.1.

The majority of farmers in the Nacala Corridor practice small-scale subsistence agriculture. Due to low productivity, low price of produces, and concerns over the uncertain rights for farming, farmers can receive only little benefit. This is the cause of low livelihoods in the area.

At the moment, technical assistance systems for farmers, such as research and development, extension activities, and support for associations, are not yet effective enough. Moreover, farmers' access to agricultural technologies, such as improved seeds, fertilizers, agro-chemicals, and machinery, are very limited. A major constraint or risk to agricultural production in the area is availability of water and the instability of rainfall, resulting in a short cultivatable period for crops under rain-fed cultivation. Irrigation can alleviate the challenges, but current irrigation systems are in a poor state due to irrigation systems development being abandoned or malfunctioning due to poor maintenance. Furthermore, constructed or rehabilitated facilities are defective due to poor construction skills.

Therefore, famers do not have opportunities to learn improved farming practices suitable for their area and production nor to apply those practices even if they have willingness to do so. As a result, they turn to traditional cultivation methods because it is suitable in their area and has various advantages for now.

Family farmers cultivate fields using primarily manual labor. Due to the low availability of mechanized and animal traction in the area, family farmers rely on support from the community, with the labor force coming from family members and neighbors. As a result, their cultivated lands are limited to small areas.

If family farmers have access to financing and credit, and the willingness to do so, they can apply improved practices and employ more labor to expand the cultivated areas. However, it is difficult to find a financial mechanism that farmers can use easily.

Out-grower scheme is a kind of countermeasure to solve challenges like access to extension services, inputs, and finance. However, the out-grower scheme is still under development. Because of this, low agricultural productivity is still big challenge for farmers.

Even if the farmers produce sufficient amount of agricultural produces, they cannot benefit significantly due to low prices.

Due to the poor logistic network, traders cannot easily come to farms to purchase products. Farmers' market channels and linkages are not sufficiently developed and their bargaining power is kept weak. Small volume of salable products is one cause for their weak bargaining power, therefore commercialization of farmers groups and joint-shipping of the products in group, is one measure to increase their bargaining power. However, the capacity of farmers' groups is generally not yet developed, so their activities are still in weak.

This situation leads to insufficient volumes of marketable agricultural produce, which subsequently negatively impacts the development of the agricultural distribution system and processing industries. The poor logistic networks become causes of low development of the market and processing industries too. The low development of the market and its demand means that prices of the produces do not increase so much.

Because of the above, the price of produces is kept in low. Furthermore, because volume of produces and their selling prices are low, benefits from the produces are kept low for farmers.

A fast increasing population is a latent threat to agricultural development in the Nacala Corridor Area. In an environment with a relatively low population density, traditional farming is a stable and sustainable form of agriculture. However, due to the recent increasing population trend and land occupation by investments, in many cases farmers are not able to maintain their fallow land for their expected periods.

Land use rights for farmers are legally protected under land law and its regulations; however, they are not adequately enforced and farmers are vulnerable to private investment. Such uncertainty on the security of farmers' rights is a risk for the improvement of family farmers.

The observed degradation of the forests in the area may cause an increase in the number agricultural fields. As a result, in the future the number of farmers will increase thereby putting

increased pressure on natural resources. Unfortunately, the plan for land use or forest conservation has not yet been prepared in order to archive its sustainable use; therefore, the sustainable use of natural resources is not secured. This is a negative influence on the living condition of inhabitants in the area.

In Nacala Corridor area, agricultural industries are not well developed and there are limited job opportunities. Because of that, market size is limited and chances to find off-farm income is also limited.

Due to complexity of the various challenges mentioned above, the livelihood of the inhabitants in Nacala Corridor area is not well developed. Therefore, it is essential that all concerned stakeholders make all-out efforts to improve the situation for future generations.

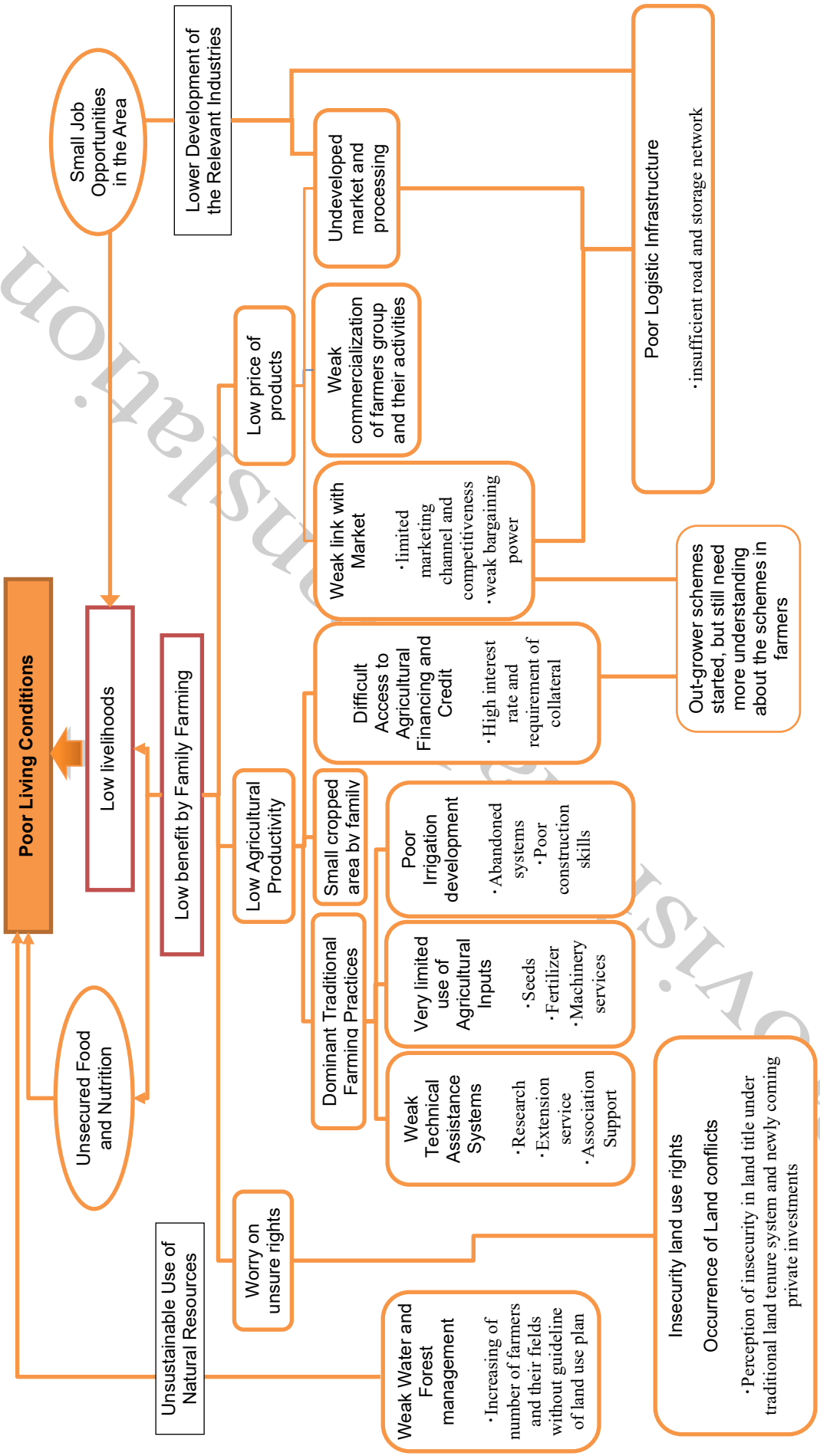


Figure 2.12.1 Agricultural Development Challenges

2.12.2 Concerns Related to Development and Considered Measures for Avoidance/Reduction

There are many concerns and adverse impacts related to development, which were also brought up in dialogues with the inhabitants of the Nacala Corridor Area. Such concerns and required countermeasures need to be considered in formulation of the development plan. Major concerns and their countermeasures are described below.

(1) Technologies of improved farming are not widely understood and negative impacts can result from excessive use of inputs or result in loss of soil fertility from erosion.

At the moment, chemical fertilizer, pesticide, and herbicide use is not common in the Nacala Corridor Area raising concerns that if agricultural practices use chemical fertilizer, pesticides, and/or herbicides without necessary guidance for farmers, excess application may occur causing harm to the environment and human health.

In order to avoid the negative impact, it is important that farmers gain appropriate knowledge regarding the use of such agro-chemicals and how excess application can cause damage. In order to achieve this, strengthening extension services and training farmers is necessary so that the following measures will be taken as agricultural development procedures:

- ✧ Strengthen research on how to optimally improve extensive farming practices;
- ✧ Enhance technical assistance to improve farming practices;
- ✧ Establish and manage demonstration farms; and
- ✧ Build capacity of agricultural extension staff and emerging farmers.

(2) Expansion of agricultural mechanization such tractor use may steal income opportunities from farmers.

The insufficient labor force for land preparation is one limiting factor in this area; therefore, many farmers mentioned the necessity of mechanization. On the other hand, because of limited opportunity to find non-agricultural jobs in rural areas, such type of work is one of the important sources of obtaining an income or food for farmers who do not have sufficient fields of their own.

The demand of hand labor for land preparation may be reduced due to mechanization. However, the need of labor for other parts of farming practices will increase according to the expansion of cropping areas and increased of agricultural production. Thus, promotion of mechanization may decrease employment for weeding and land preparation but increase other parts of farming practices.

Moreover, if machinery or other services become popular in the area, it will assist farmers with expanding their cropping area and obtaining enough income from their own fields. It might be an ideal situation that many farmers will not need to find off-farm jobs such as plowing another person's farm and will become self-sustaining farmers.

Moreover, instead of the hand labor for plowing, it might be better if there are some opportunities to find other kinds of off-farm jobs suitable for non-skilled labor. Therefore, it might increase job

creation and employment opportunities not only for skilled labor but also for simple jobs through agricultural development.

(3) Promotion of the out-grower scheme as an alternative market for small scale farmers will impose unfair low pricing of produce and debt to farmers.

In the Nacala Corridor area, a concession mechanism has been applied for cotton and tobacco produce. Based on the experiences, the out-grower scheme is also developing now. But because of no stiff regulations like a concession mechanism, both farmers and private entities participating in the out-grower scheme face confusion and problems. Specifically, it might be complicated for farmers to understand conditions of contracts and sometimes the companies do not carry out the promised conditions. In all fairness, the companies are stronger than individual farmers, so avoiding one-sided contract application should be considered in development measures. The expected countermeasures are the following:

- ✧ Strengthen the capacity of farmers for negotiating contract conditions through organizing;
- ✧ Strengthen farmers' organizations and improve farmers' access to market and market information in order to avoid dependency on the contract;
- ✧ Establish a proper legal framework for the out-grower scheme; and
- ✧ Preparation of operational guidelines for the out-grower scheme and dissemination.

(4) By promoting an out-grower scheme, a certain mono-culture will be compelled or be conducive for farmers to cultivate. Then, agricultural production may have vulnerability by expansion of the mono-culture and food security in the region will be endangered.

Disconcertingly, due to the promotion of the out-grower scheme, most farmers in the region will produce only one type of crop because farmers cannot find other options. Because of such dependence conditions, the regional economy and life of farmer will become vulnerable. This means that if the price of the crop drops in the Market, it will have a serious impact on the region due to no one being able to escape from its negative influence. Moreover, if farmers concentrate on producing cash crops, aiming to sell them outside the region and only food crops for their own consumption, the people in urban areas would not be covered in the region and would need to bring in produce from other parts. In that case, if there is a healthy market, the price of the food crops would increase and farmers may come back to produce the food crops. But if farmer cannot decide what to produce due to many limitations in their environment, this kind of balance will not be achieved. Therefore, maintaining farmers' sovereignty should be considered in the development. In order to achieve this, the following considerations should be maintained in formulation of the plan:

- ✧ Farmers will not be forced into any cultivation and they will maintain their right to decide farm management;
- ✧ Agricultural extension will support farmers in obtaining knowledge of appropriate crop

selection, introduction of crop rotation, and farm management to reduce risk; and

- ✧ Under the out-grower scheme, the contractor will provide technical instruction to farmers including crop rotation in order to maintain the productivity of the land.

(5) Farmers may lose land due to land grabbing by private investors with large-scale land occupation.

Land grabbing is one of the major concerns of agricultural development in the Nacala Corridor Area. Promotion of private investment with large-scale land occupation, such as corporate farms, is one measure to develop regional agricultural production. However, introducing the private investment without conflict with local inhabitants is not easy due to high population density in the Nacala Corridor Area. Therefore, it is necessary to establish a framework to supervise private investment in order to avoid uncontrolled investment and land grabbing.

- ✧ Need to prepare guidelines for private investors to follow in order to respect/assure land use rights by the local people (farmers)
- ✧ Need to establish a supervising structure for investors in order to avoid negative impacts (such as land grabbing) on local farmers and the community

(6) Expansion of development and growth of the regional economy may create economic disparity among inhabitants in the area and/or community.

If activities of development target only part of the people in the region, economic disparity will become wider in rural societies. Such types of development will create an unequal society and destabilize it.

Therefore, the agricultural development plan should intend to minimize the widening disparity of inhabitants in the area and/or in the community through considering family farmers as the main target group of the program. In addition, special consideration will be given to female farmers, youth, and other vulnerable groups in order to achieve inclusive development and to avoid disparity between gender, generations, regions, and areas.

- ✧ In order to let interventions definitely reach family farmers, especially vulnerable farmers, organizing groups or associations that consequently strengthen the interaction with other farmer groups or associations shall be formed;
- ✧ The farmers' groups will improve activities by aiming to get more benefits for the group, through applying various methods according to their objectives, location, characteristics of members and their socio-economic and natural environment;
- ✧ The organization is self-reliant, so that they are able to access extension services and markets, not only to sell their produce but also to purchase inputs by utilizing various supports from NGOs, development and aid organizations, etc. Access to financing will be realized by the group; and
- ✧ During implementation of the program, any disparities shall be monitored by the implementation structure together with representatives of farmers, Civil Society

Organizations (CSOs) /NGOs, and relevant stakeholders. The Master Plan will be modified periodically according to the monitoring results.

2.13 Agricultural Zoning of the Study Area

2.13.1 Zoning of the Study Area

Zoning was conducted to examine the direction of agricultural development observing the regional characteristics of the Study Area. Each district in the Study Area was evaluated based on accumulated scores of quantified characteristics of the districts from information collected during the Study. Several districts with similar scores and geographical proximity were grouped to form agricultural zones. The following three key factors and their indicators were applied for agricultural zoning.

Table 2.13.1 Key Factors and District Indicators for Agricultural Zoning

Key Factors	Analyzed District Data
1. Urgency for conversion from extensive farming	• Population density • Forest area (%) • Forest DUAT area (%)
2. Receptiveness of local farmers to new farming technologies	• Share of laborers as part of the total population (ages 16-65) (%) • Enrollment rate to ESG-I&II (ages 10-14) (%) • Share of the aged population as part of the total population (age > 65) (%)
3. Compatibility of local farming conditions with agricultural diversification	• Crop adaptability map (temperature, rainfall, soil, slope) • Land use map • Population density of rural areas • Literacy rate (ages 15-65) • Share of cultivated area as part of the total area (%) • Road density (major roads only) • Railway density • Supply and use of firewood (FAO WISDOM methodology)

2.13.2 Agricultural Development Potential by Zone

The results of agricultural zoning and the SWOT analysis are set out in Table 2.13.2:

Table 2.13.2 Results of Zoning and SWOT Analysis

Zone	Key Factors			Remarks	
	1.	2.	3.	Advantages/Opportunities	Disadvantages/Threats
I	Medium	Low	Low - Medium	• Good access to Nacala Port and Nampula city • High % of fertile soil • High % of non-food crops planted • High potential for small pump irrigation	• Reduction of farmland by the development of industry and population increase in Monapo
II	Low - High	Medium - High	Low - High	• Good markets (high urban population) • Large cultivated and fallow areas • High potential for small pump irrigation	• Reduction of farmland by development of industry and population increase in Nampula • Low % of forested areas
III	Low - Medium	Low - Medium	Medium - High	• Expected improved access to Nampula city and Cuamba city • Large cultivated area • High % of fertile soil • High % of non-food crops planted • High water resource capacity and many rivers	• Large mining concession areas in Lalaua and Alto Molocue • Large forest concessions and DUAT areas in Ribaue, Malema, and Lalaua
IV	Medium	Low	Low	• High precipitation • Cool climate • High water resource capacity • Good road access to southern provinces	• Limited farmland (mountainous area) • Undeveloped rural road network
V	Medium	Low - Medium	High	• Strategically located railway stations and road networks (road crossing points) • Close linkage with markets in Malawi • High potential for pump-irrigation systems along Lurio River	• Rapid increase of the rural population (limited farmland in the near future) in Mecanhelas and N'Gauma • Large mining concession area in N'Gauma
VI	Medium - High	Low	Low - High	• High precipitation • Cool climate • High urbanization of Lichinga • Good access to Cuamba city and Pemba • Many river courses	• Low % of fertile soil area • Large mining concession area • Large forest concessions and DUAT areas in Majune and Lichinga • Undeveloped rural road network • Far from large markets

Following the agricultural zoning and SWOT analysis, the Study Area was divided into six zones as shown in Figure 2.13.1.

Figure 2.13.1 Agricultural Zoning Results

Based on the SWOT analysis, the direction of agricultural development of each zone has been determined and is outlined in Table 2.13.3.

Table 2.13.3 Direction of Agricultural Development of Zones

Zone	Direction of Agricultural Development	Crops	
		Main Food Crops and Beans	Oil Seeds and Cash Crops
I	• Supply surplus major crops to Nacala and the Nampula areas • Replace old cashew trees and revitalize the cashew industry • Promote cotton production and processing • Support small-scale pump irrigation and rehabilitation of defunct irrigation facilities (for vegetables and other high-value crops) • Develop logistics connecting the Nacala and Pemba areas • Promote reforestation to provide biomass as a substitute for firewood (Monapo)	• Cassava • Maize • Cowpeas • Ground nuts	• Cotton • Sesame • Cashews • Vegetables
II	• Fulfill zonal demand for major crops • Promote various kinds of agro-industries to develop a center/hub for agricultural clusters • Replace old cashew trees and revitalize the cashew industry • Support small-scale pump irrigation and rehabilitate irrigation facilities (for vegetables and other high-value crops) • Effective use of fallow farmland and the present agricultural DUAT area • Promote reforestation to provide biomass as a substitute for firewood • Rehabilitation of rural roads	• Cassava • Maize • Cowpeas • Ground nuts	• Cotton • Sesame • Cashews • Vegetables
III	• Supply surplus of major crops to Zone II and Zone V • Develop an advanced agricultural production center • Support small-scale pump irrigation and rehabilitate irrigation facilities (for vegetables and other high-value crops) • Promote cotton production and processing • Develop the poultry industry • Support commercial seed growers • Effectively use the present agricultural DUAT area (Alto Molocue) • Rehabilitate the rural road network connecting the Nampula and Cuamba areas	• Maize • Cassava • Cowpeas • Ground nuts • Haricot beans	• Soybeans • Sesame • Sunflowers • Cotton • Tobacco • Vegetables (onions, garlic, etc.)
IV	• Fulfill the demand for major crops within the zone • Supply high-value crops such as vegetables and potatoes to other areas • Replace old tea trees and rehabilitate the tea industry • Promote reforestation to provide biomass as a substitute for firewood from native forests • Rehabilitate the rural road network	• Maize • Cassava • Cowpeas • Haricot beans	• Tea • Potatoes • Vegetables
V	• Fulfill demand for major crops within the zone • Promote high-value oilseed and industrial crop production • Support pump irrigation (for vegetables & other high-value crops) • Promote agro-industries and develop a center/hub for agricultural clusters • Support commercial seed growers • Effectively use the present agricultural DUAT area (Gurue) • Develop logistics connecting other domestic areas and Malawi • Carefully manage farmland development (very high population pressure)	• Maize • Haricot beans	• Soybeans • Sesame • Sunflowers • Cotton • Tobacco • Vegetables
VI	• Supply surplus of major crops to Zone V • Rehabilitate irrigation facilities (for vegetables and other high-value crops) • Develop the poultry industry • Supply potatoes to other areas • Support commercial seed growers • Rehabilitate rural roads	• Maize • Haricot beans	• Soybeans • Sesame • Sunflowers • Tobacco • Potatoes • Vegetables

CHAPTER 3 BASIC CONCEPTS OF THE AGRICULTURAL DEVELOPMENT MASTER PLAN FOR THE NACALA CORRIDOR

3.1 Basic Framework of the Agricultural Development

3.1.1 Vision and Objectives of the Agricultural Development Master Plan for the Nacala Corridor

To achieve the vision of ProSAVANA, agricultural production should be linked to the increase of individual family farmers. Therefore, assuring market access for produce to be sold at a reasonable and acceptable price is essential.

Growth of the market for agricultural produce is expected following the economic development of the Nacala Corridor. So, improving productivity and efficiency in the distribution of produce should conform to the growth of demand and expansion of types of produce in demand.

Assuring access to markets requires not only an increase in demand because of population growth, it also requires the development of distribution systems and other related economic activities, such as agro-processing, development of supply chains and services related to production such as assembling and trading of produce.

Developing agro-processing in the region should fulfill the demand in other regions. Furthermore, it would promote other economic activities related to the processing industry, resulting in an increase of job opportunities in non-agricultural sectors.

Moreover, harmonic development of the entire region should be achieved once social development, such as education and health services, and social capital align with improvements in the agriculture sector. Therefore, the structure of the Master Plan implementation should conform with the other sectors.

The vision, mission, and objectives of the Agricultural Development Master Plan of the Nacala Corridor, which takes over from the ones of ProSAVANA, are presented below.

Vision

Improve the livelihood of inhabitants of the Nacala Corridor through inclusive and sustainable agricultural and regional development.

Mission

(i) Improve and modernize agriculture to increase productivity and production, and diversify agricultural production.
(ii) Create employment through agricultural investment and establishment of a supply chain.

Objectives

Create new agricultural development models, taking into account the natural environment and socio-economic aspects, and seeking market-oriented agricultural/rural/regional development with a competitive edge.

Approaches of ProSAVANA

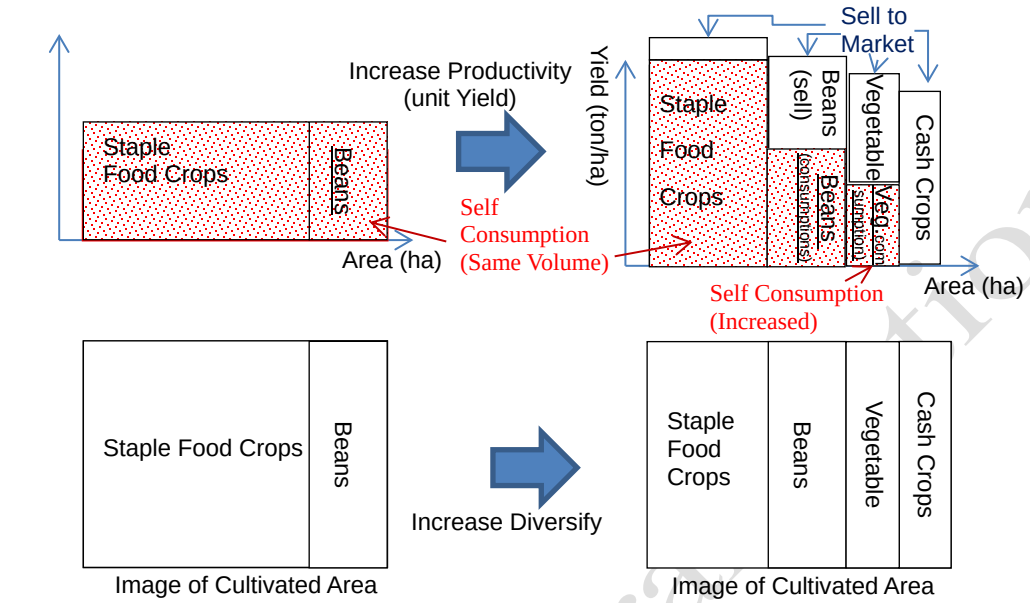
(i) Incorporate the results of relevant studies of natural conditions and socio-economic situations to support the establishment of appropriate agricultural development models.
(ii) Increase agricultural productivity and production through appropriate measures, including improvement of farming systems and access to agricultural extension services that include techniques and quality/quantity of inputs, value chain systems, and expansion of farmland.
(iii) Promote diversification of agricultural production for increasing profitability based on research results.
(iv) Provide opportunities to change from subsistence agriculture to sustainable agriculture, with respect given to the farmers' sovereignty.
(v) Strengthen the capacity and the competitiveness of farmers and farmers' organizations.
(vi) Enhance the enabling environment to promote responsible investments and activities, aiming to establish a win-win relationship between small-scale farmers and agribusiness firms.
(vii) Promote and strengthen local leading farmers to disseminate and scale-up development impacts.
(viii) Establish regional agricultural clusters and develop value chain systems.
(ix) Promote public and private partnerships as one of the driving forces for inclusive and sustainable agricultural development.

Family farmers are the majority of the population in the Nacala Corridor Area. They have been producing sufficient food staples while maintaining the preservation of natural resources. They have limited economic interaction with the outside world and very limited access to off-farm income.

However, various activities are planned for the economic and social development in the Nacala Corridor based on a comprehensive regional development approach. Therefore, the development of economic activities in urban and strategic areas, and the necessary basic infrastructure related to the agriculture sector, can be expected in the near future.

In order to achieve sound development in the whole Nacala Corridor Area, harmonized improvement in both economic growth and social progress is essential. Moreover, to achieve inclusive development and to avoid widening economic disparity, a system of distributing the gains of economic growth to rural areas should be established because growth is expected to increase first in urban and strategic areas.

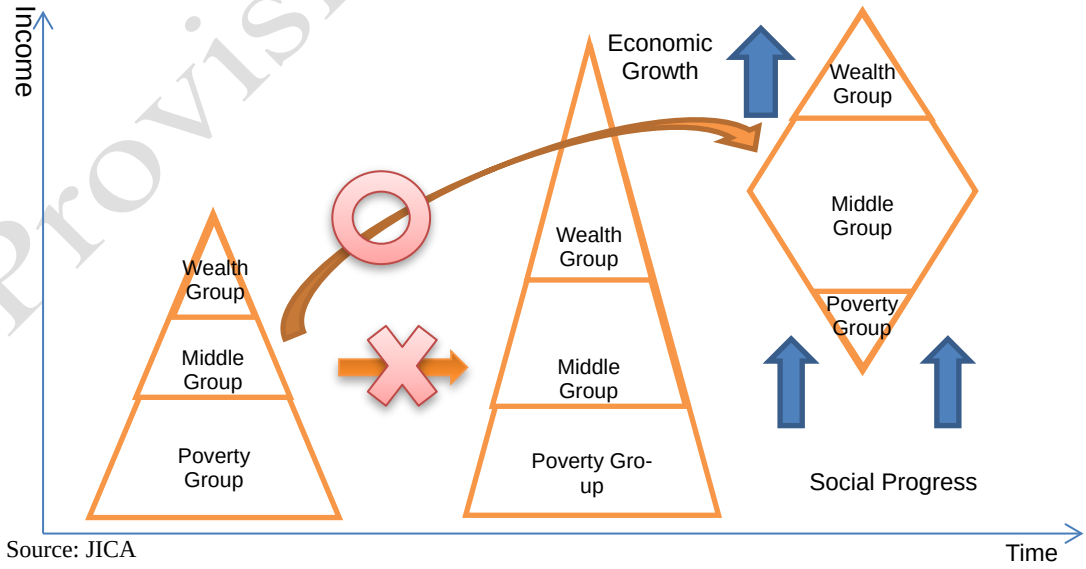
Furthermore, improvement and stability of food and nutrition security will be achieved through (i) enhancement of productivity by using improved technologies, (ii) scaled increase of production, and (iii) diversification of agricultural production through the combination of food crops and other cash crops such as vegetables.



Source: JICA Study Team

Figure 3.1.1 Improved Productivity and Diversification

In the context of social and economic development, special consideration should be given to female farmers, youth, and other vulnerable groups to achieve inclusive development and to avoid disparity between genders, generations, regions, and areas. In this context, it should be noted that the percentage of women engaged in agriculture is higher than that of men. On the other hand, the literacy rate is low and opportunities to find other work in rural areas are small; as a consequence, possibilities to get income other than from agriculture are limited.



Source: JICA

Figure 3.1.2 Inclusive Development for the Purpose of Income Disparity Adjustment

3.1.2 Target Group

The Master Plan covers all categories of agricultural farmers and all entities related to agriculture in the Corridor. Among these farmers, the Master Plan considers the family farmers[66] who are in need of increasing agricultural productivity, improving market access and the sustainable use of natural resources as the main target group.

There are about 691,800 farming households in the 19 districts in the Nacala Corridor Area, and most of them essentially practice subsistence agriculture. According to the PEDSA, farmers are divided into the following three categories as shown in Table 3.1.1:

Table 3.1.1 Criteria of Farm Scale

Small scale farmer	Meets all of the following criteria: - Non-irrigated area: less than 10 ha - Area irrigated perennial and annual crop cultivation less than 5 ha - Less than 10 head of cattle; 50 goats, sheep, or pigs; or 2,000 poultry
Medium scale farmer	Exceeds any of the above criteria, but meets all of the following criteria: - Non-irrigated area: less than 50 ha - Area of irrigated perennial and annual crop cultivation : less than 10 ha - Less than 100 head of cattle; 500 goats, sheep or pigs; or 10,000 poultry
Large scale farmer	Exceeds all of the above criteria.

Source: PEDSA 2011-2020

Small-scale farmers cultivating less than 10 ha of non-irrigated land or 5 ha of irrigated land of irrigated perennial and annual crop cultivation or having a small number of livestock are the majority in the Nacala Corridor area. Interventions, therefore, focusing specifically on this group of farmers are needed for their development. Thus, aiming to propose interventions according to the potential constraints and needs of small-scale farmers, they have been arranged into three groups according to their cropped area and market linkages, as summarized below.

1) Vulnerable farmers

Vulnerable farmers can be categorized as having less than 0.5 ha of land for cultivation, farming at subsistence level, and consequently often experiencing difficulty in achieving food self-sufficiency. These farmers do not possess adequate farm management resources, such as land, labor, and financing. They need external support to achieve self-reliant management of their small farms.

2) Typical small-scale farmers

Typical small-scale farmers grow crops on several very small plots of land, but are often able to achieve food self-sufficiency. They are the target population of the development strategies of the Master Plan, aiming to increase household income through applying measures such as (i) improvement of productivity, (ii) increase of production, (iii) market-directed diversification of crop production, and (iv) generation of value-added

[66] http://www.fao.org/family-farming-2014/home/what-is-family-farming/en/

products. Typical small-scale farmers can be further categorized into the following three types based on characteristics of production and marketing:

- Farmers mainly producing basic food crops for their own consumption and selling a very limited production surplus on the market
- Farmers mainly producing basic food crops for their own consumption and producing cash crops, such as oil or industrial crops, for small-scale sales
- Farmers mainly producing basic food crops for their own consumption and producing vegetables for small-scale sales

3) Emerging farmers

Emerging farmers cultivate cash crops on their own farmland, up to 10 ha in size, and practice diversified crop production. Agricultural productivity is not high because of the lack of use of quality agricultural inputs such as seeds, pesticides, and fertilizers. Despite the efforts of the Government to mechanize farming through supporting schemes such as the FDD and the FDA, the coverage of such initiatives is still very limited.

Middle-scale farmers, who cultivate fewer than 50 ha, and large-scale farmers, who cultivate larger areas, make up a small percentage of the rural community.

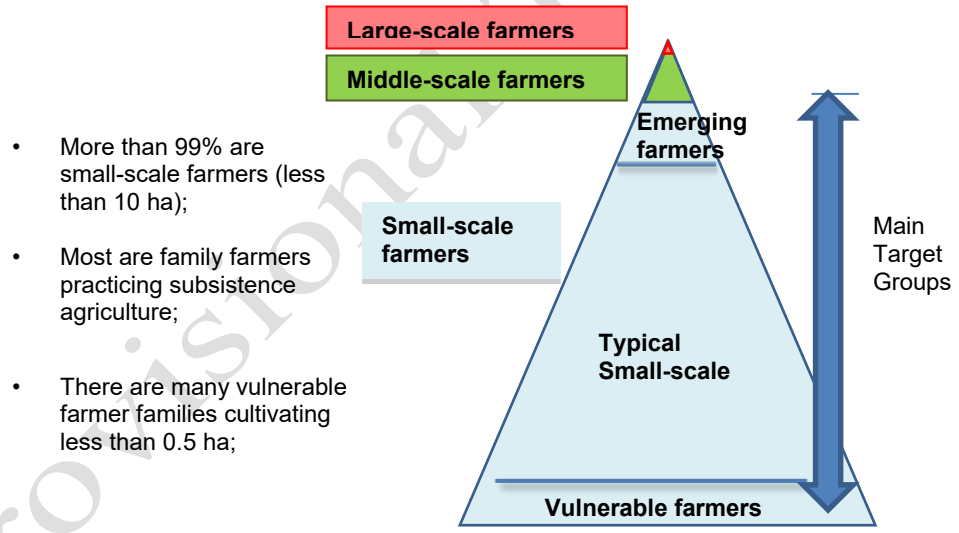


Figure 3.1.3 The Master Plan Target Groups

To increase the incomes of farmers and advance their development, market growth is required to absorb the increased quantity of agricultural produce. For instance, to secure market access by farmers, growth of an economic environment relating to agriculture needs to be synchronized with increasing agricultural production. Therefore, entities related to agriculture, such as traders, agro-processing industries, suppliers of agricultural inputs, financial institutions, etc., are also target groups of the Master Plan.

3.1.3 Master Plan Study Area

Nineteen (19) target districts in the Study Area of the Agricultural Development Master Plan are located in the three provinces along the Nacala Corridor: Nampula, Zambezia, and Niassa in the north of Mozambique; 10 districts in Nampula province: Monapo, Muecate, Mecuburi, Meconta, Mogovolas, Rapale (Nampula) including the city of Nampula, Murrupula, Ribaue, Lalaua, and Malema; two districts in Zambezia: Alto Molocue and Gurue; and seven districts in Niassa: Cuamba, Mecanhelas, Mandimba, N'Gauma, Majune, Chimbonila (Lichinga) including the city of Lichinga, and Sanga.

The Study Area covers a total of 107,002 km^2. The total population was estimated at 4.3 million in 2011, with a population density of 40.1 persons/km^2.

Table 3.1.2 Area and Population of the Three Provinces of the Master Plan

Province			Nampula	Zambezia	Niassa	Total
Study Area	Population 2011		2,566,961	670,697	1,049,757	4,287,415
	Population density (inhab./km^2)		54.28	55.77	22.01	40.07
	Share of Province	Area	57.9%	11.5%	37.0%	33.9%
		Population	55.2%	15.1%	71.3%	40.6%

Source: *1 Statistic Yearbook 2010 (INE), *2 CENACRTA, others by Census 2007(INE) on Populations are Population Projection based

3.1.4 Target Years and Staging of Agricultural Development

(1) Target years and staging of agricultural development

To achieve the objectives of promoting the improvement of living conditions in the Nacala Corridor, the Master Plan has defined targets in years for its development activities, which are focused on the improvement of agriculture in the region.

Taking into consideration the current agricultural situation and farmers and their organizations, as well as the transformation of their farming practices and modernization of the agricultural sector, a significantly large period of time should be required to realize the proposed transition.

The target completion year of the Master Plan is set at 2030, with the Master Plan gradually implemented in the following three phases:

- Phase I: Start-up period: 2015 to 2020 - six (6) years
- Phase II: Growth period: 2021 to 2025 - five (5) years
- Phase III: Maturation period: 2026 to 2030 - five (5) years.

During Phase I, the start-up stage, the foundation of development to strengthen production and organize farmers will be consolidated; it will be carried out at field/farm level. In addition, the capacity of public institutions will be strengthened and new development system/processes will be established in several areas such as land management, research, extension services, project management, etc.

During Phase II, the growth stage, activities of farmers will be strengthened based on the foundations developed during Phase I with support from the public and private sectors and

NGOs, among others. Farmers are expected to improve their activity by using irrigation and the cultivation of high-value cash crops such vegetables, to organize production and conduct collective marketing activities, and to form of cooperatives to market produce. The Government supports the creation of a sound environment for developing and establishing enhanced supply chains and will monitor the activities. The private sector, such as trading, processing, and agro-industry production are expected to follow and be improved as well.

The final, Phase III is set as a maturing period of development. During this phase, practices for production will be further improved and the relationship between farmers and the private sector will function properly under supervision of the public sector.

(2) The Goal of the Master Plan

The Master Plan was prepared as a regional plan for the implementation of the PEDSA in the Nacala Corridor, and economic indicators project an annual growth rate of 7.0% for agriculture from 2015 to 2025, and 6.0% from 2026 to 2030. The change in the economic structure of the region and the economic sector growth rate of the Nacala Corridor are shown in Table 3.1.3 and Table 3.1.4.

Table 3.1.3 Change of Economic Structures in the Nacala Corridor[67]

Unit: percent

Years	GRDP at Factor Cost (Mt Million 2003 Prices)	Agriculture	Mining/Large-scale Projects	Manufacturing Construction and Utilities	Services
2011	64,254	42	0.1	18	40
2025	182,000	33	13	19	35
2035	450,000	24	28	20	29

Source: PEDEC (JICA 2014)

Table 3.1.4 Growth Rates by Economic Sector in the Nacala Corridor

Unit: percent

Periods	Agriculture	Mining/Large-scale Projects	Manufacturing Construction and Utilities	Services
2011-25	7.0	49.3	8.5	7.4
2026-35	6.0	9.7	9.7	7.4

Source: PEDEC (JICA 2014)

[67] The Nacala Corridor Region in this table is composed of whole districts in Nampula, Niassa, Cabo Delgado, and Tete Provinces, and the seven northern districts in Zambezia Province.

3.2 Assumptions of the Agricultural Development Master Plan

3.2.1 Family Farming is Leading Part in Agricultural Development

(1) Mainstreaming of family farming in agricultural development

Family farming in the Study Area provides not only food for the population, but also has the potential to supply food to neighboring regions. It is therefore considered that family farming in the area would figure prominently in attaining food security for Mozambique. Furthermore, the growing family farming sector will bring opportunities to boost the economy when it is underwritten by concrete government policies and measures aiming at improving social security and the welfare of rural communities. This Master Plan, therefore, places family farmers as its main target for support measures because they are the key to development.

(2) Agricultural development based on sovereignty of farmers

Agricultural development in the Nacala Corridor will be promoted with respect for the sovereignty of farmers, which includes the right to produce food, the right to choose farm management techniques and crops, as well as ensuring the right to use the land and other natural resources. The Master Plan proposes development mechanisms that respect and preserve the sovereignty of farmers when socioeconomic changes are brought about by the development.

(3) Participatory and inclusive planning

Firstly, regional agricultural development is to be planned to primarily meet the needs, priorities, and interests of the family farmers in the Nacala Corridor. Accordingly, the Master Plan has been formulated through consultation with relevant stakeholders at different organizational and societal levels. Secondly, the implementation of the Master Plan considers creating a structure to monitor and review the Plan at the end of each phase with the participation of stakeholders, such as farmers' and civil society organizations, as well as a feedback mechanism to periodically seek advice or consult the opinions of external experts such as those in the academic sector. These mechanisms will be included in the implementation framework of the Plan.

3.2.2 Protection of the Rights of Family Farmers and Communities for the Use of Land and Other Natural Resources

Natural resources such as land, water, forests, etc., are fundamental to the livelihood of the population, most of whom are farmers, and offer the best development potential for agriculture. It is therefore essential that the rights of farmers to use and manage land and other natural resources shall not be threatened during the development of agriculture in the region, and that the development and farmers' livelihoods shall be well balanced.

Socially vulnerable groups, such as female farmers, etc., shall be given due consideration for participation in the development process of agriculture along the corridor. In many cases, farm

households headed by women or by older people have small farmland plots and limited management resources, such as labor. Therefore, instead of focusing on labor-intensive agriculture to attain self-sustainability of vulnerable groups, household incomes should be increased through combining multiple activities such as gardening, raising small stock, and small-scale on- or off-farm economic activities.

3.2.3 Utilization of Resources, Capabilities, and Services of the Local Private Sector in the Support of Family Farming

Limitations of resources managed by family farmers, such as land, labor, finances, etc., and the disadvantages posed by a lack of infrastructure and difficult access to credit and markets are impeding the growth of family farming. To realize the growth potential of family farming, the Government will tackle the prevailing conditions and provide improved extension services and improving the environment allowing for more efficient farm management. The combination of governmental support and promotion of economic activities by the private sector should then contribute to strengthening family farming through an improved agricultural management environment for family farmers through the development of potential markets, access to inputs, and technical assistance.

Furthermore, development of the regional economy and growth of family farming will be enhanced by successfully establishing a government revenue system by which increased tax earnings derived from the growth of the private sector will be used for improvements and contribute to the betterment of the standard of living of small-scale farmers.

3.3 Growth Models for Family Farmers and Local Agribusiness Industries

3.3.1 Growth Models for Family Farmers

(1) Growth of family farmers through organization into associations and promotion of modern cooperatives

The growth of family farms is expected to increase the income of farm families and secure food self-sufficiency. Increase and diversification of their production through improving farming technologies and farm management are core issues for realizing the change in agricultural practices; though farmers retain sovereignty to decide which practices shall be adopted. It is the basic theory of farmers' self-reliant development that farmers should be able to improve their activities. The pre-requirement for family farm development is the organization of groups or associations of farmers that should, as a result, strengthen interaction with other farmers' groups or associations.

The basic concepts of agricultural development are shown in Figure 3.3.1 and stage–wise development is presented below:

During the first stage, farmers are organized into groups to jointly participate in activities mainly for production and marketing. Only as a group of farmers, can they access extension services and obtain some agricultural inputs, such as certified seeds and fertilizer, mainly from the public sector or NGOs. Some farmers will access extension services and inputs utilizing the out-grower schemes.

During the second stage, the farmers' groups improve their activities aiming to get more benefits for being a group. The groups apply various methods according to their objectives, location, characteristics of their members, and their socio-economic and natural environment. It should be expected that at this stage, the organization is self-reliant, so that they are able to access extension services and markets, not only to sell their produce but also to purchase inputs by utilizing various forms of support from NGOs, development and aid organizations, etc. Access to financing will also be realized as a group.

During the third stage, farmers are organized into modern cooperatives and form linkages with agribusinesses so that they can maximize the benefits. At this level, they are able to have easy access to services, inputs, and credit.

To achieve successful growth, various stages of training and support to farmers and farmers' groups and cooperatives are required. Therefore, the Master Plan considers the support of the public and private sectors and NGOs as key to the success of this initiative.

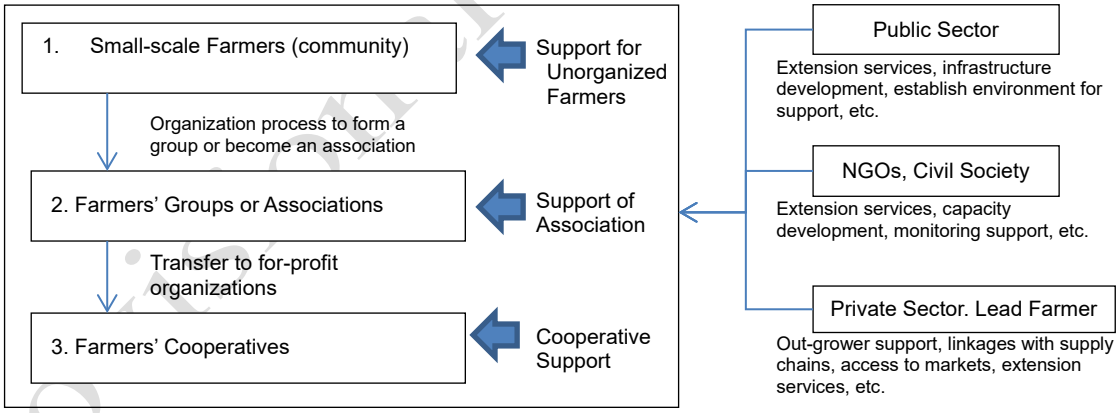


Figure 3.3.1 Outline of Growth Model for Family Farmers

The Government of Mozambique and some NGOs have promoted the organization of farmers in the Study Area. However, the rate of organized farmers is low, around 10%, requiring further efforts during the first stage of implementing the Master Plan to further intensively promote the organization of farmers.

Farmers' organizations will be formulated based on the criteria of proximity of each farm location. Once the group is constituted in this way and members have established good working relationships with each other, there would be favorable conditions for vulnerable farmers to be involved in the development as well.

To promote the increase of farmers' incomes, two approaches must be considered: (i) marketing by the association, and (ii) participating in agricultural schemes in partnership with the private sector.

Farmers producing cash crops such as oil and/or industrial crops in addition to basic food crops will be able to enlarge their production of cash crops through applying appropriate crop rotation cycles. Farmers are expected to (i) organize associations and (ii) participate in out-grower schemes or (iii) market their own produce. Currently established associations that market their own produce are expected to be re-organized into modern cooperatives aiming to develop their markets and businesses as their production increases. Some of the modern cooperatives are expected to enter into their own business of processing and/or distribution in the future.

Farmers who have potential for irrigation for their farmlands will produce irrigated crops such as vegetables in addition to basic food crops. Farmers should produce staple food for self-consumption and for sales of the surplus, but also increase their production of vegetables to develop cooperative marketing for higher-value produce. Similarly, associations will reorganize themselves into modern cooperatives to develop their own marketing and business development when farmers' production of cash crops increases. Some modern cooperatives will also launch their own processing and/or distribution businesses. The emergence should also be expected of commercial farmers specializing in vegetable production.

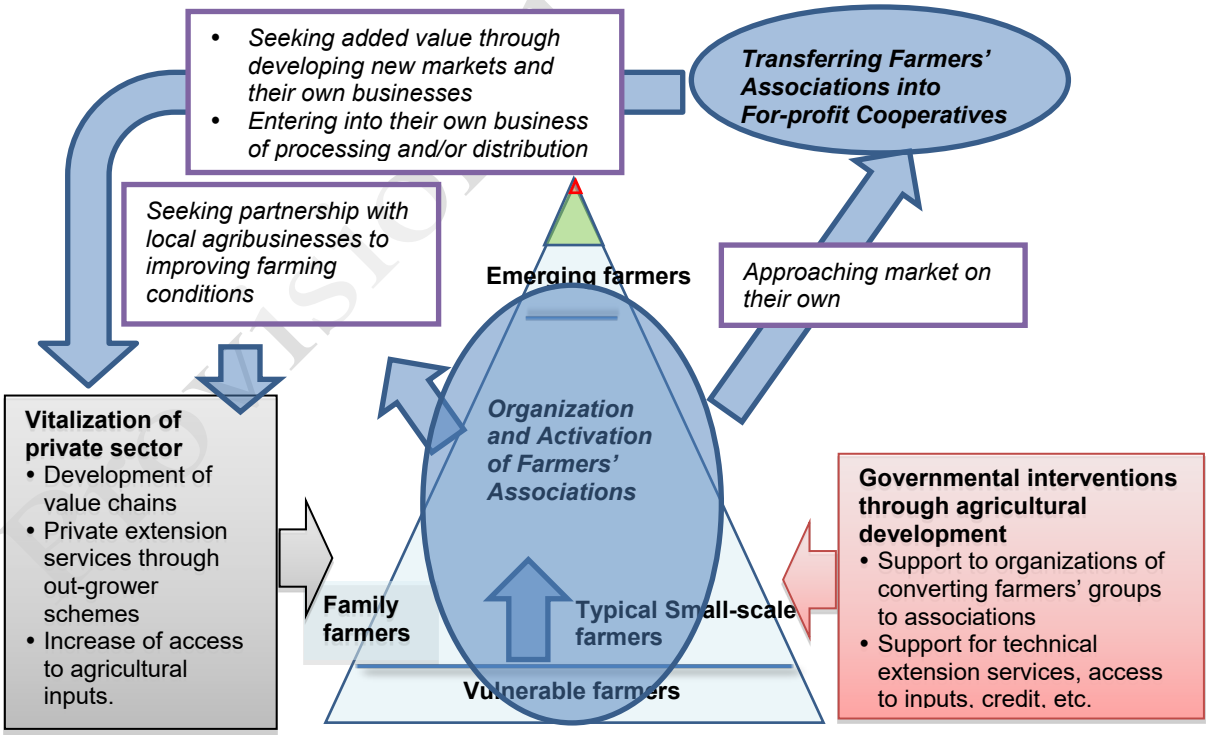


Figure 3.3.2 Projected Growth Model of Family Farmers through Organization into Associations and Cooperatives

(2) Growth of vulnerable farmers through the organization of farmers' groups at the community level

Associations or farmers' groups are expected, in most cases, to be formed within local community-based groups and/or among relatives. Such groups would own and manage a collection of farms and likely also include some vulnerable farmers who are expected to grow and progress along with other members of the group. However, some vulnerable farmers may find it difficult to keep up with other group members because of their limited resources for farm management, such as land and labor, and possibly a lack of a good relationship with neighbors or other circumstances. For those vulnerable farmers, it is necessary to consider ways and means for them to develop independently.

Considering the difficulties in managing large tracts of land by vulnerable farmers, new cultivation practices and technologies and introduction of new crops with higher added value should be promoted. To achieve higher production growth by vulnerable farmers, the combination of the following factors should be considered: (i) increased food crop productivity through improvement of cultivation technology, (ii) introduction of small scale production of vegetables or cash crops in areas that have good potential, and (iii) animal husbandry of poultry and small ruminants, according to the socio-environmental characteristics of each location. Moreover, an alternative to be considered by some farmers should be a combination of production of food crops to achieve self-reliance, together with a paid job in addition to farming to earn complementary cash income. The expansion of local industries related to farm produce, such as cashew nut or tea processing, oil milling, and other food processing industries, as well as distribution of and trading in produce, etc., can be independently but mutually beneficially promoted through partnerships with local farmers and is expected to create job opportunities for both the rural and urban workforce.

The access of vulnerable farmers to public support services will be stimulated through organizing them into groups at the community level.

Because of the limited resources and capacity of farmers, as well as their vulnerability to external shocks, such as instability of prices and natural disasters, it is necessary to consider strengthening social infrastructure and the government social security system, in addition to the interventions envisioned under the Agricultural Development Master Plan for the Nacala Corridor, among others.

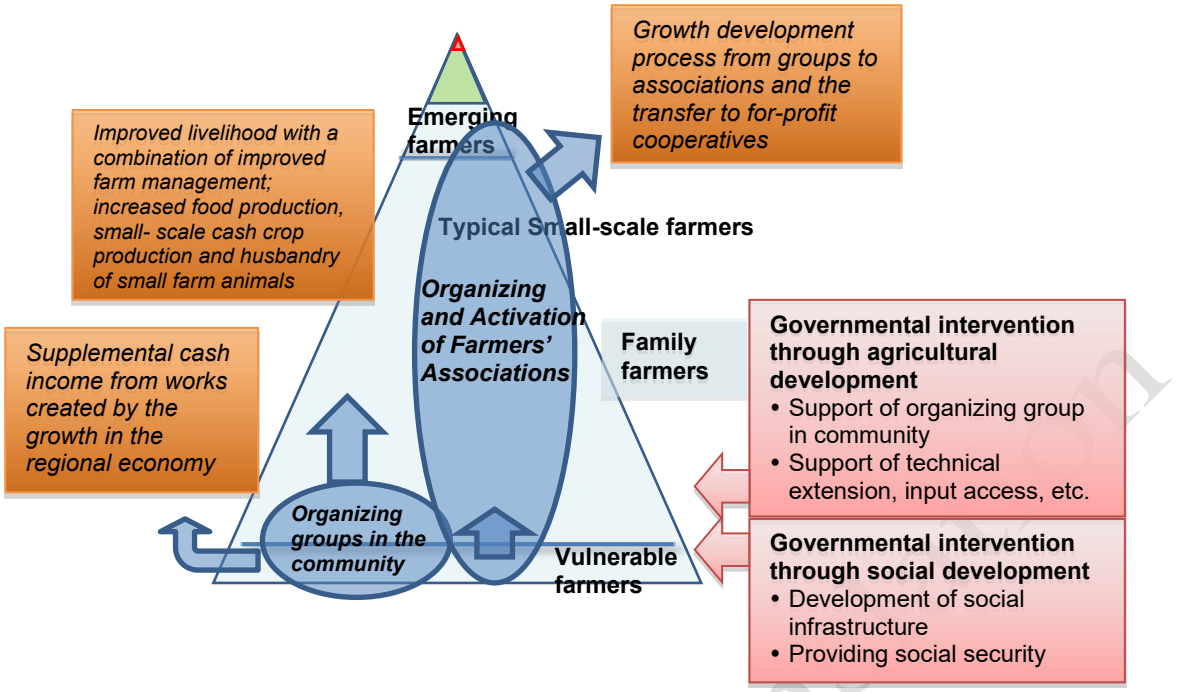


Figure 3.3.3 Projected Growth Model of Vulnerable Farmers through Organizing Groups at the Community Level

(3) Expected role of emerging core farmers in the process to organize associations and cooperatives

Emerging farmers will be core members of associations contributing to the improvement of productivity and expansion of production, as well as establishing agricultural logistics and identifying new market opportunities by creating cooperative marketing mechanisms with other associations and local farmers. The associations engage in agribusiness, such as processing and logistics. When transforming the associations into modern cooperatives, as core member, the emerging farmers will take a lead role in enhancing organizational and management capacity to enable cooperatives to run as self-sustaining businesses.

In addition to playing a prominent role in organizing farmers in the community, emerging core farmers are also expected to expand their agricultural operations by actively mechanizing their farming operations. To attain farm-operation stability, contract farming with agribusinesses for the production of cash crops such as sesame, cotton, or soybeans will be further promoted which will give easy access to agricultural inputs. In addition, emerging core farmers will act as contractors and/or facilitators for contract farming by family farmers, and they are expected to become the driving force for the development in this area through providing market information and promoting the use of improved agricultural techniques, certified seed, chemicals and fertilizers.

3.3.2 Development of Local Agribusiness Industries and Partnerships with Family Farmers

(1) Position of the Master Plan in relation to private investment

Foremost, the Master Plan's vision is to improve the livelihoods of the population in the Nacala Corridor, which it intends to accomplish chiefly by increasing production and productivity, especially with family farmers. Private investment in the agricultural sector is expected to contribute to improving the livelihoods of the population through comprehensive regional and agricultural development. Growth and expansion of local agribusinesses, such as agro-processing industries that are strongly dependent on local produce, are crucially important; hence it is necessary to strongly stimulate such agro-processing industries and related logistical activities.

However, considering the current situation in which private investments often require large tracts of land for their operations, this often results in conflicts with the local population, and it is necessary to formulate a structure to ensure that private investment will comply with the Principles for Responsible Investment for Agriculture and Food Systems (Principal of "rai"). After creating the structure, the public authority is expected to supervise and guide private investment to ensure that it will contribute to improving the livelihoods of the population and that it will return benefits equally to the community. This means the Master Plan will never promote private investments that require large scale land tenure as long as there are no relevant laws/regulations for preventing conflicts being effectively enforced by the Government side. Implementing investment based on CSR is one of ways to develop social infrastructure.

(2) Types of existing local agribusiness industries and operational systems

The types of existing local agribusiness industries in the Nacala Corridor and their operational systems fall mostly under the following categories:

- Large-scale farms and medium-scale individual farmers producing crops in their own fields: They produce maize, soybeans, beans, etc. for sale on the market. Their main buyers are domestic poultry industries and crop dealers/middlemen.
- Large-scale farms and medium-scale individual farmers that combine crop production at their own farms, contract farmers, and purchase crops from local farmers: In addition to agricultural production at their own farms, agribusinesses conduct contract farming and purchase crops from local farmers to secure enough produce for marketing. Moreover, they also export crops such as sesame, groundnuts, and some types of beans.
- Seed producers: Seed producers specifically focus on the production of seeds for cereal crops. In many cases, seed is produced through contract farming with associations and medium-scale farmers; but in some instances, they also cultivate high quality, certified seed on their own farms. Produced seed is delivered to clients such as the Government, aid agencies, and retail stores, or it is sold in their own outlets.

- Crop dealers: Crop dealers do not practice their own production activities or contract farming. They purchase crops from local farmers, associations, and modern cooperatives, which they then sell to major crop dealers in the country.
- Small-scale processing factories: Small-scale processing factories mainly operate as flour mills and process grains such as maize.
- Agricultural input dealers: Agricultural input dealers distribute and sell agricultural inputs such as seed, fertilizers, machinery, and other equipment used in agricultural production.

Since most types of the above-described agribusinesses operate with their own funds and resources, limitation of financial resources is regarded as an impediment to expanding their operations for increasing production or purchasing agricultural produce from local farmers. Moreover, agribusinesses have not yet succeeded in either (i) proactively cooperating among each other with an aim to develop agricultural logistics and new market opportunities or (ii) constructively collaborating with farmers' associations and/or modern farm cooperatives.

(3) Development of local agribusiness industries

- To increase production and diversify crops produced in the area, local agribusinesses will be strengthening collaboration with farmers' associations and further expand implementation of contract farming with local farmers in a variety of ways. Moreover, they will create business partnerships with newly organized modern cooperatives to further develop agricultural logistics and market opportunities.
- It is expected that the local agribusinesses will be able to produce and store high quality produce and eventually sell it for better prices after construction and rehabilitation of storage facilities, the introduction of standards for agricultural products, establishment of agricultural financing/credit systems, and better access to market information. These improvements will result in added value to agricultural products.
- The aforementioned business partnerships between associations and local agribusinesses will lead to increased production and diversification of crops in the area. This will further result in the growth of local agribusiness industries, including processing factories and will establish a variety of agricultural supply chains.

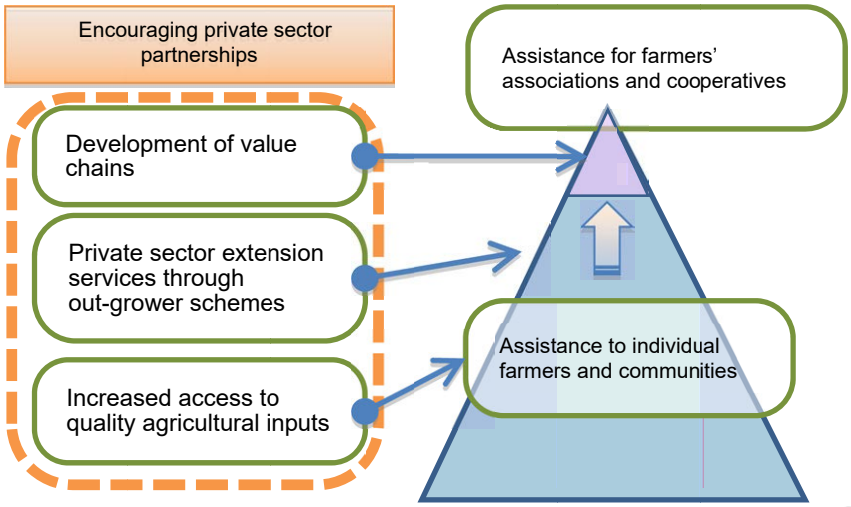


Figure 3.3.4 Involvement of Family Farmers in the Value Chain through Cooperation with Private Sector Companies

Figure 3.3.5 illustrates the basic concept of the Agricultural Development Master Plan for the Nacala Corridor.

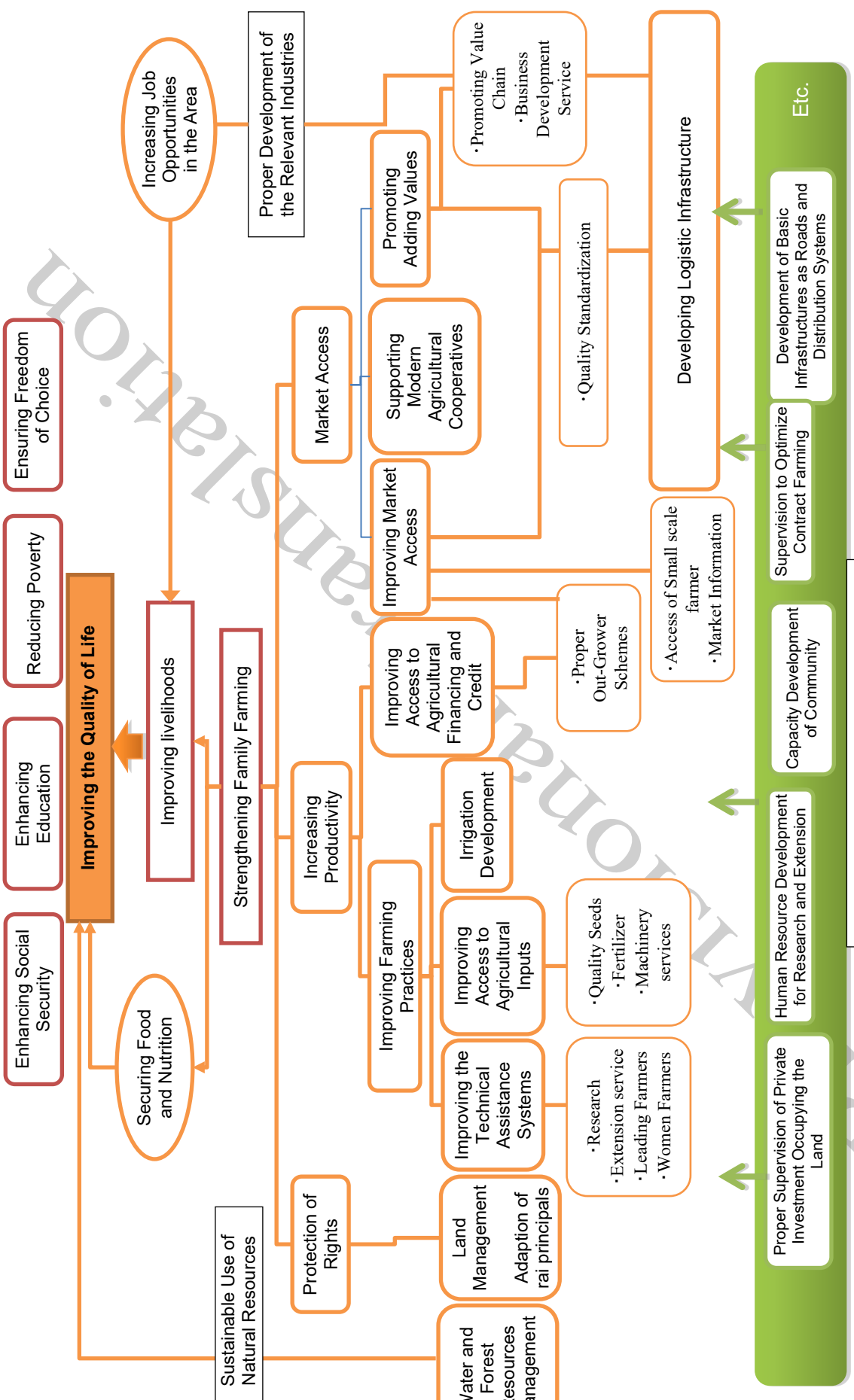


Figure 3.3.5 Basic Concept of the Agriculture Development Master Plan for Nacala Corridor Area

3.4 Delineated Pictures of Regional Agriculture

3.4.1 Expected Pictures of Regional Agriculture

Although family farmers should expect to retain their function as primary producers in the agriculture sector in 2030, the Master Plan aims to bring about the following conditions.

(1) 2020

- Farmers will increase productivity by applying crop rotation and intercropping techniques introduced through strengthened extension services, which can easily be adopted for extensive cultivation. Technical extension for adopting improved farming will be provided in specific areas with a high population density or in an area with advanced agricultural development. Moreover, organization of farmers' associations and dissemination of modern farming technology will be further promoted through extension services and out-grower schemes, among others.
- The Government will establish and strengthen the mechanisms for the use and management of land and other natural resources. In this policy framework, agriculture investment accompanied by land acquisition shall be reviewed for approval with reference to the principals of "Responsible Investment for Agriculture and Food Systems –rai." Furthermore, the Government will facilitate a series of discussions with civil society groups and other stakeholders to comprehensively define a future direction towards registration of community and individual DUATs.
- Agricultural investment in distribution and agro-processing industries, led by the private sector, will be promoted and will include agricultural cooperatives with sufficient financial capacity.

(2) 2025

- A number of leading farmers will increase productivity of major crops by adopting improved farming technology, and will start cooperatives shipping produce to local markets in collaboration with farmers' associations to strengthen and consolidate marketing linkages.
- The leading farmers' associations will take part in business activities by purchasing agricultural produce from surrounding family farms for sale to local markets or dealers. A majority of family farmers will obtain land-use rights as a result of the progress of the process procedures for registration of community/individual DUAT, and they will adopt modern agriculture technology to improve farming.
- Irrigation systems in some areas will have become functional again after the rehabilitation of damaged and malfunctioning structures and equipment.
- The Government will monitor operations of agriculture investments and private sector out-grower schemes in collaboration with an independent committee, comprising members of civil society and experts.

- The Government will facilitate the establishment of a comprehensive framework to support the development of a transparent market mechanism and value chains by setting agriculture produce standards and forming a support organization for value chain development.
- Private investment in agriculture production, processing, and marketing will be stimulated under the conditions that it will contribute to improving the livelihood of the population and that benefits are returned to the community evenly. Agriculture clusters will be eventually formed in cooperation with farmers' associations and agribusiness industries.

(3) By 2030

- Increased productivity of leading farmers and associations will be further enhanced as a result of progress in the transformation to intensive farming. While certain farmers will focus on producing specific crops, most farmers will produce both food and cash crops in a balanced manner. They will try to link with local markets and external crop dealers to market agricultural produce through their farmers' associations.
- Some farmers' associations will have transformed into modern cooperatives, and will start agribusiness operations such as the purchase of agricultural produce from farmers, processing and marketing. Moreover, certain farmers' associations will establish partnerships with private firms to build and strengthen strategic ties between the production and processing sectors through which different agriculture clusters will eventually emerge and be developed.
- The Government will play a leading role in facilitating the establishment of appropriate partnerships between farmers and private sector firms in collaboration with civil society and experts. At the same time, government institutions will be continuously providing the necessary support, such as dissemination of proper agricultural technology to marginal and isolated farmers.

3.4.2 Agricultural Development Scenarios

(1) Examining the elements of scenarios

Possible scenarios for agricultural development for 2030 in the Study Area are compared, analyzed, and evaluated in this section of the Master Plan.

The following five significant factors have been considered for the direction of agricultural development in the Study Area:

Factor 1: Dissemination of improved cultivation practices among family and medium-scale farmers
Factor 2: Private sector investment in agricultural production
Factor 3: Increased number of organized family and medium-scale farmers into farmers' associations and cooperatives
Factor 4: Development of value chains (agricultural processing and distribution)
Factor 5: Deforestation (conversion of forest areas to farmland)

Factors 1 and 2, in particular, have higher impacts on rural societies than the other factors. In this section, multiple agricultural development scenarios, combining factors 1 and 2, are advanced. It is difficult to quantify the impacts of factors 3 and 4. For the purpose of the analysis it is assumed that all scenarios have the same conditions as assumed for factors 3 and 4. Therefore, factors 3 and 4 are excluded from the scenario consideration. While factor 5 also has an important impact on the rural society, the Master Plan does not include any agricultural development projects requiring reduction of the current forest area; hence, for all scenarios the farmland area is adjusted instead of reducing the extent of the current forest area.

1) Factor 1: Dissemination of improved cultivation practices among family and medium-scale farmers

Levels of expansion of improved cultivation of family and medium-scale farmers are assumed to follow two patterns. Realistically, "no expansion of improved cultivation (0%)" is not unlikely, considering the current growth trend of the rural population growth and the arable land area.

A: Dissemination of improved cultivation practices happen in districts[68]with insufficient farmland area because of high population growth and limited deforested land area (40% of farmers).

B: All farmers already practice improved cultivation (100% of farmers)

2) Factor 2: Private sector investment in agricultural production

Private sector investment in agricultural production is one of the factors that will affect production in rural areas. The progress of private sector investment in agricultural production is reflected in the scenarios. The area of the production of private sector is considered the current area where agricultural DUAT had been prepared[69].

The private investment for agriculture production with DUAT acquisition in future is set in the scenarios. However the investment with obtaining of the DUAT is approved only after the capacity of government is sufficiently strengthened to supervise the private investment in compliance with the relevant legal instruments to set up according to "Responsible Investment for Agriculture and Food Systems: rai" which has its basis on the "Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT)"[70] by FAO.

a. Very limited private sector investment
b. Moderate private sector investment
c. Active private sector investment

[68] As projected for 2030, the land areas, "current average cultivation area (2011)" x "units of farm household (2030)" x 2, are the minimum requirements to maintain the prevailing shifting cultivation. Seven districts (Monapo, Malema, Gurue, Cuamba, Mecanhelas, Majune, and Lichinga) cannot secure this extent of farmland area. Therefore at least, improved cultivation methods will be applied in the districts. The total number of farmers in the districts will be 42% of the total in the Target Area in 2030.

[69] The area already Agricultural DUAT acquisition is about 200,000 ha in 2012 (estimated in Study)/

[70] as the foundation of the principles and shared overarching values

(2) Setting scenarios

Scenario setting is based on combining factors 1 and 2 for benchmark years 2020 and 2030. As shown in Table 3.4.1, there are five scenarios (including the zero option) for agricultural development. In the scenario, yields of crops in 2011 are set based on the current situation, and expected yields of improved farming in 2020 and 2030 are set based on practical examples in neighboring countries and the best practices in Table 2.4.7.

Table 3.4.1 Scenarios for Agricultural Development

No.	Scenario
1	**Zero Option** There are no improved farming practices applied or agricultural investments made by 2030. Productivity will slightly improve based on the prevailing extensive cultivation methodology.
2	**Cautious development** 2020: Land preparation will only be carried out without improved farming practices. There is no investment in agricultural production. 2030: 40% of farmers use improved farming practices. Very limited investment in agricultural production is made, but only after supervision system is established.
3	**Gradual development** 2020: 30% of farmers use improved farming practices. Very limited investment in agricultural production is made, but only after supervision system is established. 2030: 40% of farmers use improved farming practices, and some agricultural investments in agricultural production are made.
4	**Phased development** 2020: 30% of farmers use improved farming practices.Agricultural production by investments is made to a certain extent, after supervision system is established.. 2030: 40% of farmers use improved farming practices, and agricultural production investments are advanced.
5	**Positive development** 2020: 30% of farmers use improved farming practices. Agricultural production by investments is made to a certain extent, after supervision system is established. 2030: All farmers use improved farming practices, and investments in agricultural production are advanced.

Expected Yield (ton/ha)

	2011	2020		2030	
	current	Traditional methodology	Improved methodology *1	Traditional methodology	Improved methodology *1
Maize	1.40	1.54	2.00	1.54	2.50
Cassava	6.10	6.71	9.00	6.71	10.00
Sorghum	0.80	0.88	1.50	0.88	1.80
Beans	0.70	0.77	0.90	0.77	1.00
Ground Nuts	0.70	0.77	1.20	0.77	1.50
Paddy (rice)	1.60	1.76	2.00	1.76	2.50
Soybeans	1.30	1.43	1.70	1.43	2.50
Vegetables	8.30	9.13	12.00	9.13	15.00

Note *1: The yields of intensive farming are expected to be lower than best practices. The expected cost for input is also limited to 25% of the required amount for the best practice for seed, 30% for fertilizer and 25-100% for others.
Source: JICA Study Team

(3) Simulation of each scenario

To better appreciate the overviews of agricultural production in the benchmark years of 2020 and 2030, which are based on the above described five scenarios (including the zero option), simulated calculations for the following three options have been made. The calculation results have been compared with a simulation for the current conditions in 2011.

The three options for the simulated calculations are as follows:

a. Average cultivation area of family and medium-scale farmers
b. Average crop balance of payments of family and medium-scale farmers
c. Total amount (value) of crop production in the area

The results of the simulated calculations are shown in Table 3.4.2. Even though it is expected that the local population, including farmers, will directly or indirectly receive benefits resulting in increased incomes from adding value to produce or off-farm jobs created by private sector investment, such benefits are not included in the simulated calculations because of the difficulty in their quantification.

Table 3.4.2 Simulation by Scenarios

Scenarios	Cultivated Area (ha/H.H.)			Balance of Payments (MT/H.H.)			Total Volume of Production (Million MT)		
	Current	2020	2030	Current	2020	2030	Current	2020	2030
Scenario 1	1.34	1.24	1.13	5,653	6,132	5,658	6,952	9,852	11,794
Scenario 2	1.34	1.24	1.40	5,653	6,132	9,337	6,952	9,852	18,780
Scenario 3	1.34	1.40	1.40	5,653	7,451	9,337	6,952	13,145	24,078
Scenario 4	1.34	1.40	1.40	5,653	7,451	9,337	6,952	18,444	30,701
Scenario 5	1.34	1.40	1.86	5,653	7,451	17,043	6,952	18,444	39,193

Note: Calculations were made based on current 2011 prices (price escalations have not been taken into consideration)
Source: JICA Study Team

(4) Evaluation of scenarios

The evaluation results of each scenario were analyzed according to three factors and are described below. From the perspective of family and medium-scale farmers' income generation, increase in agricultural production, and influence of social impacts, it can be deduced that Scenario 3 is the most realistic and favorable agricultural development scenario.

1) Cultivation area

Under the zero option (scenario 1), the cultivation area will be considerably decreased because of the estimated rural population growth. When farmers apply improved practices to their cultivation, their fallow lands required for shifting cultivation can, however, be used as farmland every year. Therefore, an average cultivation area can be maintained or increased under scenarios 2 to 5. This suggests that if farmers continue to practice shifting cultivation, they will not be able to secure the same size of their current farmland without encroaching on the present forest areas. As a result, it is expected that conflicts over the use of farmland in a community will increase and land degradation will occur in and around the community caused by overuse of land, because it is difficult to maintain enough fallow land for extended periods.

2) Balance of payments for each farmer

Balance of payments for crops for each farmer will increase greatly because of the adoption rate of improved cultivation practices under scenarios 2 to 5. Although cultivation costs will increase, on balance the amount of sales of produce will increase, too. Balance of payments will increase

1.3 times in 2020 if 30% of the farmers adopt intensive cultivation at that time; it will increase 1.7 times in 2030 if intensive cultivation is adopted by 40% of the farmers, and 3.0 times when a 100% adoption rate has been attained. On the other hand, under the zero option, the balance of payments will increase in 2020 because of improvements in productivity, but it will decline in 2030 because of a decreased growing area.

3) Total amount of production in the Study Area

The total amount of production in the Study Area will increase because of production growth caused by an (i) increasing number of farmers, (ii) dissemination and adoption of improved cultivation practices, and (iii) development of new farmland by investments in agriculture. As described earlier in section 3.1.4, the Master Plan has set a target rate of agricultural growth at 7% per year by 2025 and 6% per year after that. Corresponding to this target, agricultural production will grow approximately 1.8 times from 2011 to 2020, and 3.5 times from 2011 to 2030. According to the simulation model, the total amount of crop production is calculated at 6,952 million MT in 2011, 1.9 times the estimated total targeted production in 2020 of 13,145 million MT, and 3.5 times that in 2030 or 24,078 million MT. Comparing the target in 2020 with the simulated model calculations, the estimated figure of Scenario 3 will surpass the projections. And in 2030, Scenario 3 will be slightly below the target rate, but it shows the most accurate approximate amount.

3.5 Pillars of the Agricultural Development Master Plan

3.5.1 Agricultural Productivity

- Increased agricultural productivity, production, and competitiveness, and contribution to food security and adequate nutrition -

Increasing agricultural production is the basis of regional development, as well as for food security and increasing incomes of farm households. Because family farmers form the majority of the population in the Study Area, increased agricultural production by individual farmers is considered essential for transforming regional farming systems from subsistence to commercial agriculture. Increased agricultural production at the individual farmers' level is achieved by enhancing productivity and by diversifying production applying modern farming technologies, and appropriate farm management. Expansion of improved farming with appropriate farmland management is the key to increasing production. In this regard, technical agricultural extension services provided by the public and private sectors are expected to introduce and expand new and improved cultivation technologies and farm management practices, thereby strengthening farmers' bargaining power. Moreover, organizing farmers into groups will further enhance the effects of technical agricultural extension.

3.5.2 Market Access

- Services and infrastructure for better access to markets and development of a framework directed towards agricultural investment -

The development of agricultural market opportunities for family farmers and related logistics are essential for making opportune use of improved productivity and diversified production, thereby increasing household incomes. It is also expected that the development of local agribusiness industries will increase added values of agricultural products through a combination of various supply chains. Efficient use of private sector resources is expected to figure prominently in the growth of the number of family farmers as well as enhancing their production. Increased values of agricultural produce can result in stimulating the local economy through fair distribution of benefits gained. Development of local agribusinesses will also contribute to increased incomes of farmers by generating continuous demand for local produce, and creating employment opportunities for local people. Agribusinesses, including local agro-industries, will be developed by the private sector as primary economic activities. This is expected to be further developed by (i) increased added value and opening market channels through developing value chains and agricultural clusters, (ii) strengthening collaboration mechanisms between farmers and agribusinesses through enhancing capacity of associations and individual farmers, (iii) promotion of private investment and enhancing supply chains by participation of modern cooperatives in agribusinesses, and (iv) expansion of the scale and diversification of economic activities.

3.5.3 Natural Resources

- Sustainable and integral use of land and water resources, forests, and fauna, and the protection of family farmers and communities in the development process -

Through strengthening the mechanism for the management of land and other natural resources by public administration and communities, the Master Plan gives consideration for (i) protecting the rights of small-scale farmers and communities to use land and other natural resources, (ii) preventing future land conflicts between farmers, and (iii) preventing land conflicts between large-scale developers/developments and local small-scale farmers.

In the Study Area, natural resources are currently in relatively good condition. However, there are concerns that the conditions might deteriorate because of the growth of the population and the economy if countermeasures are not taken. Therefore, the pressure on the environment caused by deforestation should be reduced through the promotion of improved agriculture as well as controlling disordered development. Moreover, appropriately adaptive farming systems must be introduced for sustainable agricultural production at regional and farm levels. There are a growing number of family farmers in the Nacala Corridor and enhancing their production by improving productivity and adding value of their produce will increase their incomes. Furthermore, growth of local agribusinesses and their partnerships with family farmers will play

an important role to developing markets and promoting value-adding to agricultural production. Poor control by the Government over the implementation of large-scale, private sector investment projects in the agriculture and forestry sectors increases the risk of infringing on the rights of, or creating conflicts with local communities. Under such conditions, the Master Plan will establish a model of Responsible Investment for Agriculture (ProSAVANA "rai"-Responsible Investment for Agriculture and Food Systems Guidelines) to better distribute the benefits and balance opportunities with the risks of agricultural investment projects.

3.5.4 Institutions

- Strengthening agricultural institutions -

Human resources are a key factor in development. Therefore, the capacity of farmers should be improved through various approaches. Moreover, it will be necessary to encourage and promote the role of lead farmers who will function as the core for agricultural development. It is also critical that the administrative and technical capacity of local governments (DPASA/SDAE) will be further enhanced in order to effectively provide technical assistance to local farmers, and to effectively and efficiently implement various agricultural development activities.

To promote orderly agricultural development and to rapidly achieve an impact on its development while minimizing risks and negative effects on various community-related conflicts, it is essential to create an appropriate and effective enactment mechanism for the "rai" and the enforcement of laws related to land and the environment. For that purpose, the governance of the agriculture sector will be enhanced through further strengthening of the coordination mechanisms of the central and local governments.

3.6 Cross-cutting Issue

Several issues essential for agricultural development are also related to other sectors, so the issues need to be tackled from various aspects in cooperation with related ministries and stakeholders.

3.6.1 Food Security and Nutrition

Food and nutritional security is essential for development of the region. It does not mean only production of a required quantity; it also needs to consider availability, access, stability, utilization, and adequacy of food for every person. A holistic approach to production and appropriate use of foods will improve the nutrition of the entire population. Increasing the availability of basic food contributes to an increase of family farmers' income and improves the condition of food security in the region and country, including inhabitants in the urban area.

At the local level, extension workers (which will receive adequate training) can promote nutritional education in consultation with post-harvest programs and gender-based trainings. Food quality also depends on the techniques and practices of management of produce on farms and in storage. So, food and nutritional security enters into all agricultural phases such as research, production, marketing, post-harvest, and consumption.

3.6.2 Gender Equality

Women play an important role in rural households, especially regarding food and nutrition security and the family economy. Usually women have great knowledge of the environment and its natural resources, being responsible for providing water and fuel wood or charcoal for the household.

However, women face constraints to perform their tasks due to existing gender relations in rural communities. The illiteracy rate of women is higher than of men. Women have limited access and control over resources and services, including land, inputs, credit, crop production, large-scale livestock husbandry, extension services, information, training, technology, employment, and decision making.

Therefore, it is necessary to implement activities that aim to ensure equal rights and opportunities between women and men for access to and control over resources and benefits. If more vulnerable farmers, such as women farmers, have can increase food security and family income through a gendered approach, it contributes to poverty reduction and the sustainable development of the country.

Issues on development of women are not only related to MASA, but also related to other ministries, such as the Ministry of Education and Human Development (MEHD). This Master Plan needs to support the activities of women in rural areas in order to strengthen organizational management and operation of women's groups, transference of cultivation technologies including irrigated vegetable cultivation, the raising of small livestock, simple agro-processing activities, etc. Meantime, training in education, food nutrition, health and sanitation, and literacy as well as trainings on gender issues is also required to be carried out in cooperation with stakeholders in other sectors.

3.6.3 Youth

Including youth in agriculture is important for the sustainable development of the agricultural sector. In order to involve youth in agriculture, achieving good living standards in rural areas is essential. Therefore, agriculture should be improved in order to create job opportunities for people in rural areas. Through that, it makes youth more attractive and also avoids population drain from rural areas, which causes widening social disparity due to a lack of stable employment opportunities for them in urban areas.

However, employment and entrepreneurial opportunities for youth living in rural areas remains limited. The job opportunities are scarce, poorly remunerated, and of low quality. On the other hand, rural youth do not have opportunities for developing skills and abilities to partake in agriculture, due to insufficient access to knowledge and information. Additionally, they have limited access to markets, and as without such access they will not be able to engage in viable and sustainable agricultural business. Improving access to education, training, and market information will redress this discrepancy and offer opportunities for young farmers to access the

market. Facilitating their involvement in youth producers' groups can be similarly beneficial in this respect.

In this context, it is necessary to prepare various interventions to support, motivate, and encourage young farmers to pursue agricultural production and to make favorable conditions so they see agricultural production as a profitable economic activity. Moreover, flexibility of the youth is a potential for applying new farming technology and practices, so that we should use the potential effectively to extend modern technology. Therefore, that approach will be considered in order to teach new techniques and practices to school students in rural areas.

3.6.4 Mitigation of Human-wildlife Conflict

In spite of the human-wildlife conflict not being a recent phenomenon in the country, it is now a serious concern not only for the general population but also for all those involved in wildlife management.

The conflict between humans and wildlife has been increasing, causing serious damage to the socio-economic condition of people living in rural areas. To cope with that, the Mozambican government formulated a Strategy for Management of Human-wildlife Conflict in 2009 and set a strategic vision "to ensure the protection of people and property by adopting conflict management strategies for meeting with human needs and wildlife conservation, taking into account the guarantee of the balance of social, economic, and ecological needs."

Under the framework of the Strategy, it is expected that the prevention and mitigation of conflict will be accomplished through spatial separation of wild animals and human settlements according to regional planning measures, removal of wild animals where there are human settlements, sealing problematic species, changing people's attitudes to animal routes, and developing projects for communities to see more of a benefit from wildlife. The time frame of the Strategy was set as five years and it has finished in 2014. An update to the strategy and implementation of related action plans is expected to take place.

The Master Plan will contribute to the mitigation of human-wildlife conflict directly and indirectly from the viewpoints below:

- Development and implementation of land-use plans to separate the sites or habitats for wildlife areas where the human population lives and develops their socio-economic activity. The District Land Use Plan (PDUT) is considered to be an effective tool in the sustainable management of natural resources and preventing human-wildlife conflict.
- Awareness-raising of the community for the proper management and utilization of wildlife as a way to mitigate the impact on wildlife and measures to prevent the occurrence of conflict. The Master Plan emphasizes the importance of an agricultural extension service incorporating sensitization and capacity-building in order to empower communities.

3.7 Detailed Forecast Picture of 2030

Agricultural production in 2030, corresponding to Scenario 3 described in section 3.4, is set out and explained in this section.

3.7.1 Land Cover and Farmland Use

With respect to the possible use of land in the future, the Master Plan does not include any plans that will reduce the present area of forests. The condition of the forests in the Study Area shall be properly maintained in terms of extent and quality by initiatives of the Government, based on comprehensive land use policies to be defined by another program.

Protection of forests is the general rule for development, and increased productivity of farmland, through a transition from the prevailing extensive cultivation to improved intensive agriculture will be promoted under the general consensus of the community and with the free will of the people. Any unused land so defined during the agricultural production transition process shall be recognized as part of community lands, and the community shall effectively use those lands on a sustainable basis.

With the following conditions, the projected land-use cover including farmland in 2030 is shown in Table 3.7.1: Subject to careful observation of land rights, corporate farms will be developed through private sector investments, mainly in DUAT areas, but also in a part of community DUAT areas:

- The present extent of the forest area will not be reduced as a consequence of agricultural development.
- Increase of the extent of the forest DUAT area has not been taken into account in the projections.

Table 3.7.1 Land Cover and Farmland Use in 2030

Land Classification	Acreage ('000 ha)		
	Present	2030	Change
(1) Uncultivable Areas (partly covered by forest vegetation)	**2,774.7**	**2,774.7**	**0**
1.1. Conservation Areas	936.0	936.0	0
1.2. Steep Slopes, Bare Lands (rocky), Barren Areas, Towns, etc.	1,838.7	1,838.7	0
(2) Cultivated Areas (areas other than "1 - Uncultivable Areas")	**7,925.5**	**7,925.5**	**0**
2.1. Forest Vegetation Areas	3,910.5	3,910.5	0
2.2. Non-forest Vegetation Areas	4,015.0	4,015.0	0
2.2.1. Farmland Areas (with small-scale farming)	(930.0)	(1,422.7)	(+492.7)
2.2.2. Community DUAT Areas	(96.9)	(1,091.0)	(+994.1)
2.2.3. Agricultural DUAT Areas	(174.9)	(174.9)	(0)
2.2.4. Forest DUAT Areas	(329.3)	(329.3)	(0)
2.2.5. Other DUAT Areas	(288.4)	(288.4)	(0)
2.2.6. Others (fallow land, bush, etc.)	(2,195.5)	(708.7)	(-1,486.8)
Total	**10,700.2**	**10,700.2**	**0**

Note: 2.2.2 Community DUAT area: not a forest area at present, for which a community DUAT has been obtained
2.2.3 Agricultural DUAT area: not a forest area at present, for which an agricultural DUAT has been obtained by entities
2.2.4 Forest DUAT area: not a forest area at present, but a forest DUAT has been obtained by entities
2.2.5 Other DUAT area: not a forest area at present, for which a DUAT has been obtained for other purposes such as mining
2.2.6 Others: not a forest area and assumed to be used as fallow land at present

Source: JICA Study Team

3.7.2 Increased Food Production and Food Security

(1) Production

Table 3.7.2 shows estimated production of the main crop in the Study Area for 2020 and 2030 based on the assumptions of agricultural development Scenario 3. The seven crops (maize, cassava, sorghum, beans, groundnuts, rice, and soybeans) account for 90% of the total extent of crop cultivation in the Study Area from 2006/07 to 2010/11.

Table 3.7.2 Estimate of Main Crop Production in the Study Area

Crops	Base Year (2011)			2020			2030		
	Area (ha)	Yield (ton/ha)	Production (ton)	Area (ha)	Yield[1] (ton/ha)	Production (ton)	Area (ha)	Yield (ton/ha)	Production (ton)
Maize	270,300	1.4	378,400	340,200	1.54/2.00/2.50	584,500	444,200	1.54/2.5/2.50	902,700
Cassava	265,000	6.1	1,616,500	300,400	6.71/9.00/-	2,222,100	328,600	6.71/10.00/-	2,637,300
Sorghum	103,000	0.8	82,400	110,900	0.88/1.50/-	118,200	105,900	0.88/1.80/-	132,200
Beans	107,700	0.7	75,400	156,700	0.77/0.90/-	126,800	181,000	0.77/1.00/-	156,000
Groundnuts	65,700	0.7	46,000	82,800	0.77/1.20/-	74,400	93,400	0.77/1.50/-	99,200
Rice	22,500	1.6	36,000	27,600	1.76/2.00/-	50,600	33,200	1.76/2.50/-	68,300
Soybeans	6,500	1.3	8,500	45,200	1.43/1.70/2.50	84,700	127,100	1.43/2.50/2.50	289,700
Sub-total	840,700	-	2,243,200	1,063,800	-	3,261,300	1,313,500	-	4,285,400
Other crops	85,000	-	-	186,300	-	-	360,000	-	-
Total	925,700	-	-	1,250,000			1,673,500	-	-

Note: Cultivated area information for 2010/11 is based on data from relevant DPASAs. DPA data was partly adjusted after comparison of other related data. The totaled figures of each district were rounded off to the nearest hundred.
1) Yield: Traditional Cultivation/Intensive Cultivation/Corporate Farm
Source: JICA Study Team

1) Demand

Table 3.7.3 shows the demand estimate of the main food crops. The demand for each crop was calculated from the volumes of direct food consumption, seed, and losses after harvesting. Hence, indirect consumption such as edible oil and forage are excluded from the calculations. One of the major staple foods, wheat, is also included in the calculations.

Table 3.7.3 Demand Estimates of Main Food Crops in the Study Area

Crop	2011 (ton)	2020 (ton)	2030 (ton)
Maize	206,000	346,400	460,500
Cassava	1,131,800	1,489,200	1,888,900
Sorghum	77,400	69,400	69,200
Beans	46,400	79,800	124,400
Groundnuts	36,800	49,500	65,600
Rice (paddy)	206,000	334,800	522,000
Wheat (flour)	94,100	158,800	253,300

Source: JICA Study Team

As shown in Table 3.7.4, the consumption has been calculated based on per capita consumption of main food crops in 2011, 2020, and 2030. The volume of consumption satisfies the necessary caloric intake requirements for people in both years. The table shows that the population is going to have a higher caloric intake than at present and with a better balanced diet in 2030.

Table 3.7.4 Estimate of Caloric Consumption in the Study Area

Crop	Base year (2011)		2020		2030	
	kg/year	kcal/day	kg/year	kcal/day	kg/year	kcal/day
Maize	40.0	388	50.0	485	50.0	485
Cassava	220.0	922	215.0	901	205.0	859
Sorghum	15.0	146	10.0	97	7.5	73
Beans	9.0	84	11.5	107	13.5	125
Groundnuts	5.0	80	5.0	80	5.0	80
Rice (paddy)	24.0	233	29.0	282	34.0	331
Wheat (flour)	20.0	199	25.0	249	30.0	298
Total of major food crops	-	2,052		2,201	-	2,251
Total of all food Types	-	2,150		2,300	-	2,500
% of Major Crops	-	95		96	-	90

Source: JICA Study Team

2) Balance of demand and supply

Table 3.7.5 shows the estimate of main food-crop demand and their supply in 2020 and 2030, compared to the base year 2011. By implementing the Master Plan, according to this estimate, there will substantial shortages of rice and wheat in the Study Area, but supplies of other main food crops will exceed demand in both 2020 and 2030.

In particular, maize and cassava will have surpluses. The analysis of maize production shows an estimated production of 902,700 tons in 2030, enough to fill the household demand of about 460,500 tons, thus generating a surplus of about 442,200 tons. Excess produce is mainly expected to be used to supplement domestic demand in areas with crop deficits, contribute to improving national food security, and used by the agro-processing industry or for export.

Table 3.7.5 Estimate of Food Demand and Supply in the Study Area

(unit: ton)

Crop	Base Year (2011)		
	Production	Demand	Balance
Maize	378,400	206,000	172,400
Cassava	1,616,500	1,131,800	484,700
Sorghum	82,400	77,400	5,000
Beans	75,400	46,400	29,000
Groundnuts	46,000	36,800	9,200
Rice (paddy)	36,000	206,000	-170,000
Wheat	0	94,100	-94,100

Scenario 3 **(unit: ton)**

Crop	2020			2030		
	Production	Demand	Balance	Production	Demand	Balance
Maize	584,500	346,400	238,100	902,700	460,500	442,200
Cassava	2,222,100	1,489,200	732,900	2,637,300	1,888,900	748,400
Sorghum	118,200	69,400	48,800	132,200	69,200	63,000
Beans	126,800	79,800	47,000	156,000	124,400	31,600
Groundnuts	74,400	49,500	24,900	99,200	65,600	33,600
Rice (paddy)	50,600	334,800	-284,200	68,300	522,000	-453,700
Wheat	0	158,800	-158,800	0	253,300	-253,300

Source: JICA Study Team

Table 3.7.6 shows the estimate of the main food crop balance in 2020 and 2030 in Scenario 1 (zero base); it is the "without" scenario with no implementation of the Master Plan. The balance in 2020 seems to be at the same level as base-year 2011 as shown in Table 3.7.5. However, it will become worse in 2030. This means that even with some degree of productivity increase, population growth and thus food demand will outstrip crop production and the food balance in the region will become insecure.

Table 3.7.6 Estimate of Food Demand and Supply in the Study Area (Zero Base)

Scenario 1 (Zero Base) **(unit: ton)**

Crop	2020			2030		
	Production	Demand	Balance	Production	Demand	Balance
Maize	496,700	346,400	150,300	529,000	460,500	68,500
Cassava	1,992,900	1,489,200	503,700	2,146,500	1,888,900	257,600
Sorghum	106,000	69,400	36,600	112,000	69,200	42,800
Beans	98,600	79,800	18,800	106,700	124,400	-17,700
Groundnuts	57,600	49,500	8,100	62,600	65,600	-3,000
Rice (paddy)	47,300	334,800	-287,500	53,300	522,000	-468,700
Wheat	0	158,800	-158,800	0	253,300	-253,300

Source: JICA Study Team

3.7.3 Contribution of Family-managed Farms to the PEDSA Goals and Agricultural Development

As shown in Table 3.4.2, it is estimated that the average balance of payment for family farmers and medium-scale farmers in Scenario 3 will be 9,337 MT per household in 2030 (with the Master Plan) and 5,658 MT in Scenario 1 (without the Master Plan). It means that the annual income of family farmers would increase by about 3,700 MT, 1.7 times the present balance of payment.

From the perspective of the regional economy, as shown in Table 3.7.7 by implementing the Master Plan, the total production would be 13 billion MT in 2020, 1.89 times the amount of seven billion MT of 2011, and the estimated amount in 2030 would be 24 billion MT, 3.46 times higher than that of the current production amount. This is equivalent to an average annual growth of 7.3% in 2011-2020, fulfilling PEDSA's objective of a growth of "at least 7%". Although, in the Scenario 1 (without the Master Plan) the total value in 2020 increases to 10 billion MT, and 12 billion in 2030, 1.42 and 1.70 of the present value, respectively.

The major reasons for the increase are improved productivity of major crops and diversification of agricultural production after dissemination and adoption of improved farming practices by farmers. Dissemination of improved farming practices may gradually progress from districts where high population growth will occur because of an increasing demand of farm produce.

Strategies for increasing agricultural production through applying improved farming practices are described in Chapter 4 with technical assistance for farmers, such as agricultural research and extension services. At the same time, farmers will be able to enjoy improved access to agricultural inputs such as improved seed, chemical fertilizers, pesticides, farm machinery/equipment, etc., because of stimulation of supply chains mainly by the private sector.

A priority financing system for agriculture shall also be implemented in order to accommodate the increased financial requirements of farmers.

With regard to natural resources conservation, existing natural forests will be maintained by applying improved modern and sustainable agricultural practices, and well-organized and managed investments.

As shown in Table 3.7.6, agricultural production will produce more than enough food for the Study Area so that food security in the region will be improved by increased agricultural production while at the same time distribution networks will be developed. The advantages of implementing the Master Plan, based on the simulation of Scenario 3, are summarized below in Table 3.7.7.

Table 3.7.7 Contribution of the Master Plan to Agricultural Production and Household Balance of Payments in the Study Area

Scenarios	Items	Total Value of Agricultural Production (Million MT)			Household Balance of Payments for Average Farmers (MT/H.H.)		
		Base Year (2011)	Year 2020	Year 2030	Base Year (2011)	Year 2020	Year 2030
With Master Plan (Scenario 3)	Amount	6,952	13,145	24,078	5,653	7,451	9,337
	Growth from Base Year (times)		1.89	3.46		1.32	1.65
	Average Annual Growth from Base Year (%)		7.3%	6.8%		3.1%	2.7%
Without Master Plan (Scenario 1)	Amount	6,952	9,852	11,794	5,653	6,132	5,658
	Growth from Base Year (times)		1.42	1.70		1.08	1.00
	Average Annual Growth from Base Year (%)		3.9%	2.8%		0.9%	0.0%

Source: JICA Study Team

CHAPTER 4 AGRICULTURAL PRODUCTIVITY

In this chapter, the five development strategies and their respective components for agricultural productivity focused on "Increased agricultural production, productivity and competitiveness, and contributing to food security and adequate nutrition" are discussed.

- Agricultural Production Increase
- Improving Technical Assistance Systems
- Improving Access to Agricultural Inputs
- ImprovinProvisional g Access to Agricultural Financing/Credit
- Irrigation Development

4.1 Agricultural Production Increase

4.1.1 Priority Crops and Opportunities for Basic Food and Cash Crops

(1) Basic food crops

Among the major crops mentioned in Section 2.4.6, maize, cassava, haricot beans, cowpeas, and groundnuts, have a relatively higher potential under the evaluation of promising crops; therefore, they are priority crops in the Master Plan. Soybeans are categorized as a cash crop according to the nature and use of the crop in the Study Area.

Among the priority crops, the highest priority should be given to maize because of its potential for a production increase and influence on the overall agricultural production in the area for the following reasons:

1) Most farmers grow maize as a major staple;
2) Maize is suitable for a wide-range of growers from small- to large-scale farmers;
3) The demand for maize as food and animal feed in Mozambique is increasing; and
4) Maize has a high potential for increased production through currently applied and new or improved technology; thus, a quick impact can be expected.

In the same analysis, rice and wheat are classified as the next group of priority crops. However, rice and wheat are not considered priority crops because of their low market purchase price and low competitiveness in the Study Area, even though there is a substantial deficit for both crops. They are included in other crops to be considered, described later in (3), and promoted in a specific area suitable for their production.

Table 4.1.1 Priority Basic Food Crops

Crop	Characteristics	Appropriate Farm Scale		
		Small	Medium	Large
Maize	A major staple, especially in the western part of the Study Area. There is a high demand in southern Mozambique and in neighboring countries. A large demand is also expected as animal feed, including for poultry. The combination of maize and soybeans is suitable for crop rotation.	Yes	Yes	Yes
Cassava	A major staple, especially in the eastern part of the Study Area, as well as an important crop substitute during periods of food shortage. New processing technology may expand market opportunities.	Yes	Yes	No
Haricot beans	High consumption in the central and western parts of the Study Area as a major supplementary food to staples. Farmers can expect higher prices because of high demand in the country.	Yes	Yes	No
Cowpeas	High consumption in the central and eastern parts of the Study Area as a major supplementary food to staples.	Yes	Yes	No
Groundnuts	High consumption in the central and eastern parts of the Study Area; and, when crushed, used as an important seasoning. It is also widely consumed in the country in various forms, e.g., raw, boiled or roasted.	Yes	Yes	No

Source: JICA Study Team

(2) Cash crops

The evaluation made by the Study Team shows that the cash crops that scored high are soybeans, potatoes, vegetables, cashews, cotton, and tobacco, and these are considered to be priority cash crops in the Master Plan. Sugarcane also scored well. However, well-established large sugarcane companies, subsidized by the Government, are located outside the Study Area. Moreover, there is little room for developing new commercial-scale sugarcane estates in the Study Area.

The selected priority cash crops, soybeans are important for agricultural development for the following reasons:

1) It can be combined with maize in suitable crop rotation cycles;
2) It is suitable to be cultivated by small- and large-scale farmers;
3) Farmers can obtain better prices for the crop with direct sales;
4) There is a high and continuous demand in domestic and international markets; and
5) There is high potential for the development of a wide-range of industries for processing and for livestock feed.

Characteristics of the analyzed priority cash crops are shown in Table 4.1.2.

Table 4.1.2 Priority Cash Crops

Crop	Opportunity	Appropriate Farm Scale		
		Small	Medium	Large
Soybeans	Continuous high demand is expected in the country, as well as from neighboring countries, for use as feed for poultry and as raw material for edible oil extraction. Even if the country achieves a huge surplus, this can be absorbed by increasing demand in the international markets.	Yes	Yes	Yes
Potatoes	A profitable and relatively easy crop for farmers, especially in Niassa Province. Demand is increasing in the domestic market. It can be combined with soybeans or other beans and groundnuts in crop rotation.	Yes	Yes	Yes
Vegetables	A good source of income for farmers because of high demand in local markets, especially in towns. High potential to generate jobs in rural areas. Tomatoes, onions, garlic, cabbage, kale, carrots, and lettuce are popular vegetables in the country.	Yes	Yes	No
Cashews	Mozambique was the leading cashew producer before independence, with Nampula Province the production center. Many projects are underway to revitalize production and processing.	Yes	Yes	No
Cotton	A well-established export commodity in the country. Processing industries can be developed. It can be combined with soybeans in crop rotation. Cotton companies must play a major role in agricultural development, since they enjoy a monopolistic position in their concession territory approved by the Government.	Yes	Yes	Yes
Tobacco	A well-established export commodity in the country, with Niassa as its production center. Tobacco companies must play a major role in agricultural development, since they enjoy a monopolistic position in their concession territory approved by the Government.	Yes	Yes	No

Source: JICA Study Team

(3) Other crops to be considered

Considering the local conditions, some other crops should be given high priority in the Master Plan, despite obtaining relatively low scores in the evaluation. Rice, wheat, and fruit follow priority crops in the scoring process, so they are considered important crops for farmers in certain areas.

Table 4.1.3 shows these crops together with their main advantageous characteristics.

Table 4.1.3 Other Crops to be considered

Crop	Advantageous Characteristics	Appropriate Farm Scale		
		Small	Medium	Large
Rice	Significant deficits for demand in the whole country and high demand of local produce at local markets. In some districts, a potentially suitable area for production exists.	Yes	Yes	No
Wheat	Significant deficits for demand in the country. Existing potential area to produce in Niassa Province.	Yes	Yes	Yes
Sesame	An emerging crop, currently exported to Asia and the Middle East. Nampula Province is the production center in the country. It can be grown in combination with cashews as an alternative income before harvesting the cashews.	Yes	Yes	No
Sunflowers	A crop for the production of oil, with a high potential to be combined with soybeans in a crop rotation system.	Yes	Yes	Yes
Fruit	Market demands are increasing and suitable for small scale and vulnerable farmers who can access markets to increase cash income.	Yes	Yes	Yes
Tea	It was a well-established export commodity in the Gurue district as a special local product. The Government is giving serious attention to revitalizing the industry.	No	Yes	Yes

Source: JICA Study Team

4.1.2 Measures for Family Farming Technology Improvement

(1) Application of modern farming technology

To achieve the increase, stabilization, and diversification of agricultural production of family farmers, it is essential to select, develop and disseminate an appropriate farming technology package for small-scale farmers, such as soil improvement and conservation techniques as well as agriculture and crop cultivation techniques, taking into account practices already developed by farmers. Farmers are expected through appropriate motivation to gradually shift towards modern technologies focused on increasing productivity based on the premise that their right to decide on a production model will be maintained.

The low income of farmers at the Study Area is mainly the result of low productivity.

Because of the limited access to inputs, family farmers find it difficult to expand their production area, resulting in low productivity and food insecurity.

The practice of extensive farming is a traditional system in which farmers regularly move to other fields to allow the recovery of soil fertility, practicing fallow rather than maintaining or improving soil fertility through the use of fertilizers and other technologies for soil regeneration, improvement and conservation. However, the practice is only feasible under the following conditions:

(i) Low population density (a limited number of people on an extended area); and
(ii) Farmers accept production at a subsistence level (no expectation for abundant harvests)

During the Study, it was observed that in some provinces with higher population densities, a considerable number of producers do not wait sufficient time for fallow land, which is 10 to 15 years, while others are attached to and remain on a cultivation area. Considering the demographic aspects, it could be concluded that maintaining the traditional agricultural system may not be sustainable.

Adopting modern farming practices is essential for increasing production and productivity. However, adopting these practices and applying them to improve production systems should necessarily take place simultaneously, since the types of cultivation technology and land use are closely interconnected.

Farmers need to be aware of the need to change their farming practices to achieve better productivity. Such a change cannot be imposed; however, no initiative will be successful if the existing production practices remain. Productivity can only be enhanced when farmers start considering adoption of improvement technologies and soil conservation, which are key factors to increasing production.

Once use of land is legally guaranteed for farmers to carry out their agricultural activities, they will find an incentive to shift their agricultural strategies towards improved farming systems, thereby maintaining soil fertility. Moreover, the fallow area under the current cultivation system,

which is estimated to have at least the same extent of the annually cultivated area, can be used to increase the cropping area after the transition to intensive farming.

The following comprehensive measures should be taken to promote a voluntary shift of farming systems by family farmers:

- Developing and disseminating improved farming technologies and practices;
- Disseminating advantages and incentives of improved farming to family farmers (to be combined with DUAT registration);
- Securing an individual DUAT of farmland (DUAT registration);
- Securing availability of quality farm inputs at affordable prices to family farmers; especially seed and fertilizer;
- Improving farmers' accessibility to markets (input and output) and market information for input and output;
- Establishing a credit system with affordable and adequate conditions for family farmers; and
- Promoting environmental education, mainly targeting children and youth.

(2) Appropriate application of fertilizers and agricultural chemicals

Low use of agricultural input such as fertilizers and agrichemicals is considered to be one of the major constraints to increasing productivity in the field. As the results of the case study of fertilizer application described in Section 2.5.2 shows, the current price of fertilizer is too high for farmers to apply adequate amounts in the field. Thus, providing fertilizers to farmers at affordable prices and in appropriate packages is indispensable to popularizing and expanding fertilizer use among farmers.

In application of fertilizers and agrichemicals, the appropriate use of inputs (avoiding excessive use) is essential for protecting the natural environment and human health and maintaining soil fertility, as well as contributing to an increase of farm income. In order to fulfill appropriate use of inputs, it is required to provide technical information to farmers and improve their understanding. Through enhanced agricultural extension services, including the Farmer Field School (FFS) and training of farmers, farmers obtain necessary knowledge and technology. Suppliers of agricultural input are also expected to have a role in providing knowledge to farmers regarding safe and effective use of fertilizer and agrichemicals. Technical extension and input supply under the out-grower scheme will contribute to expand the appropriate input use. It is also important to bear in mind that the ratio between fertilizer cost versus final output price to be attractive enough to induce the use by farmers.

The use of fertilizers and agrichemicals are to be prioritized in research and development activities to establish technical guidelines for appropriate use suitable for the characteristics of the area. At the moment, the effects of N, P, K, and poultry manure are being tried with varieties of maize, soya, and Irish potatoes in the activity of ProSAVANA-PI. Safe and effective use

agrichemicals, considering the natural environment and human health, is also to be studied in research and development. The results of the research components are expected to be compiled into a "decision support model" and will be provided to farmers through agricultural extension services. Chemical fertilizers and agrichemicals are necessary to be used appropriately under the Law of the Environment. In addition to establishing appropriate technology use and expansion through the agricultural extension service, it is necessary to strengthen the capacity of the government to set standards and improve the monitoring and enforcement of the regulations.

Moreover, in order to avoid a negative impact on the natural and social environment, the Environmental Impact Assessment (EIA) of each component will be carried out according to Mozambican laws and, when any component is supported either technically or financially by outside entities, safeguarding procedures of such entities will be additionally applied.

(3) Quality seed

The limited use of agricultural inputs such as fertilizers and quality seeds has a considerable influence on the standard of agricultural productivity. Through the implementation of ProSAVANA-PI, testing several varieties, including local varieties, to verify their adaptability in the area is investigated. The selected varieties will be provided to local farmers through local distribution of seed companies. In this context, it is also necessary to promote interventions so farmers are able to access quality seed at an affordable price. Additionally, information about its utilization shall be provided through public and private agricultural extension services.

In Mozambique, the production, trade, quality control, and certification of seeds are subject to specific regulations. The Master Plan does not encourage the use of GMO (Genetically-Modified Organisms).

(4) Conservation agriculture

Conservation agriculture is considered to be one option for improving the present situation of small-scale farmers, achieving high and sustained crop production levels and acceptable profits, at the same time as conserving resources and protecting the environment. Expected advantages of conservation agriculture are the following:

- Achieving sustainable yield increases by improving the growth conditions for crops and the efficient use of inputs;
- Reversing soil degradation processes and building up soil fertility as well as optimizing soil moisture;
- Eliminating power-intensive soil tillage, thus reducing the drudgery and labor required for crop production; and
- Reducing crop vulnerability to extreme climatic events, as well as reducing the danger of soil erosion.

The technical system of conservation agriculture is based on (i) continuous minimal mechanical soil disturbance, (ii) permanent organic soil cover, and (iii) diversified crop rotation of annual crops and plant associations of perennial crops. In order to expand this technical system, it is necessary to establish a suitable system for the natural and social conditions of the area. Thus, technical issues for conservation agriculture to adapt to local conditions are set as one of the pillars of research and development activity. At present, the technologies below are validated in ProSAVANA-PI:

- Soil improvement techniques: deep rooted-crops, residue application, etc., were evaluated
- Conservation technologies: mulching, minimum tillage, vetiver grass contour hedges, alley cropping with pigeon peas, that will reduce water soil erosion and mitigate drought effects

The result of research and development will be compiled in technical packages adaptable for small-scale farmers and to be adopted by the agricultural extension services.

(5) Agricultural mechanization

Lack of labor is one of the constraints of agriculture in the area. This causes farmers difficulty with expanding their cultivated land and preparing appropriate timing of seeding. Thus, farmers desire an introduction of agricultural machinery into their farming system.

The PEMA, with the objectives to increase production and productivity by intensifying energy throughout the agricultural production and processing cycle, was endorsed in July 2012. Based on PEMA, PNISA indicates four intervention areas: (i) the development of a network of services for mechanized farming, (ii) establishing institutions for agricultural development, (iii) the development of human and material capital, and (iv) the reorganization of production areas.

With consideration of the current situation, the improvement of farming technology especially for plowing will be fulfilled comprehensively through upgrading agricultural mechanization, which includes expanding of agricultural utensils and the introduction of animal traction and tractors.

The improvement of agricultural utensils shall be considered in the agricultural extension service.

To introduce animal traction, it is necessary that farmers acquire knowledge of the use of animal traction as well as livestock. However, the growth of animal traction in the region seems to be a challenge because of the lack of experience breeding large livestock and using animal traction.

In order to drive the use of mechanization by local farmers, agricultural machinery service providers should be fostered. The service providers know how to operate, maintain, and manage the machines. In this context, it is quite important that necessary technology of farming system using machineries to transfer for farmers, and it should be included in the agricultural extension service.

There is a plan to establish mechanization service centers (Maquicenters) under the PNISA Mechanization Program. Therefore, the intervention in the context of the Master Plan will align with the MASA's initiative to promote these service centers.

4.1.3 Livestock Development

(1) Poultry industry development

Poultry farming has a high potential for development in the Study Area. However, local poultry farm businesses still present challenges for full integration into the supply chain.

With the development of the poultry industry, it is expected that many local farmers will be directly or indirectly involved in the production chain, because this industry is able to provide incentives to farmers for poultry breeding, as well as for purchasing locally produced grain for feed processing, and it will also promote veterinary services (vaccines and medicines) that will provide specialized technical assistance and assurance of production purchases.

In addition, the promotion of a rural loan and credit facility is an important consideration for local farmers to get involved in the out-grower business of breeding chickens. Strategies for developing poultry farming are the following:

- Promote the establishment of new poultry farms;
- Promote an out-grower system for poultry farmers;
- Improve access to inputs and feed;
- Encourage local production of inputs and feed;
- Implement an affordable credit facility for out-growers;
- Promote integration of partnerships with poultry farming and processing companies;
- Establish and carry out a research and development program starting at the growth stage of the industry (2021-2025); and
- Build a poultry supply-chain in the mature stage of the industry's development (2025-2030).

(2) Other developments in the livestock sector

The potential of livestock development in the Study Area, other than in the poultry industry, is relatively low, as shown in Section 2.4.7. Goat and sheep breeding, which is more resistant to infection by protozoa than cattle and swine, is commonly practiced by small-scale family farmers, and the practice should be promoted for earning additional income. This is an effective approach to improve the quality of life of family farmers, especially those headed by women.

There are many factors impeding farmers to go into in livestock breeding. The following measures should be adopted by the Government to address these constraints before considering the introduction of cattle and swine breeding:

(i) Strengthen animal health control systems (veterinary and animal quarantines), especially to control of the tsetse fly and ASF;

(ii) Introduce breeding stock (male and female) to enlarge and diversify herds;
(iii) Establish a livestock technical extension services system;
(iv) Improve grazing areas through developing cultivated pastures;
(v) Introduce forage cropping with a preservation system to feed herds during the dry season;
(vi) Introduce slaughterhouses with conditions of bio-safety and health for certifying the quality of meat; and
(vii) Promote and improve market access for livestock products.

4.2 Improving the Technical Assistance Systems

4.2.1 Development Strategy

Agricultural technical assistance services should focus on family farmers since they are the main crop and livestock producers in the Study Area. However, the current inadequate agricultural technical assistance services are not able to provide assistance to the majority of subsistence family farmers to guide them in planning and attaining economically independent, practical farm management systems.

Technical assistance systems should encourage farmers to improve their farm management systems and their livelihoods, with an entrepreneurial spirit, to allow them to actively contribute to future agricultural development in the Study Area.

(1) Agricultural research and development

Strengthening of the agricultural sector research system is essential for agricultural development. With appropriate investments for research, it is possible to achieve considerable impacts on the development of the agricultural sector. Given the limited number of trained staff and the financial constraints of the current research system, it can be inferred that concentrating financial and human resources on core research themes is a viable option to restore the agricultural research system in the country. The following aspects are considered for the formulation of a strategy for research system improvements:

(i) Research themes and target crops should be prioritized based on the needs of farmers;
(ii) Ongoing technical cooperation projects under the auspices of the Triangular Cooperation Program between Mozambique, Brazil and Japan, i.e., the Project for ProSAVANA-PI, will play a major role; and
(iii) Synergies with the International Center for Agricultural Research (CGIAR), development partners, and the private sector will be promoted.

The priority crops mentioned in Section 3.6.1 were divided into three groups for formulating a strategy for agricultural research.

Group 1 (top priority crops): Maize and soybeans, including use of soybeans for food and

human nutrition improvements

Group 2 (secondary priority crops): Cassava, beans, groundnuts, potatoes, vegetables, cashews, sesame, and sunflowers

Group 3 (crops to be researched by private-sector companies): Cotton, tobacco, and tea

ProSAVANA has defined the following components as pillars for agricultural research, which are considered the basis for the formulation of the strategic direction of research and development:

- Empowerment of IIAM research centers (northeast and northwest);
- Evaluation of the natural resources and the environmental impact of the use of new agricultural technologies on the socioeconomic conditions of the Nacala Corridor;
- Development of soil improvement and conservation technologies for agricultural use;
- Development of appropriate cultivation and livestock technologies and practices, including appropriate use of chemical fertilizer and agro-chemicals;
- Development, validation, and application of new agricultural technology in the pilot units;
- Development of a technical package of conservation agriculture suitable for the natural and social characteristics of the Nacala Corridor; and
- Development of a technical package for increasing responsiveness to the effect of climate change, including research on varieties of food crops and production of early-maturing and drought-resistant crops as well as the production and exploitation of wild crops.

The following urgent measures to building capacity for research and development should be considered:

- Recruit competent staff for the IIAM, based on research priorities; and
- Establish an incentive system for IIAM staff.

At the moment, in ProSAVANA-PI, research and fieldwork has been carried out jointly with a university at IIAM, and results of the research are shared with universities in the Agricultural Researchers Meeting (ARM). Collaboration of those universities with the agricultural research and extension system is expected to be expanded and deepened in the following fields:

- Setting up a researchers' network for soil and plant analysis;
- Sharing results of analysis to set a standard of soil analysis; and
- Providing training sessions for utilization of soil analysis results.

(2) Agricultural extension

The conditions of the present agricultural extension system in the Study Area are quite similar to those found in agricultural research and development. It is essential to prioritize an increase in the number of skilled staff and financial resources for public extension services. The approach to extension should follow the same as the one proposed for agricultural research: concentrating resources on core themes to efficiently support the farming community. The

following aspects were considered for the formulation of the strategies for improving extension services:

(i) Objectives of themes and selection of crops for the extension services should be prioritized based on the need of farmers;
(ii) Extension activities should initially focus on farmers with technical capacity and emerging producers;
(iii) The PRONEA plays a vital role in strengthening extension services;
(iv) Promoting integration between agricultural research and extension is essential; and
(v) Promoting synergies with the private sector and NGOs is essential.

The Government will pay close attention to addressing the issue of staff shortages and insufficient financial resources for the agricultural extension system, particularly for institutional capacity building at the DPASA and SDAEs. At the same time, the use of human resources from the private sector should be encouraged to complement the public extension system.

Because of the limited capacity of the extension services in the public and private sectors and of NGOs, only about 10 to 15% of rural households are covered by these services. The good news is that the number of staff providing extension services within the public and private sectors and NGOs is increasing. However, a mechanism to promote and advance the dissemination of improved agricultural techniques among farmers is needed. Approaches, such as the FFS, targeting rural communities, or the promotion of leading or core farmers who act as a reference for their communities, are highly effective in generating capacity among farmers.

Moreover, the Government will make efforts to address issues that are not covered by PRONEA, responsible for only 11 of the 19 districts in the Study Area, namely: Monapo, Meconta, Nampula, Ribáuè, Alto Molócuè, Gurué, Cuamba, Mecanhelas, Mandimba, and N'Gauma. Measures to complement and to maximize the impact of PRONEA are set out below.

(i) PRONEA to continue in the 11 districts;
(ii) Follow-up programs to be implemented after completion of PRONEA in the remaining eight districts;
(iii) Restart the agricultural extension program on radio or TV with the participation of farmers;
(iv) Implementation and operation of a permanent system of training and updating for extension services;
(v) Establish and operate a training system for the promotion of selected leading producers to play a lead role in developing the agricultural sector;
(vi) Demonstrate appropriate agricultural technologies and agricultural management systems successfully implemented by well-trained farmers at the field level;
(vii) Promote qualified agricultural service providers, so they can provide simple technical advice to producers;

(viii) Promote the voluntary creation of producer organizations through extension activities within the community; and

(ix) Establish coordination and management mechanisms for extension services by public and private entities and NGOs by the DPASA, with a view to efficiently making use of existing human resources.

For the first several years, the extension services, in close collaboration with the IIAM, will mainly focus on issues related to increasing maize production and stabilizing its production system, including inter-cropping and crop rotation with other crops. The services directed at other crops will only be undertaken after achieving a significant increase in maize productivity.

4.2.2 Necessary Measures

To ensure a steady and uninterrupted implementation of the above strategies, the following measures required for improving the technical assistance system will be taken:

Agricultural research:

(i) Strengthening agricultural research to develop and transfer appropriate agricultural technology to farmers in the Nacala Corridor

Agricultural extension:

(i) Strengthening agricultural extension services to promote the transformation of extensive farming into improved and market-oriented farming in the Nacala Corridor;

(ii) Establishing a development model for leading farmers who will disseminate new cultivation technologies and participate in work implemented by farmers' associations;

(iii) Establishing a training center to develop qualified human resources to play the leading role in the agricultural development in communities as extension workers, leading farmers, women farmers, youth farmers and agricultural service providers. Qualified agricultural service providers are expected to provide agricultural consultation services on farming technologies and practices to farmers as a supplementary service of their businesses; and

(iv) Supporting and training family households headed by women through measures to strengthen the development of organizations, disseminate guidelines on agricultural practices and training, achieve more efficient production, promote income generation, and improve the quality of life.

4.2.3 Components of the Agricultural Development Master Plan

The following measures to improving the technical assistance system should be taken to assure a steady and uninterrupted implementation of the above set-out strategies:

I-1: Strengthening of Agricultural Research

Objectives	To enhance the research capacity of the IIAM, as well as to improve conditions towards technology development for agriculture
Goals	Develop appropriate agricultural technology and transfer it to the Nacala Corridor Area.
Expected Outputs	1. IIAM branch stations in the Nacala Corridor are rehabilitated and equipped with necessary facilities and equipment. 2. IIAM researchers and research assistants are trained on research support activities. 3. Research programs are expanded to include strategic themes for agricultural development in the Nacala Corridor Area.
Main Activities	1. Infrastructure rehabilitation of IIAM branch stations: - Providing basic infrastructure and equipment such as electricity, water supply, offices, and warehouses - Providing specialized infrastructure and equipment for specific crops and livestock of each region 2. Training of IIAM staff on research support activities: - Training on operation and maintenance of machinery and equipment - Training on maintenance of experimental fields, crops, and livestock - Financial support for contract-employed skilled operators 3. Expansion of research programs on strategic themes for agricultural development in the Nacala Corridor: - Develop and implement a research program about the utilization of farm inputs for improved farming - Develop and implement a research program about the introduction and adaptation of traditional and non-traditional crops
Implementation Period	ProSAVANA-PI: until 2016 Infrastructure rehabilitation and training: 2017-2018 Expansion of research programs: 2019-2030 2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 ‘29 2030 ⟷ ■ ■ ▨ ▨ ▨ ▨ ▨ ▨ ▨ ▨ ▨ ▨ ▨ ▨
Priority Areas (candidates)	All zones. Coverage of IIAM of Northeast Zonal Centers at Nampula, Mapupulo, Namapa, Nacaca, Namialo, Nassuruma, Nametil, and Ribaue. Coverage of IIAM Northwest Zonal Centers at Lichinga, Mutuali, Gurue, Mutequelesse, and Matama.

Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	IIAM staff at CZnd and CZno: approximately 85 researchers and 200 field operators (permanent or short-term)	Extension workers of public, private, and NGO sectors in the whole area: approximately 1,200	-

Implementing Agencies and Related Organizations	IIAM (Northeast and Northwest Zonal Centers), INCAJU, and IAM

I-2: Strengthening of Agricultural Extension Services

Objectives	To enhance production, productivity, and market access of family farmers in the eight districts not covered by PRONEA
Goals	Strengthen agricultural extension services to expand improved and market-oriented farming, as well as strengthen self-reliance of vulnerable farmers
Expected Outputs	1. Allocation of qualified extension workers in all target districts in the operation area 2. Development of capacity of extension workers and farmers
Main Activities	1. Empowerment of extension workers in the public sector, NGOs, and private sector through training and workshops including supply of equipment necessary for the services: (1) Public sector reorientation and support (2) NGO/Private sector promotion and support in extension activities 2. Empowerment of individual farmers and farmers' organizations through training and workshops: (1) Grouping and empowerment of farmers' organizations (2) Farm enterprise development (3) Special attention to vulnerable farmers and matriarch farmers 3. Improve extension services in order to disseminate farming practices to increase and diversify agricultural production with improved farming at the provincial and district/local level by extension workers from the public and private sectors and NGOs: (1) Provincial-level service provision (2) District/local-level service provision 4. Restarting of agricultural extension programs on radio and TV (1) Provision of farming technology (2) Provision of farm management know-how and marketing information

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	PRONEA														

Priority Areas (candidates)	All eight districts that are not covered by PRONEA, i.e., Mecuburi, Muecate, Mogovolas, Murrupula, Lalaua, Majune, Lichinga, and Sanga		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	*In eight districts, not covered by PRONEA 32 extension workers (public) and 80 extension workers (Private/NGO), Approximately 400 farmers	Approx. 56,000 farmers (through extension workers) Approx. 140,000 farmers (through broadcasting, about 20% of total farmers)	-
Implementing Agencies and Related Organizations	MASA/ National Directorate of Agrarian Extension (DNEA), Provincial Agricultural Extension Service (SPER), SDAE, NGOs, and private companies who provide technical assistance to farmers		

I-3: Agricultural Training Center

Objectives	To promote agricultural development in the operations area through the capacity development project
Goals	Foster development of human resources, which are to play a leading role in agricultural development in the Study Area.
Expected Outputs	1. The number of qualified farmers dedicated to agricultural and rural development is increased in the operations area. 2. The number of qualified public extension workers dedicated to agricultural and rural development is increased in the operations area
Main Activities	1. Preparatory work: (1) Identifying construction sites for training-centers

<table>
<tr><td></td><td>(2) Making preparations for training
(3) Constructing buildings, including dormitories
(4) Procuring equipment
2. Training of lead farmers and public sector agricultural extension workers:
(1) Training capable young people (high school graduates) who have a strong will to bear the responsibilities for the development of regional agriculture
(2) Training lead farmers focusing on management, group organizing, and other subjects related to developing skills
(3) Providing the following options as incentives to qualified trainees after their two-year training:
1) About five ha DUAT and soft loans to cover initial capital costs to start farming
2) Employment as a public extension worker for the intended SDAE
(4) Training newly recruited public sector extension workers (six months training at the time of recruitment, except for graduates of the academy)
(5) Providing refresher-training for veteran public sector extension workers (one month training after every five years of the career of the workers)
3. Other supplementary training:
(1) Community leader training (ad hoc training sessions based on requests from extension providers)
(2) Gender awareness training (ad hoc training sessions based on requests from extension providers)
(3) Agricultural service provider training (two weeks of training, once a year)
(4) Other training sessions based on specific requests
4. Training for community youth groups:
(1) Training of potential leaders for community youth groups
(2) Training for organizing young people into groups and group management
(3) Training for group activities such as marketing of farm produce and other economic activities
(4) Providing support for groups of farmers entering into economic activities, especially in coordinating support activities provided by the Master Plan such as technical extension, business support, credit, etc.
5. Trainers:
(1) Full-time instructors
(2) Invited specialists and lecturers
(3) Professors and instructors from agricultural universities, IIAM researchers, senior staff of DPASA, NGOs, and from the private sector</td></tr>
<tr><td>Implementation Period</td><td>2016 | ‘17 | ‘18 | ‘19 | ‘20 | ‘21 | ‘22 | ‘23 | ‘24 | ‘25 | ‘26 | ‘27 | ‘28 | ‘29 | 2030</td></tr>
<tr><td>Priority Areas (candidates)</td><td>All 19 districts (candidate location for the Academy: Cuamba)</td></tr>
<tr><td>Expected Beneficiaries</td><td>Direct Beneficiaries
• Selected personnel: 350 (25 persons/ year)
• Community leaders: 700 (50 persons/year)
• Female leaders: 700 (50 persons/year)
• Agricultural service providers: 700 (50 persons/year)
• Community youth groups: 700 (50 persons/year).

Indirect Beneficiaries
• Approx. 17,500 farmers (trained by extension staff)
• Approx. 28,000 farmers (by other trained persons)

Others</td></tr>
<tr><td>Implementing Agencies and Related Organizations</td><td>MASA; DPASA in Nampula, Niassa, and Zambezia; SDAE in 19 districts, IIAM (North East Center & North West Center), INCAJU, Youth Associations</td></tr>
</table>

I-4: Model for the Development of Lead-Farmers in the Communities

Objectives	To establish a model to develop lead farmers (core farmers) who will disseminate improved farming practices as well as the effects of improved cultivation technologies, and motivate family farmers to adopt these improved technologies and practices
Goals	The community lead farmers will be trained through the implementation of several practical methods for improved farming and modern farm management. Neighboring family farmers are organized into farmers' organizations. Production increases and income generation for family farmers are achieved.
Expected Outputs	1. Lead farmers are identified and selected in communities 2. Individual DUATs are registered in pilot communities 3. A farming program aiming to increase farmers' income will be prepared by the lead farmers and announced in the communities 4. Lead farmers will attain increased capacity for farming 5. Family farmers living near the lead farmers are organized into groups or associations to collectively identify business partners 6. Capacity of extension workers in the SDAE has been developed
Main Activities	<u>Preparatory Work:</u> 1. Preparation of the project design and formulation of its implementation structure 2. Providing the means of transportation for extension workers in SDAE for supervision of the farmers 3. Selecting pilot communities based on voluntary initiatives in a transparent process: 1) Publicizing pilot projects, and explanation of the aims and objectives to representatives of communities 2) Selection of pilot communities and farmers to take part in the project 3) Selection of capable young farmers as reference groups to participate in the project 4. To survey all farmlands of individual farmers in the pilot communities and register their DUATs. <u>Training of lead farmers and communities:</u> 5. Preparing farming programs for lead farmers in consultation with extension workers: 1) Studying present farming methods of each farmer to identify details of their crops, varieties, management practices, marketing methods, household incomes, etc. 2) Preparing draft farming programs, aiming at income generation based on improved cultivation, including farm management, marketing, and financial management 3) Making public announcements of the farming program in the communities 6. Supporting farming activities of the lead farmers: 1) Supporting the procurement of necessary inputs by introducing reliable input dealers and stores, and an available loan scheme, if necessary 2) Providing improved technical suggestions and training to lead-farmers based on their farming plans 3) Supporting the establishment of contacts between farmers and their markets, according to the marketing plan 4) Monitoring lead farmers' activities throughout the farming period (to be evaluated by the farmers themselves), and evaluating the project after sales of the major crops. The following year's program is to be prepared based on the evaluation. 7. Provide training to promote organizing associations and joint activities among farmers: 1) Providing training and technical assistance to lead-farmers for group activities and marketing 2) Supporting expansion activities, such as formulating legal farmers' associations and matching them with private sector companies, who are seeking good partners 8. Capacity development of SDAE and its extension workers: 1) Sharing knowledge and experience of the project with local government staff, such as extension workers and SDAE 2) Formulating a development model for small-scale farmers based on the lessons learned in the final stage of the pilot project, including the compilation of a project operation

	manual for extension workers and SDAE staff														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■	■	■								
Priority Areas (candidates)	The districts of Monapo, Rapale (Nampula), Meconta, Mogovolas, Mutuali (Malema), Alto Molocue, Gurue, Cuamba, and Lichinga are highly populated areas that urgently require transition to improved, intensive cultivation.														
Expected Beneficiaries	Direct Beneficiaries							Indirect Beneficiaries						Others	
	76 lead farmers Approx. 4,000 farmers (community members)							Approx. 7,600 farmers (in 19 districts)						-	
Implementing Agencies and Related Organizations	Extension services from MASA, IIAM, SDAEs, and NGOs														

I-5: Development of Agriculture based on Respect for Gender Equality

Objectives	Improving household economies: the livelihoods of farm households will be supported by organizing female and young farmers and by providing training on cultivation techniques and practices.														
Goals	Support will be provided to improve the economies of farm households of groups who are in socially vulnerable positions and to ensure that health and nutrition services will be provided.														
Expected Outputs	1. Gender equality problems in agriculture will be clarified. 2. Groups and associations of female and young farmers are autonomously managed in an appropriate manner.														
Main Activities	1. Conduct a baseline study on gender equality problems in agriculture and preparing an activity plan 2. Train women and youth organizations in new farming technologies and practices 3. Provide required inputs for agricultural production 4. Provide training on issues relating to improvement of livelihoods of women and youths (childcare, food nutrition, health and sanitation, and literacy) 5. Support the operations of female and youth farmers' groups and associations														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Priority Areas (candidates)	All 19 districts														
Expected Beneficiaries	Direct Beneficiaries							Indirect Beneficiaries						Others	
	Female farmers (Approx. 9,500: 20 farmers x 25 groups x 19 districts).							Family members of the female farmers							
Implementing Agencies and Related Organizations	DNEA, DPASA, SDAE, Ministry of Gender, Children and Social Welfare (MGCAS), Organization of Mozambican Women (OMM), and NGOs														

4.3 Improving Access to Agricultural Inputs

4.3.1 Development Strategy

Currently, most farmers practice extensive farming with low use of agricultural inputs. One of the main reasons for this low use of inputs is low productivity. While the low use is due to poor accessibility, many input-suppliers affirm that low demand from farmers is the most critical problem for their businesses.

Nevertheless, problems related to the supply of agricultural inputs are complex, as shown in Figure 4.3.1 Problems Related to Accessibility of Agricultural Inputs. There are reciprocal causes and effects (a vicious circle) on both the demand and supply side. Figure 4.3.1 shows that "low demand" and "high costs" are the major targets to be addressed, and a strategy to improve accessibility to agricultural inputs should consider a comprehensive approach to the problems on both sides of the equation.

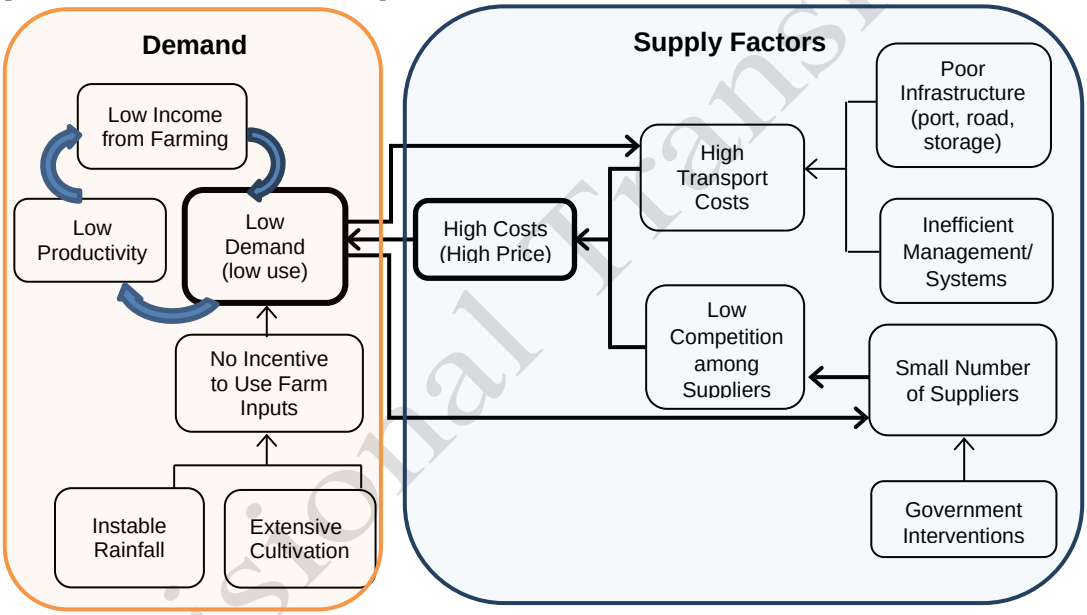


Figure 4.3.1 Problems Related to Accessibility of Agricultural Inputs

Providing farming inputs or business management in the supply chain is not the primary role of government. The following measures will be taken to improve producers' accessibility to agricultural inputs (in particular, items 1) to 3) are the priority measures to be adopted by the Government):

1) Reviewing the government's intervention policies in supply chains, including direct distribution of inputs to farmers;
2) Reviewing tax systems and administrative formalities for supply-chain control from the point of view of promoting the private sector;
3) Implementing a subsidized public-financing system targeting small- and medium-scale agricultural service providers at provincial and district levels;
4) Developing and rehabilitating road networks and major ports;

5) Transforming extensive farming to improved cultivation;
6) Establishing a subsidy system for fertilizer for a defined period; and
7) Establishing a subsidy system for tractor hiring services to promote the private sector to enter this business, and further promoting the expansion of the machinery/equipment center concept implemented by MASA.

4.3.2 Necessary Measures

In order to ensure the steady implementation of the strategies outlined above, the following measures to improve access to agricultural inputs will be adopted:

(i) Improving accessibility of farmers to fertilizer, by introducing a subsidy system;

(ii) Improving access to quality seed at affordable prices at the district level by increasing qualified seed growers and the production of certified seed of major crops;

(iii) Increasing the number of agricultural mechanization service providers to create an enabling environment for farmers to use mechanized services at affordable costs; and

(iv) From the viewpoint of gender equality, training women in new farming technologies and practices with consideration of their high illiteracy rate.

4.3.3 Components of the Agricultural Development Master Plan

To ensure steady implementation of the strategies set out above, the following measures to improve access to agriculture inputs will be implemented. The necessary measure (iv) is included in the components of Development of Agriculture based on Respect for Gender Equality (I-5) as described in section 4.2.3:

I-6: Improvement of Accessibility to Fertilizer

Objectives	To improve agricultural productivity through better access of inputs for farmers in general
Goals	To improve access to chemical fertilizer for farmers in general
Expected Outputs	1. Price of chemical fertilizer decreases to an economically feasible level for major crops, especially for maize 2. Farmers' demand for chemical fertilizer is actively promoted
Main Activities	1. Prepare and implement a subsidy system for agro-chemicals for MASA 2. Grant a subsidy to fertilizer traders to cover 50% of the FOB price of imported chemical fertilizer for five years. The rate of the subsidy shall be gradually reduced by 10% per year (the upper limit of the FOB price shall be set and periodically reviewed based on the international market price) 3. Formulate a fertilizer subsidy scheme for MASA 4. Allocate a budget of US$10 million for the subsidy every year (this amount shall be gradually reduced by 20% per year from the 6th year to the end of the period) 5. Prepare legal and financial arrangements for the implementation by MASA 6. Subsidy should be granted only for urea and NPK (12-24-12), which are relatively popular among general farmers for use on major crops. Re-export of subsidized fertilizers must be prohibited, even after blending by traders/blending companies. MASA should introduce a registration system for private fertilizer traders. 7. Implement the fertilizer subsidy scheme, so that only registered traders can be granted the subsidy. However, corporate farms that produce crops by themselves or by out-growers, such

	as tobacco, sugarcane, cotton, bananas, rice, etc., or their affiliated companies will not be allowed to be registered as traders. 8. Establish an independent monitoring system by the Government

Implementation period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030

Priority Areas (candidates)	The entire country		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	All farmers in the intervention area (approx. 4 million in 2030)	Generally farmers and inhabitants of Mozambique	
Implementing Agencies and Related Organizations	MASA and Ministry of Industry and Commerce (MIC)		

I-7: Promotion of the Production of Quality Seed at the Regional Level

Objectives	To improve agricultural productivity through improved farming technology and practices
Goals	To improve agricultural productivity through enhancing farmer access to quality/certified seed at the district level
Expected Outputs	1. The number of qualified seed growers in the area of operation will increase. 2. Production of quality seed of major crops will increase in the area of operation.
Main Activities	1. Formulate an implementation plan for DPASAs 2. Train the technical staff of seed companies and agricultural extension workers on the production of quality seed (IIAM). While target crops in the initial stage shall be maize and beans/pulses, other crops, such as potatoes and vegetables, shall also be covered, but not until the mid-stage of the plan. 3. Give priority for receiving breeder seeds to the seed companies who send staff for training at IIAM 4. Introduction by SDAE/DPASA of qualified farmer' groups to seed companies 5. Introduce an appropriate financial system to seed companies

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030

Priority Areas (candidates)	All 19 districts		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	Seed companies and their technical staff, agricultural extension workers, qualified farmer' groups as candidates to become out-growers	General farmers in the intervention area	
Implementing Agencies and Related Organizations	IIAM (North East Center & North West Center), SDAE in 19 districts, DPASA in Nampula, Niassa, and Zambezia.		

I-8: Promotion of Agricultural Machinery Service Centers

Objectives	Improve agricultural productivity through improved farming technology														
Goals	To increase the number of agricultural mechanization service providers to create an environment in which farmers can use mechanization services at an affordable cost														
Expected Outputs	1. The retail price of tractors is reduced 2. Tractors can be purchased under favorable conditions 3. Potential farmers or mechanization service providers can obtain necessary information on agricultural mechanization services through extension workers or tractor dealers 4. The number of qualified tractor operators is increased														
Main Activities	1. Formulate an implementation plan, including measures to reduce the price of tractors by MASA through, for example the revision of tariffs and VAT, simplifying import procedures, etc. 2. Establish incentives for potential farmers/entrepreneurs for purchasing tractors from MASA, such as preferential credit (a tie-in with the Development Initiative Fund can be considered) 3. Train extension workers in income/expenditure and maintenance fees which they can introduce as a business model for agricultural mechanization and services to potential farmers and entrepreneurs. Extension workers will also introduce potential clients to mechanization service providers. 4. Provide short-term training to tractor operators who provide mechanization services by the Government (DPASA/SDAEs) in cooperation with private tractor dealers														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
					■	■	■	■	■	■					
Priority Areas (candidate)	All 19 districts.														
Expected Beneficiaries	Direct Beneficiaries							Indirect Beneficiaries			Others				
	Farmers and entrepreneurs for the purchasing of tractors, extension workers, and tractor operators							General farmers in the intervention area							
Implementing Agencies and Related Organizations	MASA, DPASAs, and SDAEs														

4.4 Improving Access to Agricultural Financing and Credit

4.4.1 Development Strategy

(1) Establishment of a platform to formulate a comprehensive agricultural financing system in the Nacala Corridor

Over the past years, the Government has applied different financial mechanisms to promote agricultural loans. Unfortunately, outcomes have not always been favorable. Credit services are available to less than 1.2% of farmers (1.2% in Nampula Province, 0.4% in Zambezia Province and 0.7% in Niassa Province. 2010 INE). Financial institutions have limited outreach in rural areas and require high interest and collateral, discouraging family farmers to use credit.

Promoting access to credit, the following measures should be taken:

(i) Develop a long-term strategy to promote agricultural financing and credit for different types of agriculture and agribusinesses, with loan conditions adapted to agricultural production cycles, the scale of businesses, and the ability of borrowers (financially and operationally in relation to agricultural production);
(ii) Based on this strategy, introduce accessible and affordable loan schemes to all types of producers and agribusinesses;
(iii) Establish unified dissemination of information channels and platforms for applicable financing schemes, which allow proper distribution of financial resources to the agriculture sector; and
(iv) Support local financial institutions to strengthen their operational capacity to expand the volume of agricultural loans, especially to individual family farmers and small- and medium-size agribusinesses.

(2) Introduction of accessible and affordable financing mechanisms for individual farmers and entrepreneurs

1) Agricultural financing and credit for individual farmers

As a starting point for promoting agricultural credit for individual farmers, it is necessary to introduce short-term, soft-loan schemes with terms adapted to agricultural production cycles. Such schemes will be introduced by the Government with its own funds or by financial contributions from development partners for the provision of subsidized credit lines to commercial banks or micro-finance institutions, which will manage the loans. It is important to note that private financial institutions should be involved in the operation of agricultural credit on behalf of the Government to ensure transparency in the screening of loan applications and proposals and efficiency in the fund's operations. Soft loans will also be promoted for the start-up of small-scale agribusiness-activities by individual farmers.

2) Agricultural financing and credit to farmers' organizations (cooperatives and associations)

The DIF was launched in September 2012, with the objective of involving family farmers into the commercial agriculture value chain.

The DIF originally planned to offer loans with low interest rates (5%–10% per annum) to local agribusiness companies and farmers' organizations (associations and cooperatives). However, based on the results of the first round of proposals for the DIF in October 2012, farmers' organizations were not given the opportunity to use such loans because of their lack of capacity in developing business proposals and providing the proper collateral required by the DIF.

Nonetheless, a mechanism should be set up under the DIF, to allow farmers' associations and cooperatives to access loans with reasonable conditions in order to introduce improved production and agriculture processing systems, and to purchase produce. The provision of

proper technical assistance in production and marketing should be a prerequisite for providing loans to farmers' organizations to avoid the risk of default.

In order to introduce a separate budget line for loans to farmers' organizations, the DIF capital will be increased by the MASA or through assistance from partners of the Government.

4.4.2 Necessary Measures

To ensure unimpeded implementation of the above strategies, measures for improving access to agricultural financing and credit will be taken such as instituting credit and financial support systems for small and medium scale service providers, farmers' organizations (cooperatives and associations), and individual family farmers.

4.4.3 Components of the Agricultural Development Master Plan

To ensure stable and sustainable implementation of the above strategies, the following components of the Agricultural Master Plan are set out in I-9 below.

I-9: Establishment of Financial Support Systems for Small- and Medium-Size Agribusiness Enterprises, Farmers' Organizations, and Individual Farmers

Objectives	- To formalize the DIF mechanism for small to medium-sized local agribusiness enterprises to promote agribusiness investments involving family farmers - To establish an affordable financial mechanism for farmers' organizations that allows them to invest in improving their production system - To establish an affordable and accessible finance mechanism for individual farmers that allows them to invest in agricultural inputs and services to allow them to improve their production system														
Goals	- Agribusiness initiatives and investments with involvement of groups of family farmers in commercial production are expanded by the efforts of private sector agribusiness enterprises - Capacity of farmers' organizations to improve agricultural productivity and marketing is strengthened through access to affordable finance and credit systems - Agricultural productivity and household incomes of individual farmers is improved through the introduction of agricultural inputs and technical services, which will result in the promotion of the improved intensive-cultivation systems														
Expected Outputs	1. DIF is transformed into a formal financial system for agricultural development in the Nacala Corridor 2. A modality to support farmers' organizations is established and made operational under DIF 3. A financial mechanism (soft loan scheme and micro-financing) to support individual farmers is established and made operational														
Main Activities	1. Establish the structure of a financial support system (accessible agricultural loans) for agricultural development in the Nacala Corridor 2. Mobilize potential financial institutions that will operate agricultural loans 3. Develop criteria and conditions for agricultural loans for specific private sector agribusiness enterprises, farmers' organizations, and individual farmers (e.g., criteria for loan applications, maximum amount of loans, interest rates, and conditions for the provision of collateral) 4. Start agricultural loan operations 5. Conduct regular monitoring and evaluation (M&E) of the fund's operations														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Priority Areas	All 19 districts. Further discussions should be held with the concerned government authorities														

(candidates)	regarding the coverage area (whether the coverage could be extended to other districts along the Nacala Corridor) and the source and amount of funds available for the loan.		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	Financial institutions that administer the agricultural loans, private sector agribusinesses, farmers' organizations, and individual family farmers who will benefit from agricultural loans	General farmers to participate in out-grower schemes of private sector agribusinesses, or farmers' organizations that benefit from the agricultural loans	
Implementing Agencies and Related Organizations	MASA, DPASA in Nampula, Niassa, and Zambezia, private financial institutions, the D IF Operation Unit, ABC, JICA, and other donors.		
Cost	Although the original fund/capital is expected to be provided by the Government budget or donors, operational costs of the financial support schemes will be covered by the interest revenues generated from end users.		

4.5 Irrigation Development

4.5.1 Development Strategy

In this section the basic strategy for irrigation development is described. Irrigation development by zones is summarized as follows:

Zones	Characteristics and Direction for Irrigation Development
I and II	Zones I and II have good access to the major vegetable markets, including urban areas such as the city of Nampula and the special economic zone (SEZ) of Nacala. It is therefore expected that the area will be developed, emphasizing the promotion of irrigated vegetable cultivation through rehabilitation of existing irrigation systems and the promotion of small-pump irrigation.
III	Zone III has a large potential for irrigation development by utilizing existing irrigation systems, which, however, need to be rehabilitated and improved. With irrigated farming of vegetables, such as onions and garlic, being widely produced, this zone is considered to be an advanced area of irrigated vegetable production. The development of irrigation in this Zone is expected through the expansion of irrigated areas by rehabilitating and improving existing irrigation systems and by developing new small-pump and gravity irrigation systems using the abundant water from rivers and springs.
IV	Zone IV is a mountainous area that has low potential for irrigation development. Although the potential areas are limited, there are possibilities for introducing small-scale irrigation for vegetables using pumps or spring water at the bottom of the valleys.
V	Zone V has good access to Cuamba, and is expected to be a strategic assembly point for agricultural produce in the future. To utilize this advantage, the Zone is expected to produce various food and cash crops under irrigation. Since the development potential of existing irrigation schemes is low, irrigation will be promoted by developing small-scale pumped irrigation systems, taking water from sources such as the Lurio River and its major tributaries, and spring water from the mountains. With its potential access to markets in Malawi, Mandimba has a high potential for vegetable production using these small-scale pumped irrigation systems.
VI	In Zone VI, irrigated cultivation of potatoes, haricot beans and other vegetables will be promoted, taking advantage of the cool climate and relatively abundant water resources. The rehabilitation of existing irrigation systems in Lichinga (Lichinga Sede and Chimbonila) will be given priority, while the development of new irrigation systems will be promoted in Majune.

(1) Rehabilitation of existing irrigation systems

Regarding the full use of the regional potential of irrigation development, priority is given to the recovery of function and use of existing irrigation systems. The table below summarizes the number of existing irrigation systems, which are considered as potential for irrigation development.

Table 4.5.1 Number, Coverage Area, and Actual Areas in Operation of Existing Irrigation Systems

Items	Zone I		Zone II	Zone III	Zone IV	Zone V	Zone VI
Class[1)]	A and B	C	A and B	A and B	A and B	A and B	A and B
Number of Systems	18	1	33	29	0	17	20
Coverage Area (ha)	963	2,000	1,400	1,848	0	335	602
In operation (ha)	160	1,300	267	732	0	172	469

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

In some irrigation systems, both irrigation plots and rain-fed plots exist within the original command area as a result of non-functioning or abandonment of the canal network. Rearranging the irrigation plots and separating them from rain-fed fields through land consolidation, will result in the creation of an enabling environment for appropriate irrigated land management, and for effective and efficient use of water. Through effective use of land and water, the actual irrigated area can be expanded.

At present, the inventory of irrigation systems is maintained by the DPASAs. However, the information collected is neither sufficient nor kept up-to-date. It is necessary to improve the contents of the inventory and create a database to adequately manage the information, allowing better planning of development and management of the irrigation systems.

(2) Improving technical capacity for construction, operation, and management of hydraulic structures

To maintain sustainable operation of irrigation facilities in the long term, it is essential to improve the skills and technology at each level of governmental organizations, local construction companies, local communities and farmers.

The DPASAs, in collaboration with SDAEs, are in charge of (i) management of irrigation structures and facilities, (ii) project planning, design and investigation, and construction supervision, and (iii) guidance to farmers. For the efficient execution of its duties, it is necessary to increase the number of its personnel, as well as the qualification of the irrigation section staff to cope with increasing management tasks for irrigation projects. In addition, support for the national-level administration should be strengthened through the development of technical guidelines and standard designs for hydraulic structures, and enhancing of technical guidance and advice.

To increase the quality of construction of hydraulic structures in irrigation systems and in rivers, procurement procedures will be improved by introducing a qualification system for the

construction of hydraulic structures, improvement of standard designs, and strengthening of technical guidance and supervision of local construction companies by the Government. Community and water users, i.e., farmers' groups or associations, should carry out regular maintenance, simple repairs, and small-scale construction of irrigation facilities. It is necessary to improve the skills and technical capacity of communities and water users through effective organization, training, and guidance of DPASAs and extension workers.

(3) Sustainable use of irrigation facilities through strengthening of farmers' organizations and associations and the formulation of water users' associations

Operation and maintenance of irrigation systems should be independently carried out by the members of the water users' groups through the collection of water user fees, participation in maintenance work, and by providing construction material for repairs. For this purpose, the following activities are promoted in the Master Plan:

- Organizing farmers' groups into associations to operate the irrigation systems;
- Promoting the establishment of farmers' associations which function as water user groups;
- Merging multiple farmers' associations or forming water users' associations consisting of multiple farmers' associations to improve operation and maintenance of medium-scale irrigation systems used by these associations and/or groups;
- Improving the technical capacity of farmers' associations and water users' associations for irrigation systems operation and maintenance;
- Enhancing the capacity for organizational management for collection of water user fees and participatory operation and maintenance; and
- Increasing the efficiency of water use though improving water management in field and canal systems.

(4) Promotion of small irrigation systems using pumps

Irrigation of vegetable production by family farmers will be promoted by introducing the use of small pumps and providing technical guidance on irrigation practices, so that these farmers can increase their production, productivity, and therefore, income. Individual farmers will mainly own small pumps, but sharing their use or rental by owners should also be considered. Efficiency of the pumps can be further increased by installing water storage tanks or farm ponds.

For development of vegetable production with irrigation, the following measures to support family farmers should be promoted by the public administration:

- Financial support to family farmers to procure pump equipment and fuel;
- Technical guidance on the effective and efficient use of water and farming practices for growing vegetables;
- Stable supply of vegetable seeds at reasonable price; and

- Support of family farmers in creating irrigation associations and developing marketing channels by promoting connecting to large-volume buyers for contract sales, etc.

Furthermore, irrigated vegetable production by groups of family farmers is considered an activity with a high economic potential for women. Improvement of women's economic positions in their communities by supporting the organization of groups and providing technical extension services for small-scale vegetable production is expected.

(5) Development of new small-scale irrigation systems

High priority will be given to the expansion of the irrigated area by rehabilitating existing irrigation systems and to the development of new small-scale irrigation schemes at sites with favorable conditions. While it is not realistic to expect large-scale irrigation development requiring a large investment, small-scale systems can be developed through the initiative of local lead farmers or farmers' associations by using spring water or water pumped from rivers to irrigation canals or into storage tanks. Such activities can contribute significantly to promoting the roles, functions, and activities of community lead farmers.

4.5.2 Necessary Measures

To ensure sustained implementation of the above strategies, the following measures for irrigation development will be adopted:

(i) Increasing and diversifying agricultural production by promoting irrigated crop production through rehabilitation of existing irrigation systems;
(ii) Improving capacities of stakeholders with regards to irrigation technology. In detail, this involves developing farmers' skills and technologies for irrigated farming and water management and improving the quality of construction work and maintenance of irrigation facilities; and
(iii) Promoting vegetable production for family farmers using small pumps and simple irrigation systems, aiming to increase their income.

4.5.3 Components of the Agricultural Development Master Plan

To ensure sustained implementation of the above strategies, the following measures for the rehabilitation and construction of irrigation systems will be adopted:

I-10: Rehabilitation and Construction of Irrigation Systems

Objectives	To increase the actual irrigated area and agricultural production through rehabilitation and construction of existing irrigation systems
Goals	Malfunctioning and damaged irrigation systems will be made functional and the systems will again be used appropriately, effectively, and efficiently. Good practices for construction of irrigation facilities, management of irrigation systems, irrigation technology and practices in the field, and farm management of irrigated cultivation will be demonstrated in pilot areas.

<table>
<tr><td>Expected Outputs</td><td>1: Existing irrigation systems are rehabilitated and their functionality is recovered
2: Pilot irrigation areas are established and utilized for technical extension of irrigation development
3: Organizational activities by irrigation water users, such as management of irrigation systems, water fees, and contributions of labor and building material by members for operation and maintenance work are enhanced
4: Members of the water users' organizations, through using their newly improved skills and technologies, carry out appropriate operation and maintenance of irrigation systems.</td></tr>
<tr><td>Main Activities</td><td>1: Rehabilitation of irrigation systems:
1-1: Survey of irrigation development potential, improving inventory of irrigation systems and building and maintaining an improved database
1-2: Formulating rehabilitation and development plans for irrigation systems
1-3: Implementation of rehabilitation works for the irrigation systems, reconstruction of canal networks, and rearrangement of irrigated lands through land consolidation.
2: Establishing pilot areas for irrigation development:
2-1: Selection of pilot areas for irrigation development
2-2: Establishing pilot areas for irrigation development
2-3: Preferential implementation of rehabilitation/construction work, improving water users' capacities for operation and maintenance, improving irrigation technology and practices of farmers
2-4: Utilizing pilot areas for extension activities through good practice demonstration of irrigation development
3: Enhancement of water users' organizations:
3-1: Organizing water users' groups into legal farmers' associations in order to strengthen their financial status
3-2: Organizing irrigation water users' federations where one system covers multiple water user associations
3-3: Enhancing the activities of the associations, including collection of water/membership fees, control of accounts, and arranging members' participation in operation and maintenance work
3-4: Training of farmers' groups in construction and repair of simple structures
3-5: Enhancing technical guidance and inspection capacity for operation and maintenance of systems by SDAE extension officers
3-6: Making community members and water users fully aware of the necessity of appropriate operation and maintenance
4: Technical assistance to DPASAs for supporting implementation of irrigation development:
4-1: Supporting the formulation of irrigation development planning
4-2: Supporting the implementation of irrigation development and technical extension in the pilot areas</td></tr>
<tr><td>Implementation Period</td><td>
<table>
<tr><td>2016</td><td>‘17</td><td>‘18</td><td>‘19</td><td>‘20</td><td>‘21</td><td>‘22</td><td>‘23</td><td>‘24</td><td>‘25</td><td>‘26</td><td>‘27</td><td>‘28</td><td>‘29</td><td>2030</td></tr>
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</table>
</td></tr>
<tr><td>Priority Areas (candidates)</td><td>All zones.
First priority for irrigation systems rehabilitation is given to Zones II and III; second priority to Zones I and V and Lichinga of Zone VI.
Priority for establishing pilot areas for irrigation development is tentatively given to Malema in Zone III, with the following pilot areas to be established in each district according to the prioritized Zones.</td></tr>
<tr><td>Expected Beneficiaries</td><td>A total of 87 irrigation systems will directly benefit. However, the total number of potential irrigation users has not been determined yet.
<u>Irrigation Rehabilitation in the Study Area</u>
<table>
<tr><th>Zone</th><th>I</th><th>II</th><th>III</th><th>V</th><th>VI</th><th>Total</th></tr>
<tr><td>Number of systems</td><td>14</td><td>27</td><td>22</td><td>13</td><td>11</td><td>87</td></tr>
<tr><td>Target area (ha)</td><td>778</td><td>1,290</td><td>1,697</td><td>305</td><td>152</td><td>4,222</td></tr>
<tr><td>Area currently in operation (ha)</td><td>148</td><td>255</td><td>672</td><td>162</td><td>69</td><td>1,306</td></tr>
</table>
</td></tr>
</table>

Implementing Agencies and Related Organizations	DPASA in Nampula, Niassa and Zambezia, SDAEs, MASA, and National Institute of Irrigtaion (INIR).

I-11:Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities

Objectives	To strengthen the technical extension services of the SDAE on irrigated farming to enable farmers to practice appropriate irrigated farming with effective and efficient water use. To enhance the technical capacity of DPASAs to improve the quality of irrigation facilities.
Goals	Farmers' skills and technology for irrigated farming and water management are improved. The quality of construction works for irrigation facilities is improved and the facility can operate and be maintained in the long term.
Expected Outputs	1: Farmers implement appropriate water management and irrigation technology in the field, and their productivity increases 2: Skills and application of technology of construction companies and the quality of construction work for irrigation facilities has been improved
Main Activities	1: Improving irrigation technology application of farmers: 1-1: Enhancing agricultural extension to small-scale irrigation farmers on water management, irrigation, and cultivation technology of irrigated crops. Technical extension will be implemented by the SDAE extension services to water users' organizations such as farmers' associations 1-2: Making the community and users aware of the necessity of sustainable management of land and water 2: Improving the skills and application of technology of construction companies: 2-1: Introducing a qualification system for the procurement process for construction of hydraulic structures 2-2: Enhancing the technical guidance and inspection capacity of DPASA 2-3: Enhancing the technical assistance of MASA to DPASA through developing technical guidelines and standard designs for hydraulic structures, and establishing of regional branches of INIR
Implementation Period	2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 ‘29 2030
Priority Areas (candidates)	All zones
Expected Beneficiaries	Activity 1: Irrigation users' organizations and communities of 17 pilot areas for irrigation development will be directly benefited; all users of irrigation systems in 19 districts will be indirect beneficiaries. Activity 2: All irrigation users in 19 districts will be direct beneficiaries.
Implementing Agencies and Related Organizations	DPASA in Nampula, Niassa and Zambezia, SDAEs, MASA, and INIR.

I-12: Vegetable Production Models with Small Pumps and Simple Irrigation Systems

Objectives	To promote vegetable production in small pump and simple irrigation systems aiming at increasing the cash income of family farmers.
Goals	- To increase the irrigated area and production of vegetable crops - To increase farmers' income through market-directed production of vegetables under irrigation - To organize family farmers into associations for the procurement of material and equipment for irrigation, improvement of irrigation and cultivation practices, and the application of techniques and the development of marketing of produce by the associations

	- Coaching small and medium lead farmers in the area through production of vegetable crops
Expected Outputs	1: Farmers who intend to practice irrigated farming will be able to obtain necessary pump equipment and/or simple irrigation systems 2: Farmers who intend to practice irrigated farming are organized into associations and start the process of equipment procurement and construction of facilities as well as the development of marketing channels 3: Cultivation and the application of irrigation techniques and practices for vegetables are improved by having received adequate technical extension services 4: Farmers' groups and associations will expand their markets and sales by having received necessary support for their marketing activities
Main Activities	1: Establishing support systems for introducing small-scale irrigation systems: 1-1: Supporting the introduction of small irrigation systems for individual family farmers: • Preparation and selection of model groups • Providing preferential loans for individual farmers for the procurement of equipment, or lending equipment to/through farmers' associations 1-2: Supporting the developing of simple irrigation systems for farmers' groups or medium-scale farmers: • Preparation and selection of model groups • Providing preferential loans for farmers' associations for the construction of simple hydraulic structures, canal systems, farm ponds, and procuring equipment and storage tanks • Providing technical assistance for planning, designing, and training members of associations on construction of simple hydraulic structures 2: Enhancing farmers' groups: 2-1: Organizing small-scale irrigation farmers into groups and promoting the formation of farmers' associations as well as their legalization 2-2: Mobilization loans for irrigation equipment and facility development by the associations 2-3: Operation and management of irrigation equipment and facilities by the associations 2-4: Enhancing activities of associations on irrigation systems management, including the collection of water and membership fees, account control, and arranging member participation in operations and maintenance work 3: Establishing a technical extension system for vegetable cultivation under irrigation: 3-1: Priority implementation of technical extension by extension workers on water management, irrigation practices, and cultivation of vegetable crops 3-2: Ensuring stable and timely supply of seed in the framework of the Plan for Promotion of Quality Seed Production at the Regional Level 4: Developing markets for vegetables: 4-1: Supporting the development of collection and handling facilities for vegetables 4-2: Supporting farmers' associations and medium-scale farmers to connect to sales marketing channels
Implementation Period	2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 ‘29 2030
Priority Areas (candidates)	Priority for vegetable production with small pump irrigation is given to Zones I, II, III, V, and VI, while priority for developing simple irrigation systems is given to Zones III and V.
Expected Beneficiaries	Direct beneficiaries: One hundred ninety (190) small pump user-groups. Nineteen (19) irrigation associations or irrigation groups using simple irrigation systems. Indirect beneficiaries: all farmers and groups producing vegetables under irrigation.
Implementing Agencies and Related Organizations	DPASA in Nampula, Niassa and Zambezia, SDAE, and the District Governor's Office

CHAPTER 5 MARKET ACCESS

This Chapter presents four development strategies for market access from the point of view of ***"Services and infrastructure for better access to markets, and development framework directed towards agricultural investments"***. The four strategies are described below.

- Improving Market Access by Farmers;
- Supporting the Establishment and Development of Modern Agriculture Cooperatives;
- Promoting Added Value to Agricultural Products;
- Developing Infrastructure for Logistics.

5.1 Improving Market Access by Farmers

5.1.1 Development Strategy

The trade inventory survey, conducted by the Study Team in 2012, clearly indicated that in addition to the lack of market demand and the unavailability of market information, the main problem for small-scale farmers and their associations is that there are no buyers for their produce; i.e., buyers do not come to the farm gate to purchase produce.

Therefore, it is necessary to focus on interventions of market-oriented farming practices, taking into account the aspects relating to market perspectives and changing the mindset from "produce and sell" to "produce to sell". In order to improve the market access, the means of making it possible to sell the produces as much as they plan and mitigating production losses of small-scale farmers, two different approaches will be adoptable, i.e., one is promoting an out-grower model scheme and another is developing an own market channel of the farmers. Due to limitations in the scale of production and available measures of small-scale farmers, a farmers' organization is considered as a base of intervention to improve market access for both approaches.

(1) Improving market access by farmers' organizations through out-grower model schemes

Most corporate farms are involved in the production of cotton and tobacco through out-grower schemes, whereby the companies provide technical assistance and inputs to family farmers who repay their loans from their proceeds at harvest time.

This type of arrangement facilitates the access by farmers to inputs, ensures a secure market and payment for produce, and farmers agree to sell their cash crops to corporate farms at an agreed price often set in advance, after a deduction of the costs of inputs and technical assistance.

In the process of promoting various projects in the Nacala Corridor Area, the grouping of family farmers for out-growing activities by large-scale farmers or corporate farms benefit the family farmers because it ensures the purchase (market for farmers) of products. Some ongoing projects implemented by corporate farms have already shown good results. The out-grower

scheme model should be promoted by centering on large-scale farmers or corporate farms that would undertake the responsibility to provide technical guidance and encourage grouping of family farmers and associations. Preferential loans should be given to large-scale farmers and corporate farms that accept out-grower projects. The out-growing scheme model has also been adopted as one of the development strategies of MASA.

However, support to reduce the increasing economic disparity between family farmers participating in the out-grower projects and the majority of those who are unable to participate as out-growers, must be considered too. To achieve this, it is necessary to further promote the formation of farmers' organizations in collaboration with agricultural extension activities provided by PRONEA, and establishing market-oriented agricultural cooperatives in line with the new cooperative law.

(2) Partnership between local farmers and agribusinesses

Family farmers are dominant in the region and are the major players of agricultural production in the area. However, they face several constraints, such as difficulties regarding market access, lack of agricultural inputs, a need for better agricultural technology, etc., impeding the improvement of their activities. Partnerships with agribusinesses are one of the approaches to solving these issues. This approach was developed in the tobacco and cotton industries and is now widely undertaken in Mozambique, especially in the Beira Corridor.

Local agribusinesses are expected to contribute to the development of the rural economy through adding value (i.e., marketing and processing) to crops produced mainly by family farmers, as well as providing new farming technologies to enhance the weak farming support system by the public sector, and generating job opportunities.

The existing agribusiness entities have already entered into partnerships with local farmers individually or in groups through contracts for crop production as out-growers. Considering the interests of each of the parties, the partnerships are established based on a relationship of mutual benefits, as shown in Table 5.1.1.

Table 5.1.1 Expected Benefits of Partnerships between Farmers and Agribusinesses

Farmers	Agribusiness
1. To secure a firm market; 2. To receive quality farm inputs; 3. To acquire advanced farming technology; 4. To reduce risk against unexpected incidents.	1. To save initial investment costs; 2. To save running costs (only crop growers); 3. To secure stable products (only traders and the processing industry); 4. To reduce risk against unexpected incidents.

For the promotion of agribusiness, the partnership should be tightened through reinforcing the win-win relationships. Regarding the mutual benefits, production increase in terms of quantity and quality has the strongest impact on the relationships. The following strategy should be applied to realize a production increase of out-grower farming between local farmers and agribusinesses. The Master Plan will consider preparing an environment to promote these strategies without directly intervening in win-win relationships.

(i) Sharing all necessary information, to avoid information gaps between out-growers and agribusinesses;
(ii) Sharing benefits due and responsibilities of the parties;
(iii) Making contracts in a transparent manner;
(iv) Applying clear quality standards with necessary technical assistance provided by agribusinesses; and
(v) Organizing out-growers to improve working efficiency.

In order to create an environment to promote these strategies without directly intervening in the win-win relationship, the Government should prepare an "operational guideline of the out-grower scheme both for agribusiness and local farmers," and then disseminate it to agribusinesses and local farmers through campaigning.

Moreover, the Government should strengthen the capacity of SDAE to provide the necessary advice to protect farmers from unfairness and to solve disputes regarding the out-grower scheme in their territory. Furthermore, the Master Plan will cooperate with NGOs, civil societies and other stakeholders to establish information channels from community to government and strengthen DPASA and SDAE as an access point for farmers in arbitration mechanisms to settle land conflicts.

(3) Improving market access by farmers' organization through developing an own market channel

Besides introducing an out-grower model scheme, there is a way to improve the market access of small-scale farmers by developing an own market channel. In order to develop an own market channel, it is essential to catch-up to the information on market demand, such as kind of produce, quality, amount, timing, distance to the market, etc. and fulfill the contract provisions. Furthermore, establishing coordination and a strong tie with traders, retailers and buyers is important to realize that. However, small-scale farmers have limitations: small production scale and small amount of surplus for selling, no transportation means for produce, difficulty in accessing market information and market channels, lack of appropriate storage facilities for produce, etc. The most important issue is the lack of a market-oriented mind. By improving market access especially improving storage, roads and efficiency of transportation, loss of agricultural products will be decreased and will be a better benefit for the farmers.

In order to overcome those limitations and realize market-oriented farm management, the approach through farmers' organization will be essential. Through supporting the farmers' organization, small-scale farmers are expected to obtain a sense of market-oriented farm management and access to the market.

1) To organize small-scale farmers into legalized farmers' associations, and to strengthen the organizations through training and workshops;

2) To support the associations to develop a market channel by establishing linkages between the associations and traders, retailers and buyers through facilitating matching coordination;
3) To support a legal association to construct a storage facility for collecting produce and keeping an adequate quality;
4) To provide an association a credit scheme for operation costs as well as an investment to storage facility and transportation; and
5) To generate the development model of association to improve the market access of small-scale farmers, and to extend the model.

(4) Improvement of farmers' access to market information

It is important to collect and disseminate market information nationwide for actors of value chains to access market opportunities. The Agriculture Market Information System (SIMA) of MASA plays a significant role therein. Nationwide market information is collected and updated every week on their website. However, small-scale farmers can hardly access such market information through Internet services. In addition, a new facility for on-demand market information by the Short Message Service (SMS) system has been launched in Mozambique. Using such market information, not only farmers, but also other actors in the private sector can make decisions for investment in various facilities, processing and transportation equipment. The sources of information and information dissemination systems should be diversified taking into consideration the socio-economic conditions of relevant stakeholders. By improving access to market information, the Master Plan will create an environment for fair competition in order to improve distribution of agricultural products, as well as market efficiency.

5.1.2 Necessary Measures

In order to ensure implementation of the above strategies, the following measures regarding the improving market access of farmers will be taken:

(i) Establishing a proper legal framework for out-grower schemes in order to develop partnerships between family farmers and local agribusiness enterprises to overcome the difficulties of family farmers to access agricultural inputs, sale to markets, improving agricultural technology, etc.;
(ii) Developing an own market channel of small-scale farmers through enhancing farmers' organizations; and
(iii) Improving access to market information for farmers by radio and other media.

5.1.3 Components of the Agricultural Development Master Plan

To ensure consistent implementation of the above strategies, the following component plans for improving market access by farmers will be implemented:

II-1: Establishment of a Proper Legal Framework for Out-grower Schemes

Objectives	To establish and introduce a proper legal framework/system for out-grower schemes to promote the collaborative mechanism between farmers and agribusinesses.
Goals	Fair and practical contract farming operation involving more local farmers and agribusiness operators is widely carried out in the Nacala Corridor through establishing a proper legal frame-work for the out-grower schemes.
Expected Outputs	1: Operational guidelines of the out-grower scheme for agribusinesses are prepared, which include basic rules and obligations for operators, a model contract form, and other necessary operational guidance on items such as input supply, technical extension, financial arrangement and marketing of produce. 2: Materials for providing information on the out-grower scheme to local farmers is prepared, and a series of promotion/explanation campaigns at districts are held with these materials. 3: The mechanism for providing consultation/conciliation service is established and operational in SDAEs and DPASAs to support out-growers in case any conflict occurs with contract farming operators. 4: The function of supervising authorities such as DPASA as arbitration organizations is strengthened to strictly handle/sanction serious violations of an out-grower contract.
Main Activities	1: Hiring consultants to prepare the legal framework for the implementation of the out-grower scheme; 2: Preparing operational guidelines for out-grower schemes for agribusiness operators; 3: Disseminating the guidelines to potential agribusinesses that are interested in conducting contract farming with local farmers; 4: Preparing materials to provide information to local farmers on the proper operational arrangements of contract farming, including the rights and duties and expectations of out-growers; 5: Conducting promotion/explanation campaigns at the district level to disseminate information about the out-grower scheme to local farmers; 6: Providing consultation services to out-growers at each SDAE, providing necessary advice to solve disputes with contract farming operators; 7: Developing an arbitration mechanism for DPASA for the settlement of conflicts between out-growers and agribusinesses. In case a conflict occurs, a conciliation committee including representatives of farmers' organizations and civil society groups is called up to promptly constitute the structural framework to settle the case; 8: Providing technical assistance for establishing and operating a management framework for the out-grower scheme.
Implementation Period	2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 ‘29 2030
Priority Areas (candidate)	All 19 districts. Further discussions should be held with the concerned government authorities regarding the coverage area (whether the coverage could be extended to other districts along the Nacala Corridor).
Expected Beneficiaries	Direct Beneficiaries: Farmers participating to out-grower schemes and agribusinesses operating out-grower schemes. Indirect beneficiaries: Farmers in 19 districts (approx. 2.8 million in 2011) Others: -
Implementing Agency and Related Organizations	MASA, DPASA in Nampula, Niassa and Zambezia, CEPAGRI, and SDAE.
Remarks	- The operational guidelines should be referred to when analyzing an application for agricultural loans submitted by agribusinesses, and monitoring of the out-grower farming operations supported by the "Project for the Establishment of Financial Support System for Small and Medium-Sized Agribusiness, Farmers' Organizations and Individual Farmers" (No. I-9); - The support organizations proposed in the "Establishment of a Support Organization for the Investment and Value Chain Development" (No. II-5) should play a leading role in providing

	capacity building and advisory services to SDAE for the operation of consulting services to out-growers; - The support organization to be established under component No. II-5 will also have the function of arbitration for the settlement of conflicts between out-growers and agribusinesses in collaboration with DPASA. The implementing agency will act as a supervisor to monitor the reconciliation processes as necessary; - The official legal entity to settle disputes between out-growers and companies should be the local court. However, the component proposes to provide a function on arbitration by DPASA as well as SDAE as mediators to ease the burden of filing formal court procedures, aiming to peacefully settle cases out of court; - The information materials prepared for introducing and explaining the out-grower scheme to local farmers shall be used as a reference for agricultural extension and capacity development activities in other components proposed in the Master Plan; - It is recommended to closely work with ProSAVANA-PEM when establishing the legal framework of the out-grower scheme and preparing its guidelines; - Once the proper legal framework of the out-grower scheme, including arbitration and sanction mechanisms, is fully established and related guidelines are all prepared, its practical operation will be handled and monitored by the support organization established under component No. II-5 and the implementation unit.

II-2: Improvement of Market Access of Small-scale Farmers

Objectives	To increase the capacity of small-scale farmers to develop an own market channel in the market through enhanced activity of farmers' association.														
Goals	Small-scale farmers have an understanding of market-oriented farm management and have an improved market access through forum or group of farmers' associations.														
Expected Outputs	1. Selected forum/group of association will have the capacity to develop an own market channel in the market. 2. Linkage between a forum/group of associations and market stakeholders such as traders, retailers, buyers etc. will be established. 3. Joint marketing or collective shipping will be fulfilled by a forum/group of associations 4. Development model of market access improvement of small-scale farmers will be established.														
Main Activities	1. Preparation of project design, selection of target forum/group of associations and organizing stakeholders of the market (traders, retailers, buyers, etc.) in urban area. 2. Training of forum/associations. Collaboration with training on marketing and organizational operation provided by Strengthening of Agricultural Extension Service (I-2), Agricultural Training Center (I-3), Model for the Development of Lead-Farmers in the Communities (I-4). Including support forum/associations to prepare the business plan. 3. Facilitation of matching coordination between forum and traders, retailers, and buyers in order to establish a linkage and market channel. It will be achieved through activity of Strengthening Institutional Role in Promoting and Supporting Value Chain Development (II-5). 4. Construction of a small storage facility of produce for forum/associations. 5. Providing a credit system for operation costs. Application of the financial support system established by Establishment of Financial Support Systems for Small and Medium-size Agribusiness Enterprise, Farmers' Organization and Individual Farmers (I-9). 6. Consultation and technical support of marketing and organizational operation of forum/association. Including support forum/associations to apply the credit system.														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Priority Areas (candidate)	All 19 districts. One forum or group of associations will be selected in each district.														
Expected Beneficiaries	Direct Beneficiaries						Indirect Beneficiaries					Others			
	• Members of selected						• Potential members of								

	forum/group of associations. One forum or group of associations will be selected in each district.	association s in 19 districts	
Implementing Agency and Related Organizations	MASA, DPASA in Nampula, Niassa and Zambezia; SDAE in 19 districts NGOs, CEPAGRI, CPI,		

II-3: Improvement of Access to Market Information

Objectives	To create an environment for fair competition, to improve the distribution of agricultural produce and market efficiency.														
Goals	Producers and agribusiness operators have better access to market information.														
Expected Outputs	1: To collect lessons learned from present and past efforts on market information systems; 2: To improve access to market information for farmers and agribusiness operators; 3: To use market information for business management.														
Main Activities	(1) To elaborate a work plan for improving information dissemination systems. (2) Improving farmers' access to market information: 2-1 Preparing necessary material and equipment; 2-2 Conducting staff training. (3) Providing guidance to farmers' groups and small-scale business operators on how to use the information to enhance their business management practices.														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Priority Areas (candidate)	All zones. Priority will be determined during the basic design study.														
Expected Beneficiaries	Direct Beneficiaries							Indirect beneficiaries					Others		
	Farmers in 19 districts (approx. 2.8 million in 2011) and agribusiness operators							-					-		
Implementing Agency and Related Organizations	MASA, SIMA, DPASA (Nampula, Niassa and Zambezia), and Provincial Department of Industry and Commerce (DPIC)														

5.2 Supporting the Establishment and Development of Modern Agriculture Cooperatives

5.2.1 Development Strategy

Modern agriculture cooperatives are to be established and developed as part of the organization, training and strengthening of farmers' associations. Associations will be transformed into modern agriculture cooperatives as a way of pioneering developing farmers' associations. The members of associations will determine the principles of transformation from farmers' associations to modern agricultural cooperatives; understanding the full benefits of such transformations.

As an approach to organizing family farmers, which is required for the agricultural development of the Nacala Corridor Area, organizing and developing modern agricultural cooperatives will

be supported through establishing a system for efficient, effective and business-oriented management and operations, under the new cooperative law. The main activities will be to inform the relevant organizations and individuals at provincial and district levels about knowledge and awareness of the new cooperative law relating to organizing farmers and establishing agricultural cooperatives. New agricultural cooperatives with voluntary farmers will be established and supported through model projects, while support will also be provided for the transformation of existing farmers' associations into new agricultural cooperatives. The operations of the newly established cooperatives will be further supported with soft loans. These soft loans are to be granted as "credit for small and medium-scale agribusiness and farmers' associations" and will an improvement of the DIF. Likewise, regular training sessions will be held for human resource development of the new cooperatives. Human resource development will focus on orientation of agricultural cooperatives into entering market-lead business.

5.2.2 Necessary Measures

To ensure the implementation of the above strategies, the following measures for supporting the establishment and development of modern agriculture cooperatives will be taken:

1) Establishment and enhancement of modern agricultural cooperatives and transforming existing associations into such cooperatives for the joint purchase of agricultural inputs, joint sales, and processing agricultural products for markets.

5.2.3 Components of the Agricultural Development Master Plan

To ensure the implementation of the above strategies, the following component plans for supporting the establishment and development of modern agriculture cooperatives will be implemented:

II-4: Formulation and Development of Modern Agricultural Cooperatives

Objectives	To strengthen the bargaining powers of farmers' groups, increase the income of family farmers, and improve their living standards through sustainable management of modern agricultural cooperatives.
Goals	The management of farmers' organizations will be improved through the activities of modern agricultural cooperatives.
Expected Outputs	1: The new cooperative law and various support programs related to rural business incubation are widely recognized; 2: New agricultural cooperatives will be established as model projects; 3: The model agricultural cooperatives will be managed in a sustainable manner.
Main Activities	1: Dissemination of the new cooperative law and various support programs related to rural development: 1-1: Conducting seminars for relevant organizations and stakeholders involved in the formation of agricultural cooperatives to acquaint them with the new cooperative law as well as to familiarize them with information on support programs related to rural business incubation. 2: Establishing new agricultural cooperatives as model projects: 2-1: Selecting farmers' organizations with potential to form new agricultural cooperatives; 2-2: Supporting the formation of the new agricultural cooperatives through activities including business incubation seminars.

<table>
<tr><td></td><td colspan="15">3: Training the model agricultural cooperatives in sustainable management practices:
3-1: Supporting the model cooperatives with soft loans from financing systems/organizations;
3-2: Training cooperative members on institutional strengthening of agricultural cooperatives:
3-3: Conducting monitoring and evaluation of the operations of the cooperatives.</td></tr>
<tr><td rowspan="2">Implementation Period</td><td>2016</td><td>‘17</td><td>‘18</td><td>‘19</td><td>‘20</td><td>‘21</td><td>‘22</td><td>‘23</td><td>‘24</td><td>‘25</td><td>‘26</td><td>‘27</td><td>‘28</td><td>‘29</td><td>2030</td></tr>
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<tr><td>Priority Areas (candidate)</td><td colspan="15">All 19 districts.</td></tr>
<tr><td rowspan="2">Expected Beneficiaries</td><td colspan="7">Direct Beneficiaries</td><td colspan="5">Indirect Beneficiaries</td><td colspan="3">Others</td></tr>
<tr><td colspan="7">Staff of DPASAs and SDAEs in charge of the new cooperative activities.
Members of the model modern agricultural cooperatives (Approx. six cooperatives).</td><td colspan="5">Members of the new modern agricultural cooperatives.
General farmers who contract their production with modern agricultural cooperatives.</td><td colspan="3"></td></tr>
<tr><td>Implementing Agency and Related Organizations</td><td colspan="15">DNEA, DPASAs, Association of Mozambique for Modern Cooperative Promotion (AMPCM), and NGOs</td></tr>
</table>

5.3 Promoting Adding Value to Agricultural Products

5.3.1 Development Strategy

Growth of the market is the only factor needed to secure the sales-increase of agricultural products of the farmers in the area. The value of produce will increase through the supply chain, and the increased values will flow through the area and return to the people in the form of increased employment and income. Therefore, the development of local agro-processing industries or other agribusinesses is required to improving the livelihood of the population.

When agricultural produce is purchased by traders and sold to outside areas, farmers and other inhabitants in the area receive only the simple benefit of raw products. However, if value-adding industries like agro-processing operate in the area, value is added by their activities resulting in added value that becomes a benefit for the population. The benefits for the population occur in different ways, such as increased employment and income or cheaper transportation costs, and it activates the regional economy. This contributes to improving the lives of the farmers and the population in general. Moreover, if farmers participate in the value-adding sector through their associations or cooperatives, they can obtain more direct benefits.

Therefore, expansion of the industry is required. However, if an industry operates in the area, its development may be slow. If several related industries simultaneously operate in the same area, they can develop faster and more effectively. Under this perspective, it would be better to develop clusters for the establishment of a supply chain and its related, complex system.

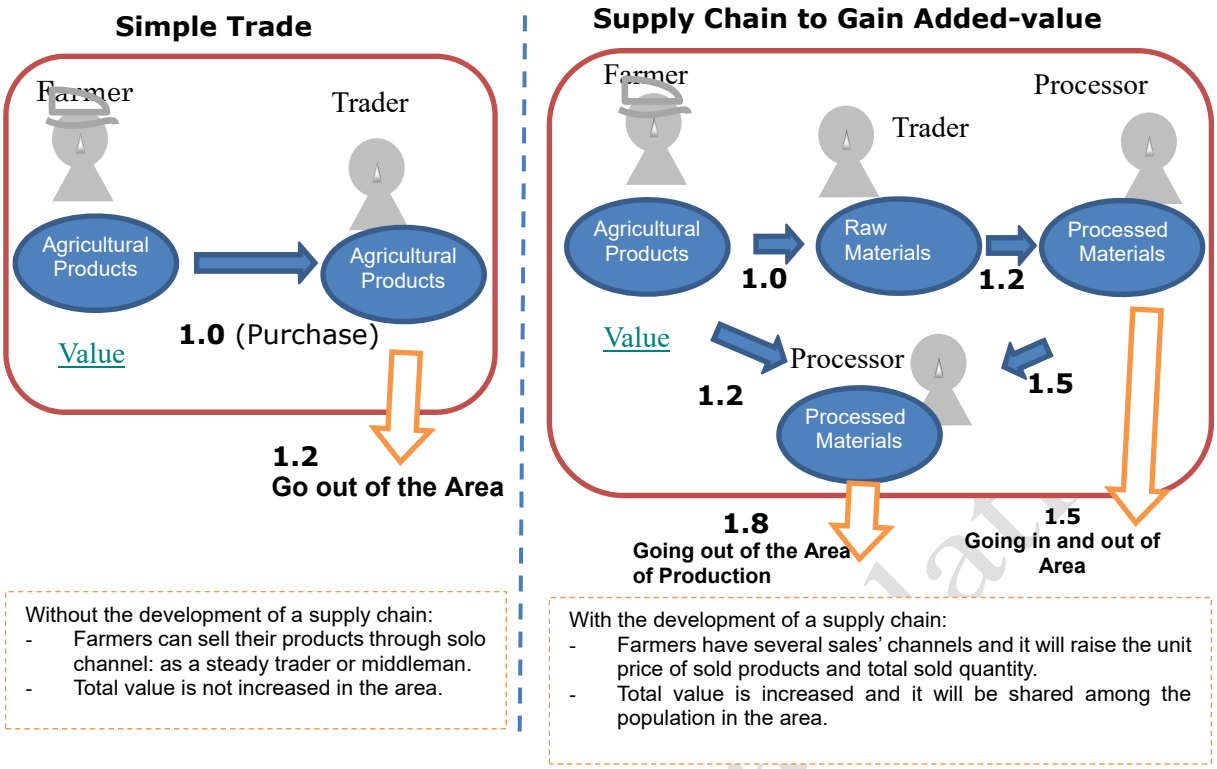


Figure 5.3.1 Concept of Added Value of Farm Produce

(1) Cluster development approach

1) Concept of agricultural clusters

As described above, with the development of agricultural clusters, the economic structure of a region will shift from raw material-oriented marketing to value-added product-oriented marketing to produce benefits for the local population.

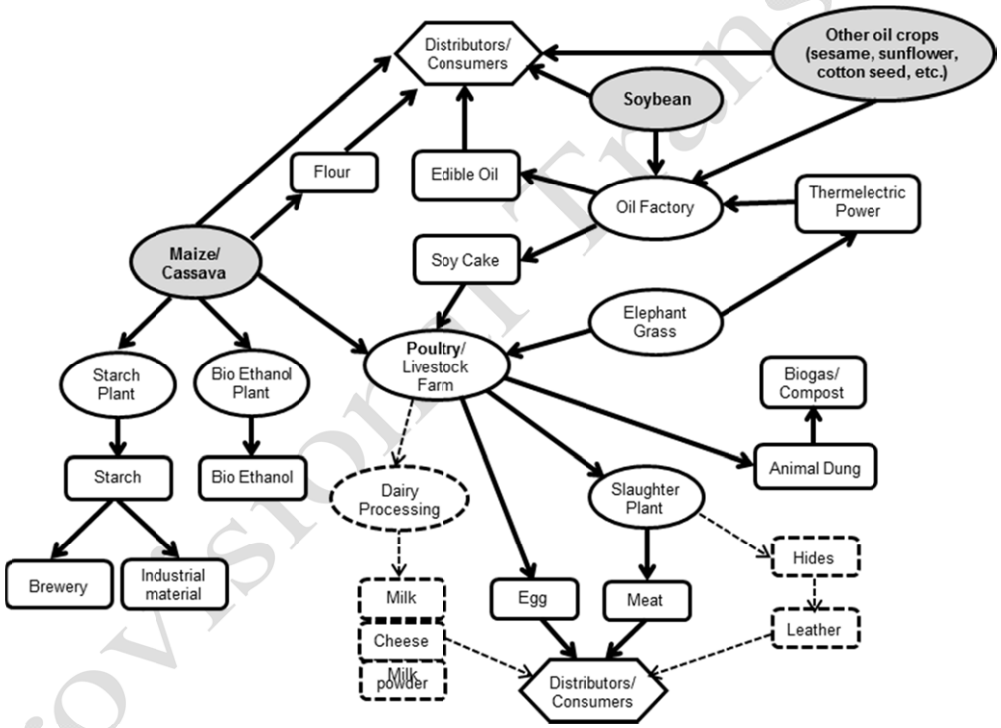
The emergence, development and expansion of clusters bring considerable benefits to the entire local economy, particularly to the agricultural sector. In a region where family farmers play a large role in the agricultural sector, as in the Study Area, it is expected that a substantial part of the benefits will flow to family farmers. They will be able to improve their livelihoods through increased, diversified and value-added production, as well as through enhanced job creation and business opportunities. Small-scale farmers will also play an important role in the development of clusters through the organization of associations or cooperatives.

All parties involved directly or indirectly to agricultural production, such as producers (farmers), input suppliers, machinery suppliers, and other service providers, represent parts of the basic elements of a cluster. Clusters also involve marketing and processing networks, including producers of complementary products and by-product processors. Clusters include the public sector, institutions of learning such as universities and training centers, and public commercial sectors, which provide training, education, information, research and development, and other specialized technical assistance.

The development of agricultural clusters is a strategic approach to accelerate agricultural development within a specified territory. The fundamental approach of the development strategy is to design one or more value chains to create potential for synergies and to enable appropriate development in the context of the socio-economic character of a territory. Such clusters will channel various efforts for agricultural development and enable its realization within a shorter period than without applying such a strategy.

Considering the direction of agricultural development in the Study Area, maize, cassava, soybeans and other oil seed crops (e.g., sesame, sunflowers, and cotton) would be major products; with a substantial surplus of these crops expected in the near future. As a consequence, the agricultural cluster developed in the Study Area should be composed of value chains of these crops, as shown in Figure 5.3.2 Agricultural Cluster Model for the Study Area.

An agricultural cluster is developed based on the unrestricted activity of the private sector, which also includes family farmers and farmers' associations and cooperatives.



Note: Development of livestock value chains may be very weak because of the small potential in the area at present
Source: JICA Study Team, 2013.

Figure 5.3.2 Agricultural Cluster Model for the Study Area

2) Strategy for the development of agricultural clusters

The Master Plan will focus on creating favorable conditions for clusters, instead of developing the clusters themselves. Business entities, should take the initiative for the development of clusters based on their business strategies. The focal factors to create favorable conditions are as follows:

1) Resource factor:
   Good access to high quality resources, e.g., manpower, production facilities, knowledge and information, capital, logistics, and infrastructure, which are all necessary to survive in a competitive market.
2) Demand factor:
   Growing high market demand produce in terms of quantity and quality.
3) Support services factor:
   Availability of high quality and competitive support services, e.g., raw material supply, facility maintenance, and spare-parts supply.
4) Institutional and social capital factor:
   A fair and open market supported by business practices with acceptable norms and principles, institutional interventions, and relevant laws and regulations.

Though the market should be open to all business entities, participation of local companies and farmers' cooperatives will be stimulated considering the socio-economic character of the agricultural clusters to be envisioned in the area. Promoting local agro-industries is another key factor for the sustainable development of clusters.

(2) Establishing value chains

Development of several main value chains is fundamental for cluster development. The value chains of each crop and possible intervention by farmers are described below.

1) Maize

The value chain for maize is shown in Figure 5.3.3. Maize is grown for human consumption and for animal feed. In the agribusiness, service providers such as maize millers, traders, transporters, and storage and distribution services are key actors for the development of the value chain. Increasing the number of service providers is necessary to increase the processing volume of millers and the handling capacity of transporters.

Most farmers sell raw maize and only a limited number of farmers' organizations transport the produce by themselves. If farmers' associations or cooperatives take the role of trader/transporter, provide storage and distribution services, or establish maize milling facilities, the added value of these activities will be shared by its the members. As shown in Table 5.3.1, many maize mills are expected to be established in the area by 2030.

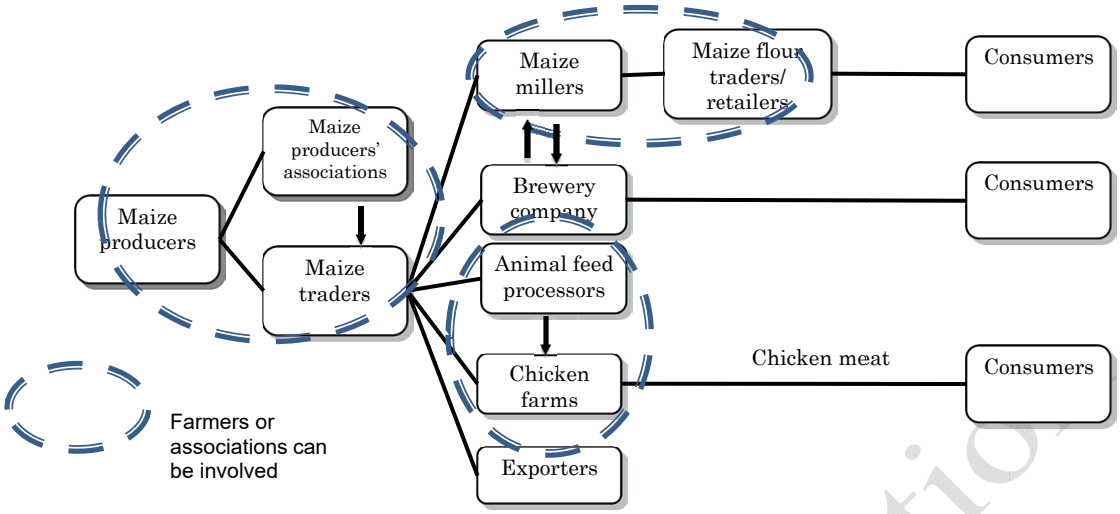


Figure 5.3.3 Value Chain of Maize

Most maize mills in rural areas are small-scale with a capacity of less than 200 kg/hr. Such types of service could be provided by farmers' associations or by a local service provider. Middle-scale maize mills, with a 1,000 to 5,000 kg/hr processing capacity, with weighing and bagging equipment, and likely packaging equipment, buy maize grain and sell maize flour packed in bags. Cooperatives or farmers' federations (several associations joining together) could provide services of this type to mills. Support for finance and business management will be necessary for small and medium-scale maize mills. The number of large-scale maize mills, which have more than a 5,000 kg/hr processing capacity, is expected to increase in urban areas.

Table 5.3.1 Forecast of the Number of Maize Mills in 2030

Capacity		Number of Maize Mills		
		Small	Medium	Large
Processing (kg/hr)		200	1000	5,000
Annual Processing (tons/yr)		480	2,400	12,000
District	Consumption (ton)	Small	Medium	Large
Monapo	31,400	22	1	0
Muecate	8,900	8	0	0
Mecuburi	13,800	12	0	0
Meconta	15,700	14	0	0
Mogovolas	77,200	20	4	1
Nampula	80,700	28	3	1
Murrupula	14,100	12	0	0
Ribaue	28,600	14	2	0
Lalaua	6,600	6	0	0
Malema	14,500	13	0	0
Alto Molocue	45,400	18	4	0
Gurue	37,400	17	3	0
Cuamba	23,400	15	1	0
Mecanhelas	36,000	30	0	0
Mandimba	18,000	15	0	0
N'Gauma	12,200	11	0	0
Majune	3,400	3	0	0
Lichinga	38,200	12	4	0
Sanga	6,500	6	0	0
Total	512,000	244	18	2

Source: JICA Study Team

(Note) 1) Covering rate: 40% of demand is milled by processing machines

2) The premises of the forecast are as follows:

Scale of mills	Small	Medium	Large
Processing Capacity (kg/hr)	200	1,000	5,000
Working hours per day (hr/day)	8	8	8
Working day (days/year)	300	300	300
Annual processing capacity (ton/year)	480	2,400	12,000

Traders and transporters play an important role in providing logistical services. Traders have a role to store maize under proper conditions (quality control) and supply the product down the value chain throughout the year.

2） Cassava

Fresh cassava perishes easily; therefore, as soon as it is harvested, most cassava is sliced and sun-dried for shipment to a market/processor. Because of these product conditions, the value chain of cassava has only been considered for dried cassava as illustrated in Figure 5.3.4 Value Chain of Cassava.

Individual family farmers and farmers' associations can produce the sun-dried chips. Cassava-milling to produce flour can be undertaken by associations or cooperatives, depending on local demand.

Potential market opportunities other than for cassava flour, such as from the brewing industry, for baking, the production of bio-ethanol, and other secondary industrial products, are key factors for further value adding to this sub-sector. Public research and development institutes for the industry and agriculture can cooperate with the private sector to further develop other uses of cassava.

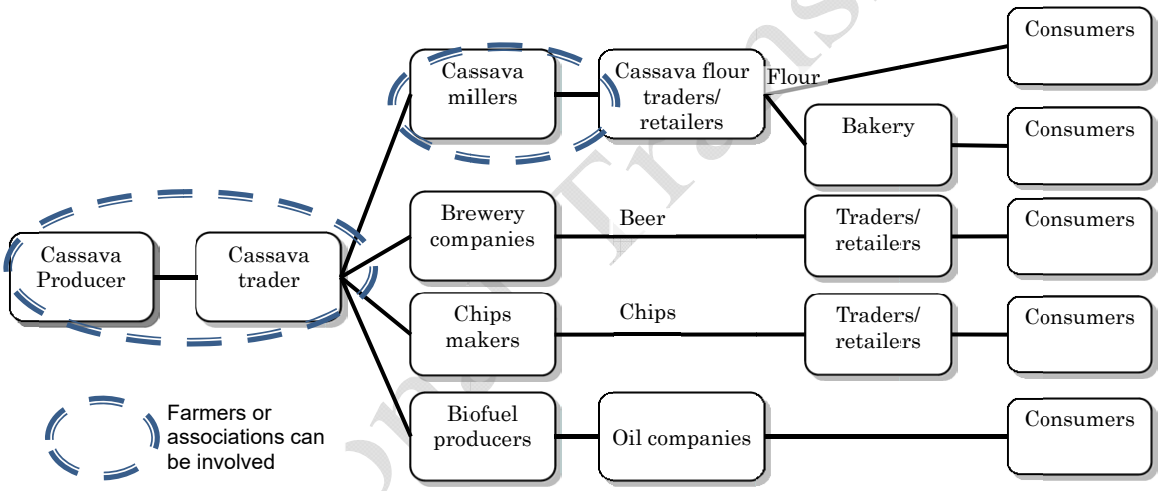


Figure 5.3.4 Value Chain of Cassava

3） Cashew nuts

Cashew nuts are one of the most important export crops in Mozambique. More than 60% of cashew nuts are produced in the coastal area of Nampula and Zambezia provinces under the several favorable natural conditions.

Recently cashew nuts production of small-scale farmers are declining by low productivity of old trees, insufficient crop and pest management, damage to trees by fires, insufficient replanting rates, lack of interest in planting cashew trees, restricted availability of good quality tree seedlings at the village level etc. Now, it is necessary to take countermeasures for revitalize cashew production of small-scale farmers by accelerate replanting and technical assistances.

The value chain of cashew nuts is shown Figure 5.3.5. In the area, raw cashew nuts are produced by family farmers and collected and bought by traders. Because processing cashew nuts is difficult and complicated, if farmers seek to obtain more profit in this value chain, they

need to improve the quality of raw material and sell according to quality. Under these conditions, the pricing of raw material should change from quantity to quality based.

If the total volume of quality products is increased, the processing and export will also be maximized in terms of their gross and net value.

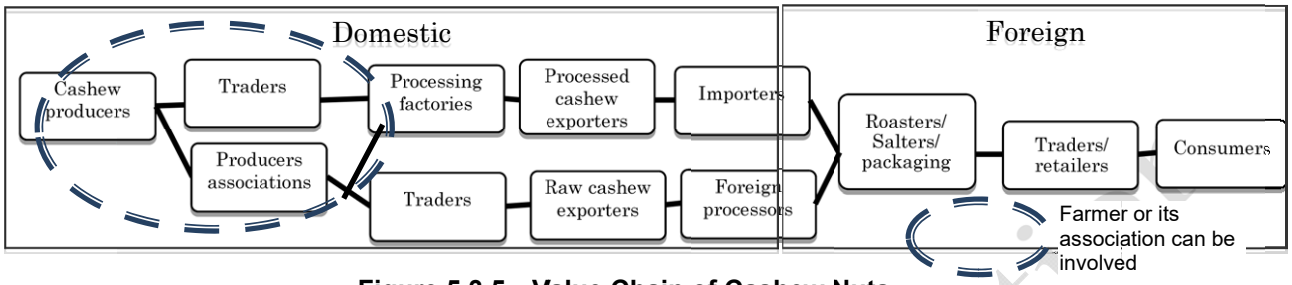


Figure 5.3.5 Value Chain of Cashew Nuts

4) Soybeans

The value chain for soybeans is important for the supply of edible oil and oil cake, enabling imported products to be substituted by domestic products. However, oil processing is too complex and has no advantages because of its high production cost, if done on a small-scale. Therefore, it is more appropriate that farmers are involved in the value chain of soybeans only for its production. Soybean is still a new crop in the area, so there is space to improve techniques and practices for production to obtain more profit for farmers. Moreover, if farmers' organizations begin to operate small-scale chicken farms in rural areas, animal feed processing is also possible at the farmers' level.

The Government has to take the following necessary steps to support the start-up of the soybean value chain and to direct its development appropriately.

- Facilitating communication among stakeholder groups to improve quality, quantity and the collection and distribution system of the products;
- Providing technical extension services to farmers;
- Supporting the development of business administration skills of small and medium-scale producers and processors;
- Facilitating the organization of each stakeholder-group in the supply chain, such as input dealers, machinery service providers, producers, processing industries, and chicken farmers;
- Disseminating market information, techniques and practices for the production and processing to stakeholders.

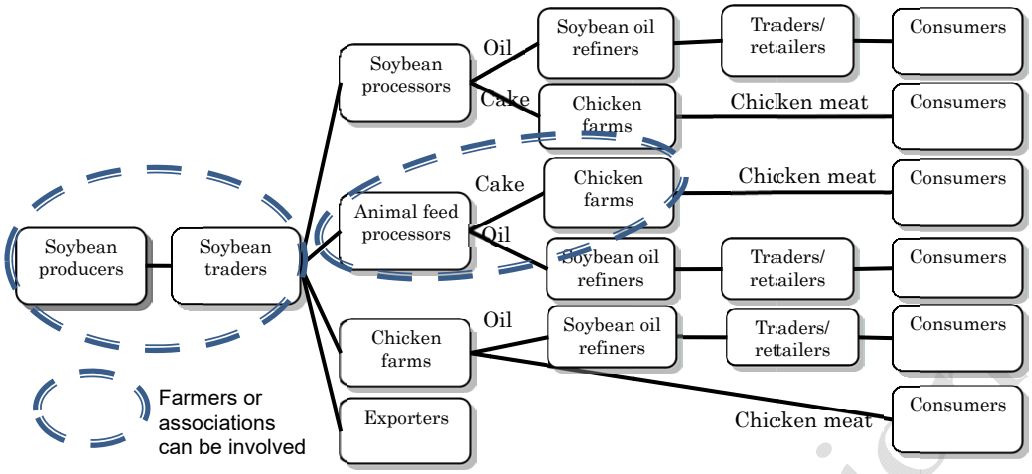


Figure 5.3.6 Value Chain of Soybeans

5) Vegetables

The production of vegetables is labor-intensive; therefore, family farmers are expected to occupy the main production role. Moreover, if individual farmers and their associations/cooperatives are involved in the primary stages of the value chain, such as cleaning, grading and packing, the obtained value will be higher than from selling the raw produce.

As a result of facilitating further investment in the Nacala Corridor, it is anticipated that:

- The number of laborers in factories and urban areas will increase in Zone I and II, and consequently, increased demand for vegetables and other food crops is anticipated;
- In districts adjacent to Malawi, the quality and profitability of vegetables cultivation will improve to compete with imported vegetables, and with better quality, produce will be exported to Malawi in the future.

As an example, the value chain of tomatoes is illustrated in Figure 5.3.7 Value Chain of Tomato. From a demand perspective, the number of processed vegetables in the northern region is not high enough to induce investment for processing facilities. In large consumption areas, especially Maputo, processed food produced in the northern region has a disadvantage because of high transportation costs when competing with imported products. Therefore, the processing of vegetables should only be considered when local demand starts to increase in the future.

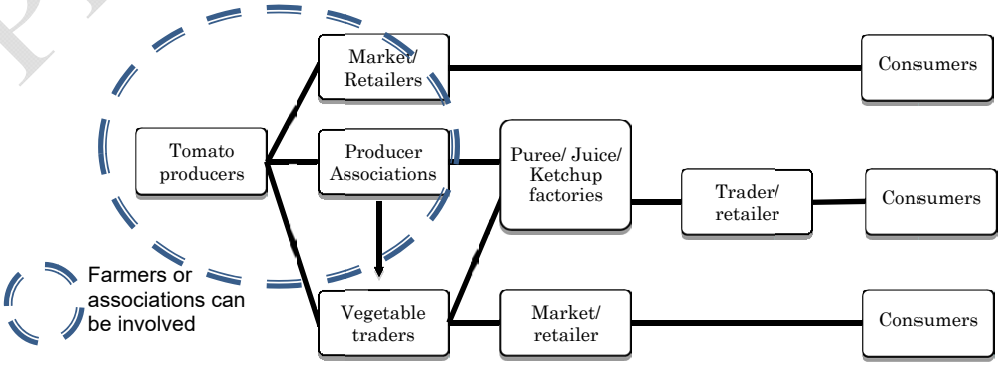


Figure 5.3.7 Value Chain of Tomatoes

6） Fruits and Other Crops

As a tropical country, Mozambique has high potential for the production of large quantities of fruit, such as citrus, banana, avocado, pineapple, passion fruit and mango[71].

Banana production for export was started by a private company in Namialo, Nampula Province. Recently the Tropical Fruits Training Center was refurbished and processing equipment was installed at the IIAM research field in Namialo.

In order to increase Mozambique's private sector competitiveness by strengthening targeted value chains, the Mozambique Trade and Competitiveness Program (AgriFUTORO) was implemented under the financial and technical assistance of United States Agency for International Development (USAID). The program targeted high-potential agricultural value chains of banana, pineapple, mango, soybean, sesame, groundnuts, cashew and forestry products[72].

Other crops, such as groundnuts, beans, and sesame presently do not have value-chain activities, and they are not expected to significantly expand their value chains within the period of the implementation of the Master Plan. Improvement of transportation network efficiency and storage management can contribute to increasing the competitiveness for these crops in both the domestic and international markets.

7） Tea industry

The high land of Gurue District has favorable natural conditions for tea production. Tea plantations were first established in the 19th century. By the 1970s, 15 estates were producing tea leaves averaging 19,000 tons/year and employing 28,000 workers in 9,000 ha of planted area. During the civil war, after independence from Portugal, most of the tea plantations were nationalized and later closed and abandoned. After privatization, tea production started again, and in 2012 tea production reached 2,500 tons in 5,700 ha by six tea estates and small-scale growers employing 3,000 workers.

Together with nine countries, Mozambique is a member of the East Africa Tea Trade Association (EATTA), whose headquarters are in Kenya and which operates the largest tea auction center in Mombasa. Recently, the Tea Association of Malawi invited neighboring Mozambique and Zambia tea associations to start selling their black tea through the Limbe Tea Auction in Blantyre. These conditions make the marketing of tea easy in domestic and international market. In 2013, one of the tea estate started tea processing and bringing tea bags to the market.

[71] TechnoServe, Brief Document The Mozambique Fruits Industry, Oct. 2002
[72] USAID AgroFUTURO Project, First Annual Work Plan, Feb. 2010/ Mid-Term Performance Evaluation of The USAID-Funded Development Credit Authority (Dec) Activity, Sep 2014:

On the supply side, improvements are anticipated through the replanting old and low productive trees for those of higher quality and output and the renewal of deteriorated processing plants for value-added products. The Development Plan of Zambezia Province sets tea revitalization in Gurue District as a high priority program.

Additionally the tea sector is a very labor intensive industry with labor accounting for two thirds of production costs ex-factory. Plucking is done by hand by women and men, which accounts for 75% of labor costs. The sector contributes substantially to employment generation in the region.

(3) Support services for business development

The performance of small and medium enterprises (SME) is one of the driving forces for value chain development in rural areas. For example, if the number of local traders is increased in rural areas, it will help farmers sell their produce to markets. (Of course, farmers should have improved their bargaining power by that time.)

Various credit lines are currently provided to facilitate the expansion of existing businesses. Nevertheless, in addition to high interest rates, the lack of business planning capacity and business management skills make access to credit services difficult.

Support services, including the provision of advice on business administration, need to be included in the services delivered by both the public and private sectors. The IPEME is an institute under the Ministry of Industry and Trade that provides advice to entrepreneurs on how to develop a specific business from the concept stage, and gives advice to existing SMEs on how to improve their business management. However, since IPEME has limited human resources, nationwide service deployment cannot be expected in the short term. Therefore, a quality Business Development Service (BDS), involving human resources from the private sector, has to be developed by positioning IPEME as a trainer of potential service providers (trainer of trainers). The functions of BDS will be:

- Providing advice on business planning and management;
- Analyzing the financial status;
- Providing business-related information;
- Providing information on credit sources for companies; and,
- Creating groups according to the corresponding roles within the value chain.

(4) Increasing added value by improved quality (applying quality standards)

Agricultural products are purchased at lower prices if the quality is uncertain, because traders take into account the risk of inclusion of poor quality products in a consignment. If quality standards are adopted, and products are traded in accordance with those standards, farmers can sell good quality products at higher prices and traders will consistently buy these products,

because risks will be considerably reduced. Thus, the purchase price of products can be raised because of lowering risks, and adding further value to products and their value chains.

Therefore, the Government should create quality standards for agricultural products through discussions with farmers' organizations, the private sector and research and development institutions. After determining and setting the quality standards, the Government should promote their adoption and application.

5.3.2 Necessary Measures

To ensure the implementation of the above strategies, the following measures for the promotion of adding value to agricultural products will be taken:

1) Establishing a support organization for value-chain development that will function as a comprehensive platform for providing investment and marketing information;
2) Developing quality business development services to contribute to rural and regional socio-economic development through promoting and fostering small and medium scale enterprises;
3) Strengthening price competitiveness of agricultural products by decreasing transaction costs and increasing the quality of products through the introduction of standards for the quality of agricultural products;
4) Establishing a development model for a particular crop and/or industry;
   - Revitalizing cashew production as a unique local product by replacing old disease – infested trees;
   - Promoting fruits production among small scale farmers through a fruit research center in Nampula (CFF-Nampula)
   - Revitalizing tea production as a unique local product by establishing an accessible financing mechanism, replacing aged tea trees with quality seedlings, and promoting tea out-grower schemes;
   - Developing a cassava processing agro-industry under out-grower schemes with local farmers' associations; and
   - Quality crop seed, at affordable prices, are needed to increase the production of family farmers.

5.3.3 Components of the Agricultural Development Master Plan

In order to ensure the proper implementation of above strategies, the following components for the promotion of adding value to agricultural products will be implemented:

II-5: Strengthening the Institutional Role in Promoting and Supporting for Value Chain Development

Objectives	To establish a comprehensive support platform for providing information for value chain development and agriculture marketing in the Nacala Corridor.														
Goals	The business environment for promoting value chain development has improved.														
Expected Outputs	1: The support institutions for investment are strengthened; 2: Business opportunities in the agricultural sector are expanded as a result of an enhanced information access service.														
Main Activities	1: Developing a support plan for value chain development; 2 Providing information on promotion and consulting services to potential private sectors, and dissemination of agricultural potential; 3: Facilitating the regulatory services for investors and farmers; 4: Providing advisory services for business start-ups (support in preparing business plans, introduction of available financial schemes for agriculture investment, etc.) for small and medium local agribusiness entrepreneurs, as well as to farmers' associations and cooperatives. 5: Providing technical assistance for the promotion of value chains of agricultural products and local small businesses. (This advisor will support implementing Component II-2 and II-5 as well as component II-4.)														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Priority Areas (candidate)	All zones. The main office will be located in Nampula, while branch offices will also be established in core areas (e.g., Cuamba, Lichinga, etc.).														
Expected Beneficiaries	Direct Beneficiaries						Indirect beneficiaries					Others			
	Small and medium local agribusiness operators and potential investors, farmers' associations and cooperatives in 19 districts						Farmers in 19 districts (approximately 2.8 million in 2011)					-			
Implementing Agency and Related Organizations	CEPAGRI, CPI, Cabinet of Accelerated Economic Development Zone (GAZEDA), Institute of Export Promotion (IPEX), IPEME, MASA/DPASA, ProSAVANA Coordination Office, and donors														

II-6: Capacity Development of Business Development Services

Objectives	To contribute to rural and regional socio-economic development through fostering small and medium enterprises by providing quality business development services to SMEs.
Goals	Private sector service providers will provide quality business development services for SMEs.
Expected Outputs	1: Capacity of staff involved in business development services of IPEME is strengthened; 2: Quality business development services are provided by a number of private sector service providers; 3: Effective and efficient coordination among organizations and institutions related to business development.
Main Activities	1. Training of trainers for BDS: 1-1 Prepare a training plan for potential trainers in business administration and support schemes for SMEs; 1-2 Preparing training materials and equipment; 1-3 Conducting a series of training sessions. 2. Training of BDS providers: 2-1 Preparing a training plan for private business development service providers on business administration and support schemes for SMEs; 2-2 Preparing training materials and equipment; 2-3 Recruiting and selecting potential participants for the training; 2-4 Conducting a series of training sessions.

	3. Establishing partnerships among concerned organizations on BDS: 3-1 Facilitating the Chamber of Commerce (CoC) in the three provinces to enhance their functions; 3-2 Organizing and conducting a series of business seminars for members of the CoCs and other business leaders; 3-3 Facilitating related organizations and institutions in business development, such as BDS, CEPAGRI, CPI, GAPI, IPEX, and provincial CoCs.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
		■	■	■	■										

Priority Areas	All zones

Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	50 BDS providers, and 480 members of CoCs.	Small and medium local enterprises and potential investors in 19 districts.	-

Implementing Agency and Related Organizations	IPEME, CEPAGRI, CPI, GAPI, IPEX, and provincial CoCs.

II-7: Quality Standardization of Agricultural Products

Objectives	To strengthen the price competitiveness of the agricultural products of Mozambique by decreasing transaction cost and increasing quality of product.
Goals	Trading prices of products are decided in a fair manner based on agricultural standards.
Expected Outputs	1: Quality standards for agricultural products are established and officially issued; 2: The standards are used nationwide.
Main Activities	1. Promoting coordination among relevant government institutions, selecting and organizing a forum for discussion for standard-formulation and monitoring; 2. Studying and formulating National Standards for Agricultural Products: 2-1 Studying quality standards of agricultural products, which are currently used in Mozambique and in neighboring countries; 2-2 Making a plan for determining product quality standards; 2-3 Selecting members for a working forum for agricultural product quality standardization (e.g., concerned officials, farmers' organizations, private sector and academic institutions) 2-4 Discussing agricultural product quality standards in the forum; 2-5 Publicizing agricultural product quality standards countrywide; 3. Organizing seminars to disseminate the newly formulated standards; 3-1 Promoting the use of agricultural product quality standards; 4. Monitoring, evaluating and revision: 4-1 Maintaining the product quality standards reflecting market needs.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
		■	■	■	■	■	■	■	■	■					

Priority Areas (candidate)	The entire country.

Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	All farmers and traders	Consumers	-

Implementing Agency and Related Organizations	MASA, IIAM, MIC, INNOQ, representatives of stakeholder groups involved in production, including trading, processing, and retailing of agricultural products, as well as research and development institutes, including universities.

II-8: Cashew Production Development

Objectives	To promote regional agriculture and to improve the livelihood of family farmers.
Goals	To enhance cashew nut production as the main production area of the country.
Expected Outputs	- Productivity, production volume, and quality of cashew nuts are improved; - Productivity, production volume and diversification of main crops in the area are improved.
Main Activities	1. Planning of projects, and selection of target areas and farmers（600 farmers x 2 ha=1200 ha）; First year: 50 farmers, second year: 100 farmers, third year: 200 farmers, fourth year: 400 farmers, fifth year: 600 farmers 2. Building capacity of farmers' associations, which manage cashew trees, and conduct production, planting trees and harvesting of cashew nuts; 3. Distributing inputs, such as cashew seedlings, fertilizer and good quality seed; 4. Develop the capacity of farmers' associations for the marketing of cashew nuts and apples by the construction of storage, access to fund for purchasing the produces and support matching with processing industries. 5. Providing technical assistance for intercropping systems of cashew with others crops, such as groundnuts, maize, cassava, sesame, and cotton.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■										

Priority Areas (candidate)	Districts of Zone 1 (Monapo, Muecate, and Mecuburi). Districts of Zone 2 (Meconta, Mogovolas, Nampula, and Murrupula).		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	600 farmers	2,800 farmers in seven districts	-
Implementing Agency and Related Organizations	DPASA, SDAE, INCAJU, IAM, NGO, and private sector companies.		

II-9: Fruits Promotion for Small Scale Farmers

Objectives	Promoting regional agriculture and improve the livelihood of farmers through promotion of fruits production
Goals	Competitive fruit production is promoted through the training of farmers groups and associations.
Expected Outputs	1: Strengthen the capacity to produce the seedlings of fruit trees at a fruit research center in Nampula (CFF-Nampula) 2: Fruit production is promoted to small scale farmers
Main Activities	1, Strengthen the capacity to produce the seedlings of fruit trees at a fruit research center in Nampula (1) Strengthen the production of seedlings of fruit trees, such as Mangos and Oranges, in the center (2) Organizing and training the surrounding farmers to produce the seedlings (3) Research of fruit varieties while considering market demand (4) Training of extension workers for the maintenance of fruit trees 2. Fruit production is promoted to small scale farmers (1) Training of farmers groups and associations to produce the fruits. (2) Provide the seedlings free of charge for farmers to plant in farmers' gardens. (3) Maintain the fruit trees with extension workers (4) Develop distribution of the fruit

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
		■	■	■	■	■									

Priority Areas (candidate)	Districts of Zone 2 (Meconta, Mogovolas, Nampula, and Murrupula)		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	20 farmers (seedling producer) 150 farmers (fruit producer)	5000 farmers	-
Implementing Agency and Related Organizations	DPASA, SDAE, IIAM, CFF		

II-10: Tea Industry Revitalization

Objectives	- Promoting regional agriculture and improve the livelihood of farmers through the creation of a model for tea production; - Promoting the out-grower model for tea production; - Producing seedlings of improved varieties of tea plants to replace old, unproductive plants.														
Goals	The tea industry around the Gurue district gains higher competitiveness in national and international markets, without accelerating environmental degradation or creating socio-economic disparity.														
Expected Outputs	1: An accessible financing mechanism is established; 2: Aged tea plants are replaced by quality seedlings; 3: The tea out-grower scheme is operational and expanding.														
Main Activities	1, Establishing an accessible financing mechanism for tea companies: (1) Using the "Development initiative Fund "; (2) Providing fiscal incentives for investment in processing facilities. 2. Supporting the replacement of old tea plants: (1) Introducing improved foreign varieties (seed and seedlings) through collective purchase; (2) Providing financial support to offset replanting costs (subsidies or loans); 3. Promoting the tea out-grower scheme: (1) Conducting initial trials using part of the abandoned tea gardens of companies; (2) Developing contract farming supported by technical assistance and provision of seedlings and inputs by tea companies.														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■										
Priority Areas (candidate)	Gurue district, Zambezia Province (Zone IV) Target Group: Tea Producers' Association in Gurue (consisting of five private tea companies), Out-growers (small scale farmers) in Gurue.														
Expected Beneficiaries	Direct Beneficiaries				Indirect Beneficiaries						Others				
	Five private tea companies				500 out-growers, and Employees of tea companies						-				
Implementing Agency and Related Organizations	DPASA, SDAE, Private entities														

II-11: Rural Agro-Industry Development

Objectives	Establishing and strengthening agricultural associations formed by family farmers will increase bargaining power, access to inputs, machinery and equipment, and credit or loans. Establishment of a management structure aimed at developing small-scale agricultural production will also enable the socio-economic advancement of family farmers. Registration of farmers' organizations will be encouraged for the provision of technical assistance, conducting

<table>
<tr><td></td><td colspan="15">monitoring and evaluation, and formulating contractual links with local industries.
The cassava-processing industry and farmers will be connected through out-grower schemes, preferably, through one or more legal entities (associations). The following outcomes are expected from the out-grower scheme:
- Increased production of cassava flour and starch;
- Increased production of cotton, groundnuts, maize and vegetables;
- Increased household incomes;
- Increased number and enhanced capacity of farmers' associations.</td></tr>
<tr><td>Goals</td><td colspan="15">➢ Promoting the establishment of farmers' associations and start cultivation of cassava and other recommended crops such as cotton, groundnuts, maize and vegetables;
➢ Starting and/or expanding cassava processing facilities;
➢ Ensuring the stable supply of raw materials for the processing of cassava;
➢ Developing a value chain for cassava products and other crops.</td></tr>
<tr><td>Expected Outputs</td><td colspan="15">1: The minimum area for establishing a cassava-processing facility will be five ha, and the total area for production of cassava to supply the industry will be 2,000 ha.
2: The goal is to establish five famers' associations, each consisting of about 200 farm families. During the first year, the first association is to be established with around 100 farm families, which will be expanded to 200 families in the second year. Other associations will be established in subsequent years.
3: Each farm family will independently decide on the area for production of cassava for supplying the industry, as well as growing other cash and/or food crops. The production farming system will be cassava inter-cropped in rotation with maize, groundnuts and cotton. Areas that are likely to receive irrigation will be oriented to vegetable cultivation.</td></tr>
<tr><td>Main Activities</td><td colspan="15">1. Organizational and institutional arrangements
1-1: Identification and evaluation of existing associations and lead-farmers;
1-2: Defining practical actions for the strengthening of associations and the development of management tools;
1-3: Training of registered producers on agricultural production management;
1-4: Strengthening public systems of rural extension to support the above actions;
1-5: Involving the private sector based on model contracts for the purchase and sale of products, including the supply of inputs and private extension services;
1-6: Monitoring and evaluating the program will be carried out by extension workers of SDAE, to ensuring progress efficiency and effectiveness.
2. Implementation, Processing and Marketing (by private firms)
2-1: Establishing a cassava-processing industry and training industry's manpower;
2-2: Providing inputs for cassava producers;
2-3: Operation of the cassava-processing industry should be able to begin as soon as the first cassava roots have been harvested, at about 12 months after the first planting;
2-4: Some machines and equipment will be acquired by the farmers' associations who will also be responsible for the maintenance and care of this plant (two tractors of 120 hp each, two heavy plows, and two light plows).</td></tr>
<tr><td>Implementation Period</td><td>2016</td><td>‘17</td><td>‘18</td><td>‘19</td><td>‘20</td><td>‘21</td><td>‘22</td><td>‘23</td><td>‘24</td><td>‘25</td><td>‘26</td><td>‘27</td><td>‘28</td><td>‘29</td><td>2030</td></tr>
<tr><td>Priority Areas (candidate)</td><td colspan="15">The southern part of Malema district, and near Cuamba Municipality.</td></tr>
<tr><td rowspan="2">Expected Beneficiaries</td><td colspan="5">Direct Beneficiaries</td><td colspan="5">Indirect beneficiaries</td><td colspan="5">Others</td></tr>
<tr><td colspan="5">1,000 households of family farmers (5 associations x 200 households)</td><td colspan="5">Owners of newly established cassava processing facilities.</td><td colspan="5">Other local actors of the cassava value chain (service providers, extension service providers, dealers of raw materials and processed products, etc.).</td></tr>
<tr><td>Implementing Agency and Related</td><td colspan="15">- The program shall be operated in a sustainable manner through the collaboration of local government officials, farmers' associations and producers.
• Facilitating private investments to establish cassava processing plants and promoting</td></tr>
</table>

Organizations	out-grower production; • Procuring processing equipment through loans from financial institutions. - The public sector such as IIAM, SDAE, the private sector, and NGOs will support the purchase of agricultural inputs and train farmers. - The public sector will provide social infrastructure and social services for the program.

II-12: Multiplication of Quality Seed

Objectives	- Strengthen family farmers' production through partnerships with seed companies; - Improve access to quality seed for producers through the increased production of quality seed in the region; - Provide recommendations for training programs, training for farmers and technical assistance; - It is hoped that local government will establish partnerships with new businesses by giving tax incentives, because the plan is expected to have high profitability and, thus generate taxes.
Goals	- Supplying quality seed that enables greater productivity and, as a result, higher income for farmers and corporations operating in the Nacala Corridor; - This business model will generate contracts that will help, in the medium term, the strengthening of the producer's associations that are currently present in the region, as well as the development of other associations that will strengthen the activities carried out by small-scale farmers.
Expected Outputs	1: It is proposed to install a Seed Processing Unit (UBS) for the commercial production of soybean-, maize- and cotton seed. Small-scale farmers will be involved under the out-grower scheme through the supply of raw materials, inputs and technical assistance linked to the contractually agreed purchase of produce. The UBS was designed to process and store a sufficient volume of different varieties of seed to sow at least 45,000 ha for production. 2: With these actions, the plan will involve 1,500 households of family farmers in the production chain, who will benefit from knowledge and technology transfer resulting in a significant increase in productivity and household incomes. Each farmer will receive support for the production of improved seed for soybeans, maize, cotton, beans, groundnuts and sesame for 1 ha of farmland. Based on their preference, farmers will also be able to grow staple food crops for their own consumption and other cash crops. 3: From the farmland that produces improved seeds, 60% of the area is intended for the production of soybean, 20% for cotton, and 20% for maize.
Main Activities	1. Selection of target areas and starting production of seed for soybean, maize and cotton; 2. Construction of the UBS; 3. Promote the rehabilitation of irrigation systems 4. Promoting the establishment of associations of local producers and starting the cultivation of crops such as ground nuts, beans and sesame; 5. Financing for the supply of inputs, and technologies to local producers.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■										

Priority Areas (candidate)	The Lalaua District		
Expected Beneficiaries	Direct Beneficiaries	Indirect Beneficiaries	Others
	1,500 households of family farmers.	25,000 farmers (enabled to have access to improved, quality seed)	
Implementing Agency and Related Organizations	The following are necessary for the development of the cluster: - Investors interested in financing the implementation of the UBS; - Financing agricultural machinery and equipment, inputs, and technology for local producers; - Local institutions (IIAM and SDAE) providing and facilitating the access of producers to inputs; - Local institutions (IIAM and SDAE) providing extension services and promoting training for local producers; - Public-private partnership (PPP) between IIAM and investors, for joint development of commercial varieties, adaptive to local conditions.		

5.4 Developing Infrastructure for Logistics

5.4.1 Development Strategy

The basic goal for improvement of logistical infrastructure is to achieve efficient management of logistics for lower costs and shorter delivery times. Through the development of roads, access from farmlands to assembling points and/or consumption areas will be improved. Such improved transportation, together with the development of storage networks, will lower transportation costs, increase output volume by decreasing product loss, and improve quality of products.

These improvements to logistics, along with the benefits mentioned above, are catalysts for the overall improvement of the agro-industry.

(1) Access road improvement

Roads and bridges are the primary infrastructure requirements for conducting all activities relevant to socio-economic development. Therefore, one of the specific objectives of the Government is to ensure the rehabilitation of access roads at different levels, including local and regional access roads. These access roads are of vital importance for the transportation of agricultural products, ensuring market access by family farmers in rural areas.

The following aspects should be taken into consideration when implementing road network enhancement:

1） Capacity development for road planning taking into consideration agricultural strategies

The National Roads Agency (ANE) is responsible for the improvement of national and regional roads. However, in the scope of PNISA, MASA is currently preparing a project to improve rural roads for agriculture development.

In road improvement planning, roads are ranked according to their priority. To reflect road improvement as part of agriculture development planning, the relevant actors include ANE in charge of roads, DPASA in charge of local Agriculture, and Ministry of Planning and Development (MPD) in charge of planning. These government agencies should strategically collaborate in the development of a road improvement plan.

The plan will be prepared based on the requirements from local districts, using a participatory approach to determine it; it should, nevertheless, ensure consistency with provincial and/or regional strategies.

2） Priority roads for improvement

a) Roads to increase market access

Roads connecting to production areas of specific products and their markets will be improved according to their priority. Benefits such as cost reduction, shortened transportation time, and

quality improvement can be expected when roads are constructed in an existing production area. In particular, the following ideas should be considered for the Study Area:

- Roads connecting production sites to markets or to major roads in Gurue, which is located in Zone IV, should be paved to improve the quality of vegetables shipped to the market;
- Improving roads and constructing bridges in Zone IV and V, which are in poor condition and can easily be damaged by heavy rainfall;
- Priority should be given to the improvement of roads that connect production areas to processing sites or consumption areas/markets in (i) areas that produce crops that are easily damaged during transportation, and (ii) areas that produce crops, on which the quality of processed products is dependent on the length of the time after harvest, such as vegetables and cassava.

b) Roads and bridges to ensure access throughout the year

Ensuring year-round transportation is one of the major challenges in the target area. Generally, 15 to 17% of the total length of roads is impassable during the rainy season. The major causes are the lack of bridges and poor drainage of steep slopes and sections located in low-lying areas.

In order to mitigate these conditions, drainage improvement and partial pavement is required; especially for roads used by heavy trucks. Moreover, there are many seasonal streams in the target area, which often isolate many communities during the rainy season. In these areas, the price of agricultural products fluctuates greatly between the beginning of harvest season and the end of rainy season. Year-round transportation in these areas will increase the opportunity for farmers to get more profit.

This aspect is particularly important in Zones III, IV and VI, which have hilly terrain.

c) Improvement of road maintenance capacity of local communities

In addition to the above, increased damage of older roads caused by the lack of maintenance is a major reason of blocked roads. The Government of Mozambique (GOM) represented by the ANE is maintaining roads with their own budget, but this is not sufficient to cover all sections in all areas. Therefore, road users, such as local communities, should take some responsibility in maintaining the roads they use. Training on necessary road maintenance techniques and practices should be provided to these communities through road construction and rehabilitation projects.

3） Required activities to support rural road development

The Government of Mozambique implemented a rural roads implementation program (RRIP) during 2008–2011, during which it endeavored to find solutions to reduce the costs for road construction. Through that program, various materials and methods for road construction and pavement were identified, but further research and development is still required.

Research and development, of adaptive techniques and practices to be applied by local communities, for example road improvement with sand bags or pavement with stones, etc., should be further conducted to achieve community-driven road development and maintenance.

a) Roads to support new development

Road networks should be developed in accordance to the development strategies of relevant sectors. Access roads are essential infrastructure to attracting investors to new strategic development areas for agribusinesses, such as the SEZ. Moreover, roads connected to communities with potential for crop production will also contribute to promoting the development of these areas. For example, a number of communities are located near rivers without access roads in Malema, Alto Molocue, Mandimba and Lichinga. Production areas for vegetables or other irrigated crops can be developed if roads connect these communities.

b) Road improvement in line with development

The required level of priority for roads will change depending on the conditions of agribusiness development. Thus, road development priorities in a strategic plan should be revised periodically.

c) Involvement of community for maintenance of feeder road

Constructed roads should be maintained for appropriate passage and the government is responsible for this maintenance. However, it is also important to involve communities using the feeder roads in order to easily maintain them. The community will organize a maintenance group for feeder roads and learn construction and maintenance techniques for roads through the participation of construction work on the roads.

(2) Railways

Rehabilitation and development of a railway line from Tete to Nacala Port through Malawi is implemented by the private sector for completion in 2017. On completion it can conveniently be used to transport production surpluses from the Nacala Corridor to regional and international markets. Consideration should be given in the operation plan for agricultural development to use the railway line for hauling agricultural products.

(3) Storage facilities

a) Large Scale Distribution Network

The estimated production, demand, and surplus of maize in 2030 is 907,000 ton, 460,500 ton and 412,000 ton in respectively (Refer to Table 3.7.5). Surplus of maize is substantial in comparison to other crops. Cassava has a large volume of surplus, but the harvesting period is much longer than that of maize. Therefore, the required storage facilities should primarily focus on the demand and surplus of maize in each district. Areas with a high surplus or consumption volume will be positioned as priority locations for the distribution network.

As illustrated in Figure 5.4.1 Strategic Assembling Points, strategic assembling points, taking into consideration the present product distribution flow and rehabilitation plans of roads and railways, were identified based on the above estimate of demand and surplus of maize in 2030. In the figure, strategic assembling points are divided by size and function. Products are collected from inside a district at a primary assembling point. A secondary assembling point is used for inter-district trade, in addition to functioning as a primary assembling point. The final assembling point is for large consumption areas, inter-regional trade, long-term storage, and/or exports. The total required capacity for primary, secondary and final assembling points is approximately: 10,000 tons or less, 30,000 tons or less, and 30,000 – 100,000 tons, respectively.

Source: JICA Study Team

Figure 5.4.1 Strategic Assembling Points

Public storage facilities are located in each district of the Nacala Corridor Area. In order to improve the efficiency of the supply-chain network and quality control of agriculture products, the present public storage network should be rehabilitated or upgraded. Cuamba and neighboring districts in Niassa Province are expected to produce large surplus of maize by 2030. Cuamba will become a grain supply center, which can distribute products to Malawi, the Pemba Corridor, and the central region, as well as to other regions along the Nacala Corridor. It may also need special support to establish larger-scale storage facilities through public investment.

As is currently the practice, these public storage facilities will be rented to the private sector. In storage facilities of primary assembling points, priority will be given to users handling small to medium volumes, especially farmers' groups who cannot have the financial resources to invest in commercial-scale warehouses, to improve their access to the storage facilities. Under such

conditions, one storage facility should consist of a number of small-capacity warehouses, each with a capacity of about 100 tons, so that many groups, individuals, and companies can utilize them. Medium to large-scale storage facilities, including grain silos, should be invested in and built by the private sector.

b) Storage of farmers

In order to mitigate storage losses and maintain the quality of the produce, the storage networks should be linked between farm-gate to the hub storage sites. Therefore small scale facilities at the farmers' sites or associations will be promoted using the support of a financing system and technical assistance.

Meantime, post-harvest technology, especially appropriate storage techniques for the quality control of the products, has to be imparted on stakeholders involved in the supply chain of agricultural products. Through the network, the market access of small scale farmers can be improved.

(4) Logistics

Improvement of road conditions, as well as an increase in transaction volume, stimulates the private sector to increasingly participate in the logistic service businesses. This can help lower the current transportation costs, shorten the delivery time, and decrease loss during transportation, which are the major logistic constraints in the target area. The private sector has an important role to play in investing in the logistical service business.

As mentioned in section 5.3.1, expansion of the agro-industries is required in order to increase the added value on agricultural produces and the benefits for the population. By developing logistics, some rudimentary conditions for the development of the value chain can be supported, such as maintaining produce volumes, sustaining uninterrupted transportation, and decreasing costs to strengthen competitiveness. It is also necessary to promote private sector investments in various sectors and levels for value chain development.

The Government of Mozambique has mechanisms to establish SEZ and IFZ (Industrial Free Zone) in specific locations and thus create a favorable environment, which includes efficient value chains for crops and increased productivity for industries related to production, processing, storage, and distribution, into a single complex and that will attract investment. IFZ mainly targets industries related to export of products, while SEZ target entities for both domestic markets and for export. Therefore, in parallel with such developments in logistics, preferential treatment to private investment may be necessary through the establishment of SEZ.

5.4.2 Necessary Measures

In order to ensure the implementation of the above strategies, the following measures regarding the development of infrastructure to improve logistics will be taken:

1) Rehabilitating and/or improving roads that are used for agricultural activities such as the hauling of agricultural inputs or distribution of agricultural products;

2) Improving the efficiency of supply chains including quality control of agriculture products, and rehabilitation of the existing public storage network facilities; and

3) Improving logistic center to support the development of agricultural industries.

5.4.3 Components of the Agricultural Development Master Plan

To ensure the implementation of the above strategies, the following components regarding the development of infrastructure for improved logistics will be implemented:

II-13: Improvement of Access Roads for Agricultural Activities

Objectives	To rehabilitate or improve roads used for agricultural activities, such as the distribution of products and connecting production areas with markets for sales.														
Goals	Agricultural roads are maintained so that they are accessible all year to connect agricultural production areas, markets, processing facilities and storage facilities.														
Expected Outputs	1: A strategic road improvement plan for agricultural development is prepared; 2: Rural roads are improved.														
Main Activities	1: Preparing a five year strategic plan for agricultural roads development: 1-1: Setting up rural road improvement committees in each province that have representation of DPASA, Provincial Directorate of Transport and Communication (DPTC), ANE, SDAEs and District Service of Planning and Infrastructure (SDPI)s; 1-2: SDAE, in cooperation with SDPI, examines its own plans from the perspective of agricultural promotion in the districts, and presents its findings to the committees. The committees prepare strategic plans for rural road development based on the draft proposals from each SDAE. 2: Improvement of rural roads based on the prepared plans: 2-1: Setting up road maintenance groups, selected from communities situated near roads that will be improved according to the prepared plans. 2-2: Implementing rehabilitation work according to the plans. The maintenance groups will participate in this work and will be trained in basic maintenance skills; 2-3: The maintenance group will be carrying out basic maintenance work.														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
Priority Areas (candidate)	Phase 1: Zone V and IV (7 districts), Phase 2: Zone III and IV (5 districts) Phase 3: Zone I and II (7 districts)														
Expected Beneficiaries	Direct Beneficiaries					Indirect Beneficiaries						Others			
	Approx. 11,000 rural inhabitants					Approx. 120,000 rural people						-			
Implementing Agency and Related Organizations	DPASA and ANE (in Nampula, Niassa and Zambezia), MPD, Ministry of Transport and Communication (MTC), and Ministry of Public Works, Housing and Water Resource (MOPHRH).														

II-14: Rehabilitation of Agricultural Storage Facilities and the Construction of Silos

Objectives	To improve the efficiency of the supply chain, quality control of agricultural produce, and the present public storage network.														
Goals	The private sector can access public storage facilities to manage the timing of sales because of available favorable storage conditions.														
Expected Outputs	1: A strategic storage rehabilitation plan in the Nacala Corridor for agricultural development has been prepared; 2: Public storage facilities are rehabilitated; 3: Storage facilities are properly utilized, and storage loss is reduced.														
Main Activities	1. Preparing the strategic plan for storage facility rehabilitation and construction of silos in the Nacala Corridor with the view to agricultural development: 1-1 Clarifying the necessary type and capacity of storage facilities in each district; 1-2 Identifying the present conditions of storage facilities in each district (by ICM); 1-3 Prepare storage facility rehabilitation plans and construction plans for silos (schedule, priority, phasing, cost estimates, F/S); 2. Rehabilitation work: 3. Training for the correct management and utilization of storage facilities: 3-1 Training ICM staff on Operation and Maintenance (O/M) of the facilities (rent management, loss control, periodical maintenance, etc.); 3-2 Training stakeholders on storage technology and practices (post-harvest loss due to insects, rodents, and fungi, etc.); 3-3 Setting and applying temporary agricultural product standards in cooperation with stakeholders (this will be a pilot activity for efficient trading practices applying clear grain standards).														
Implementation Period	2016	‘17	‘18	‘19	‘20	‘21	‘22	‘23	‘24	‘25	‘26	‘27	‘28	‘29	2030
		■	■	■	■	■	■	■	■	■					
Priority Areas (candidate)	All zones. However, priority will be given based on current conditions and the logistical importance of each location.														
Expected Beneficiaries	Direct Beneficiaries					Indirect Beneficiaries					Others				
	Farmers in 19 districts (approx. 2.8 million in 2011)					People in 19 districts (approx. 4.3 million in 2011)					-				
Implementing Agency and Related Organizations	ICM, MASA, DPASA (Nampula, Niassa and Zambezia), and IIAM.														
Remarks	Expected target of storage facilities are 500 tons (300 m^2) capacity class in six locations, 1,500 tons (900 m^2) capacity class in 10 locations and 2,500 tons (1,500 m^2) capacity class in three locations.														

II-15: Support to the Development of Agricultural Industries

Objectives	- To create a preferential environment to aggregate agro-industries to add increase value to agricultural products through the development of agricultural value chain networks. - For this purpose, the SEZ will be established in the western part of the Nacala Corridor, applying preferential conditions to entities in processing, distribution and other activities related to the agricultural sector. - An integrated logistics center for agricultural products will be established in the SEZ. The center will consist of storage, railway sidings, and a truck yard. - The center is expected to be the starting point for developing the agricultural value chain networks in the western part of the Nacala Corridor. It is also expected that processing industries will be developed in the surrounding areas of the center if

<table>
<tr><td></td><td colspan="15">storage facilities for agricultural products and preferential conditions are maintained for the SEZ.</td></tr>
<tr><td>Goals</td><td colspan="15">To formulate a catalyst for increasing additional value for agricultural products through developing agricultural value chain networks at Cuamba in the western part of the Nacala Corridor.</td></tr>
<tr><td>Expected Outputs</td><td colspan="15">1: The Cuamba district is declared as a SEZ for promoting the establishment of “agricultural value chain networks” with incentives (tax, financing, technical assistance, etc.);
2: An established integrated logistics center for agricultural products (10 ha including adjoining facilities).</td></tr>
<tr><td>Main Activities</td><td colspan="15">1: Declaring Cuamba district as a SEZ;
2: Establishing an integrated logistics center for agricultural products:
2-1: Conducting studies to determine the exact location and appropriate design for the integrated logistics center for agricultural products;
2-2: Constructing the logistic center consisting of office facilities, storage and basic infrastructure such as electricity, water supply and communications by government institutions (including railway access, if feasible);
2-3: Entering into a contract with a PPP to operate the integrated logistics center, including the storage facilities.</td></tr>
<tr><td rowspan="2">Implementation Period</td><td>2016</td><td>‘17</td><td>‘18</td><td>‘19</td><td>‘20</td><td>‘21</td><td>‘22</td><td>‘23</td><td>‘24</td><td>‘25</td><td>‘26</td><td>‘27</td><td>‘28</td><td>‘29</td><td>2030</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Priority Areas (candidate)</td><td colspan="15">Cuamba, western part of the Nacala Corridor</td></tr>
<tr><td rowspan="2">Expected Beneficiaries</td><td colspan="5">Direct Beneficiaries</td><td colspan="7">Indirect beneficiaries</td><td colspan="3">Others</td></tr>
<tr><td colspan="5">Farmers in Cuamba
(approx. 42,000 households)</td><td colspan="7">Farmers in Zone V
(approx. 350,000 households in 2030)</td><td colspan="3">-</td></tr>
<tr><td>Implementing Agency and Related Organizations</td><td colspan="15">The Ministry of Planning and Development through the GAZEDA</td></tr>
<tr><td>Remarks</td><td colspan="15">The area of the integrated logistics center is expected to be about 10 ha.
The capacity of storage is assumed to be about 500 tons.</td></tr>
</table>

CHAPTER 6 NATURAL RESOURCES

In this chapter, four development strategies are presented and discussed for the development and management of natural resources from the perspective of ***"Sustainable and integral use of land and water resources, forests and fauna, and the protection of family farmers and communities in the development process".*** As the discussions in this chapter of the five development strategies advance, the respective components of each strategy will be presented in detail. The development strategies are the following:

- Land Management;
- Implementation of Appropriate Investments by the Private Sector through the Adoption of the Principles of Responsible Investment in Agriculture and Food System (rai);
- Water Resources Development and Management;
- Forest Resources Development and Management;
- Adaption to Climate Change.

6.1 Land Management

6.1.1 Development Strategy

The strategy for land management will adhere to the National Land Policies, Land Law and its Regulations, PEDSA, PNISA and discussions held by the Land Consultation Forum. It is also duly recognized that customary land tenure systems do still prevail in the rural society. The principal pillars of the land management strategy consist of the following four topics: 1) dissemination of the Land Law; 2) protection of land rights for communities and family farmers; 3) prevention of conflict, and 4) optimum use of land.

Government institutions, NGOs and CSOs should promote the dissemination of the Land Law and its application to rural communities, including family farmers. By promoting community land delimitations, it is expected that boundaries of neighboring communities will become defined and agreed upon, and the DUATs certificates of communities will be properly issued. Customary systems of land management under the direction of traditional leaders will be respected at the community levels. However, necessary interventions will be enacted to achieve better governance of land in respect of its allocation, gender equality, dispute settlement and negotiations with investors. Inside the territorial boundaries of communities, lands that do not belong to any household will be primarily reserved for common use or for the expansion of land for future generations. Nevertheless, the possibility to formalize partnerships and agreements with investors are not ruled out, but will be based on community consensus for the benefit of its own members.

Regularizing DUATs for individual family farmers, both male and female, will contribute to the intensification of agriculture and the reduction of potential land conflicts. Participation, however, should be voluntary.

Land management committees should be established at community levels, following the experiences and lessons obtained through iTC (iniciativa para Terras Comunitárias: the Community Land Initiative)[73], which has been a project co-financed by Department for International Development of United Kingdom (UK-DFID), the Netherlands and Denmark, Irish Aid, Swedish International Development Agency (SIDA) and the Swiss Agency for Development since 2006, to which MCA was joined subsequently. The committees will be formed by community members, in which half of them should be women, in order to maintain gender equality.

The strengthened capacity of the government's land administration institutions will contribute to the prevention of potential conflicts among farmers, as well as between communities and investors, and making optimal use of the limited land resources for development purposes, through interventions such as land inventory, zoning or land-use planning such as PDUT, information disclosure, timely and effective supervision, among others.

6.1.2 Necessary Measures

To ensure the consistent implementation of the above strategies, the following measures to improve land management will be taken:

1) Protection of land use rights for rural communities and family farmers:
   Provide DUAT for rural communities and individual family farmers in order to reduce the threat of land conflicts, and also accelerate their applying improved farming. It should be voluntary interventions and maintain gender equality.

2) Application enforcement of land and environmental laws and support for improved land governance at community level:
   Strengthen enforcement of the existing supervision mechanism of the Land Law and Environment Law in harmony with development at local communities and environmental conservation in compliance with the Principles of Responsible Investment for Agriculture and Food System (rai). Meanwhile, conduct dialogues and workshops with local communities in cooperation with NGOs and CSOs in order to disseminate Land Law, to create awareness about their rights of appeal and grievance redress mechanism, as well as to promote gradual modernization of the customary land administration system.

6.1.3 Components of the Agricultural Development Master Plan

To ensure the implementation of the above strategies, the following components for the improvement of land management will be implemented:

[73] José Monteiro, Alda Salomão, Julian Quan, Community Land initiative (iTC), Mozambique, for 2014 Annual World Bank Conference on Land and Poverty "Improving land administration in Mozambique: a participatory approach to improve monitoring and supervision of land use rights through community land delimitation (March 2014)"; Julian Quan, José Monteiro and Paulo Mole for Annual World Bank Conference on Land and Poverty "The Experience of Mozambique's Community Land Iniciative (iTC) in Securing Land Rights and Improving Community Land Use: Practice, Policy and Governance Implications (April 2013)"

III-1: Promotion of Land Registration for Communities and Family Farmers

Objectives	- To mitigate land insecurity and vulnerability of family farmers and ensure the rights related to the use of the land and ownership of their properties on the land. - To enact proper land management at the local government and communities.
Goals	To strengthen the land rights of farmers by promoting the registration of DUAT for individual and community lands. Community land is to be utilized for the common benefit on a sustainable basis; hence, the conservation and improvement of land fertility should be promoted and protected to increase productivity. Moreover, unnecessary land conflicts stemming from agricultural development will be avoided by the formation of a database of potential land for development based on the delimitation of community DUATs.
Expected Outputs	1. Legally identifiable boundaries and representatives of land of communities and of family farmers (by legally obtaining DUAT for communities and farmers); 2. Strengthening the capacity of the government by preparing a database of potentially available land for development based on the distribution of community DUATs.
Main Activities	1. Preparatory Planning - Reviewing past projects, and enact coordination with relevant agencies; - Selecting target communities and conducting preparatory field surveys - Dissemination of DUAT and surveys, determine the level of surveys (i.e., community DUAT or/and individual DUAT), and making an activity plan with community members during meetings in the intervention areas. - Train several community members, which should include women, who support the activities of land titles in technical and in legal knowledge aspects. 2. Issuing land titles (DUATs) to communities or/and individual farmers: - Making an inventory and distribution map of users of farmland through participatory communication processes; - Conducting community consultations, formation processes and consolidation of each DUAT. - Cost-free land registration for communities and individual or small farms (up to 5 ha). 3. Institutional strengthening of government implementation agencies; - Establishing land management commissions/committees in each community, and providing training for its members; - Developing the capacity of relevant local government agencies (Provincial Section for Geography and Cartography (SPGC), SDAE, among others); - Preparing a land information database for land management and agricultural development; 4. Actively monitoring the use of land.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■	■	■	■	■	■					

Priority Areas (candidate)	The activities in Zone I and Zone V are to be implemented first.		
Expected Beneficiaries	Direct Beneficiaries	Indirect beneficiaries	Others
	Approx.500,000 family farming households in 2030	Approx. 1,000,000 household in 2030 (all households in 19 districts)	-
Implementing Agency and Related Organizations	DNTF, SPGC in Nampula, Niassa and Zambezia provinces		
Remarks	It is expected that DUATs will be prepared for a total of 1,000,000 ha. DNTF and SPGC belong to Ministry of Land, Environment and Rural Development (MITADER), therefore inter-ministerial coordination is required with MASA.		

III-2: Strengthening the Supervision Mechanism for Land and Environmental Law Enforcement

Objectives	- To harmonize agribusiness investment with the development of local communities; - To promote environmental conservation through compliance with the Principals of "rai" (Responsible Investment for Agriculture and Food Systems); - To provide legal instruments for spatial planning to the 19 districts.

Goals	All agricultural investment projects in the Nacala Corridor (especially large-scale projects covering areas over 1,000 ha or falling under Category A or B) are implemented in conformity with PDUTs under proper supervision and corrective guidance by relevant government authorities, thus contributing to avoiding conflicts with local communities and serious negative impacts on the environment.
Expected Outputs	1: PDUTs are elaborated, ratified and properly revised in the 19 districts; 2: Government officials are trained, equipped and funded to provide improved services for law enforcement supervision, using partial support of NGOs, CSOs and private service providers. 3: Monitoring and supervision missions are properly conducted in a timely and effective manner, and corrective sanctions and penalties according to current laws - including revocation of DUATs and other licenses - are put into practice for cases of non-compliance or violation; 4: All documented information, including PDUTs, is accessible by the general public; 5: Local people understand the process of grievance redress, in relation to "rai".
Main Activities	1. Providing assistance to accelerated elaboration, harmonization and revision of PDUTs: 1-1: Providing equipment such as Global Positioning System (GPS), motorbikes, cameras, computers and GIS software along with technical training in priority districts (Cuamba and N'Gauma), and the province of Niassa; 1-2: Providing budget support for contracting engineers and field operations' costs (for priority districts Cuamba and N'Gauma); 1-3: Conducting technical meetings to harmonize PDUTs based on the results of agro-ecological zoning as well as other inter-district plans (mainly between DPCA, DPASA and neighboring districts); 1-4: Assisting in the revision of PDUTs after the first five and 10 years in all 19 districts. 2. Providing technical assistance for the training of government officials aimed at improving the basic conditions of law enforcement. 2-1: Conducting seminars, OJTs, and training courses on the lawful and effective means of the supervision of agricultural investment projects in accordance with the principles of "rai"; 2-2: Providing vehicles and Information and Comunication Technology (ICT) equipment for the exclusive use of inspectors and auditors; 3. Disseminating Land Law and principles of "rai" among local communities and assisting in improving land governance: 3-1: Conducting a series of dialogues with the local people of the 65 administrative posts to explain the essence of the "rai Guidelines" and to raise awareness of their rights to appeal grievance redresses and settlements of disputes; 3-2: Conducting workshops in cooperation with NGOs/CSOs at the 65 administrative posts on the gradual modernization of the customary land administration system to disseminate Land Law, better comply with the stipulations of the Law, especially in terms of gender equality, democratic consensus building, and negotiating capacity with outsiders.
Implementation Period	Initial Intensive Intervention: 2015 – 2016, Revision of PDUTs: 2018 – 2020, 2022 – 2025 2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 29 2030
Priority Areas (candidate)	All zones. As for the elaboration of PDUTs, priority will be given to the districts of Cuamba and N'Gauma.

Expected Beneficiaries	Direct Beneficiaries	Indirect beneficiaries	Others
	Local governments of three (3) provinces and 19 districts; MASA, CPI, CEPAGRI, MITADER, and Basin Water Management Agency (ARA).	Local communities and small-scale farmers in particular along the Nacala Corridor.	-

Implementing Agency and Related Organizations	MITADER: National Directorate of Land Planning and Management (DNAPOT), National Directorate of Environmental Impact Assessment (DNAIA), General Inspection MASA: DNTF, CEPAGRI Provincial governments: DPASA (SPGC, Provincial Service of Forest and Wildlife (SPFFB)), Provincial Directorate for the Coordination of Environmental Action (DPCA)

	District governments: SDAE, SDPI Other institutions with authorization competence and supervision: CPI, ARA, among others.

6.2 Realization of Appropriate Investments by the Private Sector through the Adoption of Principals of "rai"

6.2.1 Development Strategy

(1) Establishing rules and systems for the Responsible Investment for Agriculture and Food Systems "rai" Compliance

The Master Plan is expected to establish a model of Responsible Investment for Agriculture and Food Systems (rai) to better distribute the benefits, and balance opportunities with risks of agricultural investment projects, paying special attention to the protection of the rights of local communities and individual farmers, as well as using private sector resources to benefit the family farmers. This will be achieved through the following approaches: 1) environmental and social considerations in the Master Plan, and 2) establishing "ProSAVANA Guidelines on the rai" and its applications. It should be emphasized that the "ProSAVANA Guidelines on the rai" do not attempt to create new, original principles, which may govern the design and/or prioritize the components of the Master Plan. They rather aim at translating internationally discussed principles and guidelines into more specific actions to better correspond with the reality/conditions of the Nacala Corridor when the proposed components of the Master Plan are implemented.

The targeted main users of the Guidelines on the "rai" include:

(1) The Government of Mozambique on the central and local levels;
(2) Investors, including corporations and financial institutions;
(3) Local stakeholders, including communities (for consulting purposes);
(4) Independent, neutral players such as NGOs, civil society and academic institutions; and,
(5) Bilateral/multilateral donors and, to the extent possible, governments of countries that offer investment initiatives.

Emphasis was placed on the fact that the Government of Mozambique already has a number of laws and regulations, which require obligatory compliance and respond to most principles of "rai", if properly enforced. The contents may be summarized as follows: (i) key principles and guidelines of the rai; (ii) legal regulations for the "rai" in Mozambique; (iii) recommended codes of conduct and good practices for investors; (iv) self- check list; (v) useful links; and, (vi) remarks for government officials (Annex).

The Master Plan component "Incorporation of the "rai" in legal structure and administrative system of government institutions" will help the process of the internalization of the principals of "rai" by relevant institutions and the consolidation of the legal and lawful status of the "rai" under current Mozambican legislation.

(ii) Principal Legal Instruments for "rai" in Mozambique	
Laws - Environment Law - Land Law, and its Regulations - Forest and Wildlife Law, and its Regulations - Water Law - Cultural Heritage Protection Law - Territorial Planning Law, and its Regulations - Investment Law, and its Regulations - Labor Law	*Regulations* - Process of Environmental Impact Assessment - Environmental Inspection - Environmental Audit - Standards of Environmental Quality, Emissions and Effluents - Waste Management - Pesticide Management - Phyto-sanitary Inspection and Plant Quarantine - Control of Invasive Exotic Species - Bio-safety related to the Management of GMO - Seeds - Fertilizer - License and Concession of Water - Small Dams - Survey and Exploitation of Groundwater - Process of Resettlement caused by Economic Activities - Licensing of Industrial Activities

(iii) Recommended codes of conduct and good practices for investors (final draft)
1.(1) Studying and identifying of tenanted land, local characteristics and activities carried out by people for enterprise development: 1.(2) Introduction of new cultivation technologies and practices, such as direct planting techniques; 1.(3) Maintaining community access to natural resources; 1.(4) Prioritizing project implementation in already consolidated areas to avoid deforestation and opening of new areas; 1.(5) Elaborating compensation plans for families that will be affected during the project; 1.(6) Settling disputes on rights of land use. 2.(1) Ensuring food production to secure dietary and nutritional food intake in the project area: 2.(2) Adapting production processes to Mozambican environmental conditions; 2.(3) Elaborating a contingency plan for natural disasters. 3.(1) Ensuring information disclosure and dissemination: 3.(2) Involving other actors, such as the media, in important events during the process of project design as well as project implementation. 4.(1) Motivating communities to participate in the project through appropriate communication channels. 5.(1) Internalizing social and environmental costs: 5.(2) Analyzing and adapting enterprises to local legislation and global good practices relating to the labor force; 5.(3) Avoiding the use of involuntary and/or child labor; 5.(4) Implementing good agricultural practices (BPA) and labor norms of the country; 5.(5) Training local workers; 5.(6) Installing institutional infrastructure for technological assistance and development; 5.(7) Complying with the terms of agreement for contract farming with communities. 6.(1) Creating mechanisms to cope with and settle possible conflicts of interest between investors and communities; 6.(2) Providing social services to the communities; 6.(3) Adapting investment projects into the districts' development context. 7.(1) Conserving biodiversity.

7.(2) Promoting soil conservation and improvement techniques, and the appropriate use of farm inputs;
7.(3) Promoting efficient use of irrigation water;
7.(4) Promoting good agricultural practices aimed at reducing environmental impacts;
7.(5) Restoring ecosystems at project sites in case of expiration or revocation of DUATs, or cancellation of projects.

(iv) Self check list (final draft)

(Concept Stage)

1. Did you read and/or agree with the "Principles for responsible investment in agriculture and food systems" by the Committee on World Food Security (CFS) and "Voluntary Guidelines on the Responsible Governance of Tenure of Land (VGGT)" by FAO?
2. Did you study the policies of the Mozambican central and provincial governments on food and agriculture to decide on crops, products, and value chains for your business?

(Site Identification and Preliminary Survey Stage)

3. Did you make sure to avoid disturbing the nationally designated environmentally protected areas?
4. Did you refer to the PDUTs for the identification of potential project sites?
5. Did you consider how to avoid or minimize the clearing of forests and/or disturbing the traditional community's access the right to forest resources?
6. Did you consider the possibility of the occurrence of threatened animal species and their habitats inside and/or around the project site?
7. Did you consider the possibility of cultural heritage sites or national liberation heritage sites inside and/or around the project site?
8. Did you consult the Cadaster Services about existing DUAT holders and concessions inside and around the project site?
9. Did you consider how to identify and respect the "invisible" (i.e., existing but not demarcated nor registered) DUAT holders inside and/or around the project site?
10. Did you make sure to avoid disturbing "zones for partial protection"?
11. Did you consider how to avoid or minimize involuntary resettlement and/or land acquisition?

(Assessment and Consultation Stage)

12. Did you confirm which environmental category your project might fall under?
13. Did you take into account the costs and time of conducting an EIA in the project planning?
14. Did you align correctly the schedule of three different application procedures (Investment proposal for CPI; DUAT application for SPGC or MASA; EIA for DPCA or MITADER)?
15. Did you start mobilizing and preparing enough resources for community consultations in the DUAT application process?
16. Did you start mobilizing and preparing enough resources for public consultations for the EIA process?
17. Did you start mobilizing and preparing enough resources for public consultation for the resettlement planning process?
18. Did you consider how to maintain the Investor-Community Partnership Agreement as an effective, practical and acceptable tool?
19. Did you consider how to design a fair, prompt and agreeable modality for compensation to be given to resettled people, loss of land, loss of assets, and/or disturbance to graves (if any)?
20. Did you hold participatory discussions with the district government and local communities to explain the Social and Environmental Responsibility Program?

(Technical Project Design Stage)

21. Did you consult ARA about the water resources in and around the project site?
22. Did you consider how to avoid or minimize the negative impacts on, or conflicts with traditional water users and former holders of water use rights?
23. Did you consider how to avoid or mitigate the negative impacts on the environment of surface water, groundwater, riverbanks, bottom sediments and/or aquatic biota?
24. Did you study Mozambican standards on irrigation water quality and land use on different slopes, and did you take them into account in the technical design of your project?
25. Did you study Mozambican legislation on the introduction of new species, varieties, and GMOs, and make a commitment of its fulfillment in the project?
26. Did you study Mozambican legislation on the management of pesticides, fertilizer and waste, and

make a commitment of its fulfillment in the project?
27. Did you study Mozambican industrial guidelines on the hygiene, healthiness, safety and environment in/of factories, and make a commitment to its fulfillment in the project?
28. Did you consult professionals or preceding cases on the fair and enforceable win-win contractual arrangements with out-growers?

(Operation Stage)
29. Did you study Mozambican legislation on labor and social security, and make a commitment to its fulfillment in the project?
30. Did you make voluntary arrangements for the grievance redress to any affected people, as well as information disclosure related to the project?
31. Are you aware of the risks of non-compliance with Mozambican legislation, which might result in penalty, sanction, revocation of licenses, and closure of the project?
32. Do you understand what obligations you have in terms of self-monitoring of environmental management and reporting the findings to the authorities?
33. Do you understand the frequency and objectives of the different supervisory missions by government institutions?

(2) Application and enforcement mechanisms of systems and rules

For the ProSAVANA Guidelines on the "rai" to become truly effective, it is essential to devise good mechanisms for its application and enforcement; which may include the following elements:

- Disseminating the guidelines among a wide range of users, and help them to better understand it;
- Strengthening law enforcement by the Government through the Master Plan's components for this specific purpose;
- Creating an autonomous agency or unit with specialized functions to address the "rai" issues; and, if possible,
- Set up financial conditions to induce or restrict the behavior of private investors.

The guidelines will be distributed to local governments (three provinces and 19 districts) and central government institutions such as CPI, GAZEDA, MASA, CEPAGRI and MITADER. For the central and local government officials in charge of evaluation and supervision of the investment projects, a series of seminars on the interpretation and utilization of the guidelines will be organized. Such activities will be supported by the Master Plan component plans: 1) Incorporation of the "rai" in the legal structure and administrative system of government institutions (III-3), 2) Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement (III-2), and partly, 3) Establishment of a Proper Legal Framework for Out-grower Scheme (II-1). Active involvement of civil society and other platforms (for example, the Land Consultation Forum, local councils, provincial platforms of civil society organizations, etc.) in the policy dialogue process should also be encouraged.

Establishing an autonomous organization with specialized functions to address the "rai" issues or as a unit under the execution agency of the Agriculture Development Master Plan for the Nacala Corridor will deserve an in-depth discussion. This entity should contribute to strengthening and complementing the functions of other government institutions in the

provision of services. One feasible recommendation is that this entity will be legally authorized to carry out independent monitoring, request the disclosure of any necessary documents or information, support the inspection activities by government officials, and facilitate the process of mediation or grievance redress in case of conflict (refer to Chapter 5 for the proposed idea on an independent committee, which may assume such roles and responsibilities). Also, it is strongly desired that the guidelines be utilized for the selection process of investment project proposals by financing agencies that may handle loan schemes for private investors in the Study Area, by providing favorable conditions in terms of project financing for investors who are committed to comply with the principles of "rai", or by rejecting any proposal that does not meet the requirements of the principles.

6.2.2 Necessary Measures

To ensure implementation of the above strategies, the following measures regarding the realization of appropriate investments by the private sector through the adoption of the principals of "rai" will be taken:

1) Promoting the ProSAVANA guidelines of "rai" for harmonious development, ensuring transparency on the implementation of investment projects by appropriate mechanisms for monitoring agricultural investments, and institutional strengthening for the administration of the application of rai.

6.2.3 Components of the Agricultural Development Master Plan

In order to ensure the implementation of the above strategies, the following component regarding the realization of appropriate investments by the private sector through the adoption of the "rai" will be implemented:

III-3: Incorporation of the "Responsible Investment for Agriculture and Food Systems - rai" in Legal Structure and Administrative System of Government Institutions

Objectives	For the purpose of ensuring agricultural investment projects' adherence to the principle of "rai", its application should be on a national scale, and the functions and operation mechanisms of the responsible entity would become strengthened in the Nacala Corridor.
Goals	Principals of "rai" becomes applicable and supported by a legal structure and administrative system, in order to prevent potential negative impacts of agricultural investment projects on the environment and communities, both in the Nacala Corridor and Mozambique as a whole.
Expected Outputs	1: Legal and lawful status of the principals of "rai" in Mozambique is acquired to a certain extent; 2: Elements of principals of "rai" become internalized as procedures or guidelines by institutions related to agricultural investment projects; 3: Monitoring and supervision are properly functioning under the structure to be created to promote agricultural development in the Nacala Corridor.
Main Activities	1. Technical Assistance to MASA: - Technical assistance to MASA, which is responsible for the Draft Law on Agriculture, Food Security and Nutrition in the process of being revised and debated, as well as in the negotiation and coordination with other ministries, parliament and donor agencies; - Providing support for coordination and operational tasks for the above-mentioned Draft Law, in order to guarantee its concord with principals of "rai" to the extent possible. Identifying the necessity of new legislation or amendments to existing laws for the realization of the principals of "rai", in addition to the above-mentioned Draft Law, and suggest ways and means to

<table>
<tr><td></td><td colspan="15">forward them to the Government;
- Collecting and analyzing information related to the programs or projects of the agricultural sector - either planned or ongoing, public or private - from the perspective of detection of potentially threatening elements to the protection of small scale farmers' rights, and make timely suggestions to MASA.
<u>2. Dissemination of the principals of "rai" at relevant government institutions</u>:
- Collecting and analyzing the internal rules, guidelines or procedures of government institutions in charge of evaluation, authorization and supervision of agricultural investment projects at the central, provincial and district levels and, elaborate proposals for their revision through workshops with government officers, from the perspective of justifying and incorporating the elements of principals of "rai";
- Support drafting and issuing ministerial orders or resolutions to endorse the effectiveness of revised internal rules/guidelines/procedures;
- Involving financial institutions (both public and private) in the awareness campaigns for the principals of "rai", and discussing the possibilities and steps to be taken for the principals of "rai" applications in the evaluation criteria of loan proposals, or setting of loan conditions.
<u>3. Strengthening of "rai"-related units of the implementation structure of the Master Plan:</u>
- Dispatching a team to the supposed Monitoring and Supervision Unit for capacity development in terms of function, structure, principles, action plan, budget planning and execution. Also, systematize the division of roles as well as partnerships with the existent government institutions or consultation mechanisms (such as Land Consultation Forum);
- Establishing methodologies for the control of agricultural investment projects by the Consultative Council and Independent Committee for the evaluation of proposals, supervision of the implementation phase, and application of corrective measures;
- Providing technical and financial assistance to conducting monitoring, inspection, grievance redress, etc. from the principals of "rai" perspective, on the sites of agricultural investment projects (either in the preparation phase or implementation phase), aiming at strengthening the supervisory functions of the Agency, Council, Committee, provincial/district governments and their respective units in charge.</td></tr>
<tr><td>Implementation Period</td><td>2016</td><td>'17</td><td>'18</td><td>'19</td><td>'20</td><td>'21</td><td>'22</td><td>'23</td><td>'24</td><td>'25</td><td>'26</td><td>'27</td><td>'28</td><td>'29</td><td>2030</td></tr>
<tr><td>Priority Areas (candidate)</td><td colspan="15">Activity 1, 2: All of Mozambique
Activity 3: The Nacala Corridor</td></tr>
<tr><td rowspan="2">Expected Beneficiaries</td><td colspan="5">Direct Beneficiaries</td><td colspan="5">Indirect beneficiaries</td><td colspan="5">Others</td></tr>
<tr><td colspan="5">MASA and other relevant institutions such as CPI, CEPAGRI, MITADER, ARA, local governments, and financial institutions;
Nacala Corridor Development Coordination Agency for implementation of the Master Plan.</td><td colspan="5">Local communities and small-scale farmers in particular along the Nacala Corridor.</td><td colspan="5">-</td></tr>
<tr><td>Implementing Agency and Related Organizations</td><td colspan="15">Activity 1: MASA (cabinet of minister or Economic Directorate (DE))
Activity 2: CPI, CEPAGRI, DNTF, MITADER, ARA, Provincial/District Government, Financial institutions
Activity 3: Structure of Implementation of the Master Plan</td></tr>
</table>

6.3 Water Resources Development and Management

6.3.1 Development Strategy

The mean annual runoff in the Study Area is estimated at approximately 29.7 billion m^3/year. This largely exceeds the expected water demands, including those for irrigation development. It is necessary to conduct basic investigations to fully understand the development potentials for water resources.

Fair and appropriate management of water resources is essential for the sustainable use of the natural resources as well as for fair distribution of water in catchment areas. At present, with the

exception of some rivers running through areas with high population densities, development of water resources remain at a considerably low level compared to their potential. Thus, even without strict water resources management, serious conflicts or problems have not been observed. However, considering the future development of industry and agriculture, and the increase in the population of the Nacala Corridor Area, establishing an appropriate water resources management system is regarded as a fundamental task. The main strategies for the development and management of water resources are set out below:

- Development and re-construction of the hydrological observation network, i.e., the concrete implementation of the development plans of ARA-CN and ARA-N;
- Strengthening of the water license system which should include small and medium irrigation systems with a command area of less than 500 ha, even though water fees are/will not be charged;
- Establishing and maintaining a database for water licenses and actual water use, in corroboration with MASA-DPASA;
- Formulating water management plans, including water distribution for rivers in Monapo where intensive development is expected to take place.

6.3.2 Necessary Measures

In order to ensure the appropriate implementation of the above strategies, the following measures for water resources development and management will be taken:

1) Organizing information for the development and management of water resources and sharing it with stakeholders in development, including private investors, so as everyone understands the issues of sustainable use of water resources and the development of river basins through appropriate resources use and management.

6.3.3 Components of the Agricultural Development Master Plan

To ensure implementation of above strategies, the following components of the water resources development and management will be implemented:

III-4: Basic Study for Water Resources Management

Objectives	The plan aims to contribute to the appropriate management of natural resources for sustainable irrigation development, as well as to achieve sustainable development of the entire regional economy through creating the basic conditions for well-ordered water use and water resources development. Through the activities of the plan, accurate information on the conditions of water use and the development potentials of water resources will be appreciated and shared among those concerned in the development.
Goals	To arrange necessary information for the development and management of water resources to be shared among those concerned in the development including private investors; To realize well-ordered water use and water resources development in the basins through appropriate water resources use and management.
Expected Outputs	1: Rebuilding the river observation network and hydrological information is accumulated. Data and results of assessment are incorporated into a database and are shared among those concerned in the development, including private investors; 2: Well-ordered development and sustainable use of water resources is achieved through enhancing the monitoring of water use and strengthening of the water license system;

	3: A water management plan is formulated and the hierarchy of water use is established in basins where development activities are actively carried out.
Main Activities	1. Implementing the development and re-construction of the river observation network that are planned by ARA-CN and ARA-N; 2. Hiring consultants for developing databases and formulating water management plans; 3. Developing a database on water resources development potentials; 4. Selecting potential dam sites; 5. Investigating and preparing an inventory on small and medium scale water users (such as those who use irrigation systems of less than 500 ha, and who are not included in the current water license system) and their use of water.
Implementation Period	2016 ‘17 ‘18 ‘19 ‘20 ‘21 ‘22 ‘23 ‘24 ‘25 ‘26 ‘27 ‘28 ‘29 2030
Priority Areas (candidate)	All zones, including the river basins of the Rio Monapo, Rio Mecuburi, Rio Meluli/Namaita, Rio Ligonha, Rio Lurio and its tributaries, Rio Lugenda and its tributaries, Rio Lucheringo, and Lago Chiuta. The Monapo river basin of Zone I and Zone II shall be given priority for establishing water management and distribution plans.
Expected Beneficiaries	All water users in the area.
Implementing Agency and Related Organizations	ARA-CN and ARA-N in close cooperation with DPASA in Nampula, Niassa and Zambezia provinces.

6.4 Forest Resources Development and Management

6.4.1 Development Strategy

Protection and conservation of forest will be realized through applying the Environmental Law, Land Law, Forest and Wildlife Law and other related laws, regulation and rules. PDUT is considered as a tool of controlling land use under proper supervision and corrective guidance by relevant authorities. The Master Plan proposes an intervention to strengthening the supervision mechanism on the enforcement of Land Law, Environmental Law and Forest and Wildlife Law. The principals of “rai” will guide development in the area to comply with the related laws and regulation. The “rai” will be incorporated in the legal structure and administrative system of government institutions through Master Plan implementation. Because various governmental organizations, such as MASA, MITADER, related directorates, agencies and local governments, shall be engaged in the implementation of laws and regulations related to forest protection and conservation, it is necessary to enhance the inter-ministry coordination.

The Master Plan sets the strategy of protection and sustainable use of forest resources from the aspect of agricultural and rural development:

- Increase government capacity to monitor and enforce laws and regulations related to the usage and exploitation of forest resources (through the strengthening of the supervision mechanism on land and environmental law enforcement);
- Promote the creation of community forests and enhancement of forest management by communities, which aims at reducing the pressure of forest resources exploitation as well as extending options for income-generation of family farmers;

- To increase the capacity and willingness of communities to participate to the monitoring of forest fire through Information campaigns and training;
- Increase the public sector's capacity to monitor and respond to the needs of monitoring forest fires.

To reduce the pressure of forest resources exploitation and protect the forests from further fragmentation, it is essential to establish local forests for the supply of firewood under a government initiative. In addition, a mechanism for financial support should be created with fund contributions from those who generate deforestation. Future prospects of the Master Plan on agricultural land and production in the Nacala Corridor are based on the premise that the acreage of the current forest areas will not be reduced. However, this does not mean a complete prohibition of human intervention on the forests. Any undertaking of forest clearance to expand farmland, either by local farmers or investment projects, shall follow Mozambican laws.

6.4.2 Necessary Measures

In order to ensure the implementation of the above strategies, the following measure regarding forest resources development, conservation and management will be taken in cooperation with the necessary measures mentioned in section 6.1and section 6.2:

1) Mitigating degradation of forest by developing capacity of communities for forest management and supporting its activities by establishing forestry nurseries, making available quality seedlings, and extending the income-generating options for community members.

6.4.3 Components of the Agricultural Development Master Plan

To ensure the implementation of the above strategies, the following components of forest resources development, conservation and management will be implemented:

III-5: Sustainable Forest Maintenance with Supporting Financial Mechanism

Objectives	To develop capacity of the community for sustainable use of forests by expanding options for income-generation for family farmers through the application of initiatives related to the forest sector; Continue the supply of energy and recovery of forests in degraded areas; Create a fund consisting of resources collected from entities that generate impacts on forest resources through their activities.
Goals	- Creation of a fund to support forest maintenance; - Creation of small scale public and private sector forest nurseries at the Administration Post level; - Training local personnel for forestry sector activities; - Provide incentives for afforestation for conservation purposes and for biomass generation
Expected Outputs	1. Forest nurseries are established; 2. Knowledge and skills in management of nurseries and forest management are acquired; 3. Increase of the capacity and willingness of communities to participate in the monitoring of forest fires; 4. Income improvement of family farmers through diversification of economic activities; 5. Popularization of the use of firewood and charcoal produced from wood from planted forests; 6. Reversal of the deficit in wood production of the area in the mid-to-long term.

<table>
<tr><td>Main Activities</td><td colspan="15">1. Developing tree nurseries for forestry development;
2. Training on management of nurseries, seed collection and seedling production, tree planting, and forest management;
3. Surveying areas that need forest restoration and potential areas for energy-supplying forests;
4. Information campaign and training for empowering communities on forest management, including preventing and controlling forest fires as well as sustainable use of resources;
5. Capacity-building for collection, processing and storage of wood for energy purposes;
6. Training on the use of forest residues;
7. Monitoring (evaluation of qualities of seedlings, afforestation and community-based forest management);</td></tr>
<tr><td>Implementation Period</td><td>2016</td><td>‘17</td><td>‘18</td><td>‘19</td><td>‘20</td><td>‘21</td><td>‘22</td><td>‘23</td><td>‘24</td><td>‘25</td><td>‘26</td><td>‘27</td><td>‘28</td><td>‘29</td><td>2030</td></tr>
<tr><td>Priority areas (candidate)</td><td colspan="15">All zones, with priority for Gurue District.</td></tr>
<tr><td rowspan="2">Expected Beneficiaries</td><td colspan="5">Direct Beneficiaries</td><td colspan="5">Indirect beneficiaries</td><td colspan="5">Others</td></tr>
<tr><td colspan="5">Local communities suffering forest degradation in Gurue and other districts (in total nine nurseries are expected to be established)</td><td colspan="5">Surrounding communities near the direct beneficiaries.</td><td colspan="5">Forest resources’ users in general along the Nacala Corridor.</td></tr>
<tr><td>Implementing Agency and Related Organizations</td><td colspan="15">- The Environmental Fund (FUNAB) and the Global Environmental Fund (GEF) as important partners for channeling financial resources;
- Support of NGOs in technical and operational aspects;
- District Planning and Infrastructure Service (SDPI) with operations in regional planning and in promoting activities of maintenance, protection and restoration of the environment;
- SDAE and administrative posts.</td></tr>
</table>

6.5 Adaptation to Climate Change

6.5.1 Development Strategy

Mozambique is considered as being one of the African countries that will be severely affected by climate change. Climate change will seriously influence natural resources, farmers’ livelihoods, food security, etc. due to climate variability and extreme climate.

The most recent GCM-based model projections of climate change for Mozambique[74] show that rainfall could increase from moderately to strongly over most of Mozambique, although this remains uncertain. Heat stress events will be more frequent in future, and it is likely that heat thresholds will be exceeded more regularly. More frequent high temperatures adds stress to crops, creates more rapid loss of soil moisture through changing rainfall patterns and increased evapotranspiration, and heightened risks of droughts and floods, and all of these issues call for urgent attention to adaptation.

This means that Mozambique’s small-scale and subsistence farmers, who rely almost entirely on rainfall for crops, livestock and other production purposes, are highly vulnerable and food is insecure, with climate variability and destruction caused by extreme climate events. Supportive actions and strengthening of their adaptive capacity is required.

[74] National Institute of Disaster Management (INGC) Climate Change Report: Study on the Impact of Climate Change on Disaster Risk in Mozambique, 2009

PEDSA sets the strategies for coping with the climate change with various approaches from the policy level and community/farmers level:

- Improvement of management of water resources
- Improvement of the ability to formulate policies and programs related to climate change
- Increase of responsiveness to the effect of climate change
  - Increase the production and dissemination of information on the agro-climate;
  - Strengthening early warning systems;
  - Identify and map areas prone to natural disasters and climate change and formulate agricultural development programs for these zones;
  - Develop and implement a strategy to mitigate the risks associated with natural disasters and climate change, adapting production systems to diversify sources of income;
  - Enhancing the adaptability of agricultural producers to situations of drought and climate change through training courses on response options;
  - Promote conservation agriculture for arid and semi-arid areas;
  - Promoting research, production and use of alternative crops, for example, mulberries;
  - Increase research on varieties of food crops and production of those which are early maturing and drought-resistant as well as the production and exploitation of wild crops; and
  - Promote non-agricultural activities as a way to reduce vulnerability to disaster occurrence

6.5.2 Necessary Measures

The Master Plan includes the following strategies and countermeasures to cope with the adverse effect of climate change in collaboration with strategies/countermeasures in other sectors:

- Formulating the water management plan and development of an observation network (Strategy of Water Resources Management);
- Development of farming technology for conservation agriculture and for increasing responsiveness to climate change effects, and adopting the results to agricultural extension (Strategy of Improving Technical Assistance System);
- Increase research on the varieties of food crops and production of early maturing and drought resistant crops as well as the production and exploitation of local varieties. (Strategy of Improving Technical Assistance System);
- Enhancing the adaptability of farmers to situations of drought and climate change through agricultural extension service, training and improving access to agricultural inputs. (Strategy of Improving Technical Assistance System, Strategy of Improvement of Access to Agricultural Inputs);

- Introducing forest maintenance activity on the community level. (Strategy of Forest Management); and
- Promoting small-scale irrigation agriculture. (Strategy of Irrigation Development).

CHAPTER 7 INSTITUTIONS

In this chapter, four strategies are described for institutional development and capacity building including farmers' organizations.

- Strengthening Coordination of Institutions Related to Agriculture and Food Security;
- Creating and developing Farmers' Organizations;
- Implementing Activities for Community Development;
- Improving Social Infrastructure.

7.1 Strengthening Coordination of Institutions Related to Agriculture and Food Security

7.1.1 Development Strategy

(1) Strengthening of governance in the Master Plan

The importance of governance is recognized as a prerequisite for sustainable agricultural development based on the willingness of rural people, as a factor that greatly affects the effectiveness and efficiency of development. Governance implies a form of government based on the proper balance between the State, the civil society and the market, at local, national and international levels, including systems and institutions of the government. It is a very broad concept and encompasses various challenges. In particular, its three pillars: 1) building democratic institutions, 2) developing legal systems, and 3) improving administrative functions, are considered important.

With respect to building democratic institutions and developing legal systems, some interventions are necessary in the Master Plan to realize the protection of the rights of family farmers and communities with regard to land and other natural resources, their sustainable use, and the prevention of related conflicts. In particular, it entails establishing auditing and monitoring systems by an independent committee, taking into account the strengthening of the management mechanism of the Government in regards to land laws and environmental laws, as well as to provide support the access by farmers to a conflict resolution system, among others. Furthermore, enforcing guidelines of Responsible Agricultural Investment (rai), and establishing a monitoring system are required.

In addition, it is essential that the formulation of development plans is done with the full participation of stakeholders at various levels, and participatory monitoring and review systems are also established. Thus, the core of governance is the improvement of administrative functions.

(2) Improving and strengthening of administrative functions

In the implementation of the Master Plan, many organizations will be engaged. Therefore, MASA should strengthen its coordination capacity with other ministries, agencies, provincial and district-level organizations, NGOs and the private sector.

Currently, many responsibilities are being transferred from the central Government to provincial or district-level governments and agencies as part of the administrative decentralization process. However, local government organizations do not have enough human resources or capacity to carry out these responsibilities.

Provincial-level government organizations play an important role in regional agricultural development, and they should be the core players for its planning and implementation. However, the human resources to support these activities at the district level are not sufficient, and the effective and adequate management of these activities cannot be achieved.

Therefore, both the number and capacity of the following staff must be increased: 1) agricultural engineers for planning or for monitoring and evaluation, 2) administrative staff for land management and registration, and 3) extension workers who give technical guidance to farmers.

To accomplish this, it is important to prioritize capacity development at the related organizations. Capacity development will be achieved through implementation of the activities in each project of the Master Plan. In preparation, the Mozambique Government should provide the necessary number of personnel and the appropriate budget through coordination with donors.

Moreover, when considering the budgetary limitations of local governments, it is very important to closely collaborate with NGOs, civil society and the private sector. Mechanisms to adjust their activities are required by DPASA, for effective collaboration. Thus, the proposed mechanisms will complement each other. Furthermore, the capacity of the Government for evaluation, monitoring and planning will be improved by establishing a system to collect, analyze and integrate information/statistical data on the agricultural sector.

7.1.2 Necessary Measures

In order to ensure the proper implementation of the above strategies, the following measures regarding the strengthening of coordination between the institutions related to agriculture and food safety will be taken:

1) In order to implement the Master Plan, a number of knowledgeable agricultural specialists with experience in planning, monitoring and evaluation are needed, as well as well qualified/trained extension workers to provide technical guidance to farmers;
2) Availability of accurate and reliable information on regional agriculture for the monitoring evaluation of the Master Plan and future agricultural development.

7.1.3 Components of the Agricultural Development Master Plan

To ensure steady implementation of the above strategies, the following actions to promote the coordination for the strengthening of institutions related to agriculture and food safety will be implemented:

IV-1: Improvement of Agricultural Statistics System for the Nacala Corridor

Objectives	Monitoring and evaluation of the impact of the implementation of the Master Plan shall be carried out effectively and efficiently.
Goals	Accurate and reliable information about regional agriculture in the intervention area shall be collected, and utilized effectively and efficiently.
Expected Outputs	1: An improved agricultural data collection system in the intervention area; 2: An improved agricultural data analysis system in the intervention area; 3: Strengthened capacity of concerned government staff to analyze data necessary for M&E of the impact of the Master Plan.
Main Activities	Identifying the present constraints on the accuracy of agricultural statistics: 1. Identifying necessary data to be collected; 2. Establishing a common data collection methodology. Preparation of a Manual for accurate data collection: 3. Preparing reports based on the analysis of collected data; 4. Establishing a systematic annual schedule for agricultural statistics gathering activities; 5. Developing guidelines and manuals for improving the agricultural statistics system. Training provincial and district officials in charge: 6. Training concerned staff (data collection, data analysis and reporting); • Staff of MASA seconded to the project; • DPASAs; • SDAEs; • IIAM, INCAJU and other research institutes concerned.

Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
		■	■	■	■	■	■								

Priority Areas (candidate)	Provincial and district officials in the Master Plan target area; IIAM, INCAJU and other research institutes concerned.
Implementing Agency and Related Organizations	Statistic section of MASA, IINE, DPASAs, SDAEs and IIAM

7.2 Creation and Development of Farmers' Organizations

7.2.1 Development Strategy

(1) The need for farmers' organizations

There are several factors impeding the increase of productivity and income of family farmers. Individual farmers face challenges for the development of activities, access to information and extension services, which will be easier to access by organizing individual farmers into groups and bundling their strengths. Group activities, such as cooperation in harvesting and shipping, may increase the chances of the farmers to employ their own middlemen to purchase or collect the products of the community. Furthermore, if a group forms its own management board and is

registered as a legal entity, they can open bank accounts and access agricultural credit. Thus, it is indispensable that farmers are organized into groups and/or associations.

It is essential that local farmers fully participate in the development for the growth of their rural areas.

(2) Promoting the organization of family farmers

The rate of organization for all farm households is only two to eight percent in each district, except in Gurue district where it is 17.8%. The rate is 5.0% in Nampula Province, 12.8% in Zambezia Province, and 5.2% in Niassa Province, with 6.4% being the overall average in the Study Area.

At present, farmers' organizations are needed not only as recipients of physical support, such as agricultural inputs, but also as recipients of technical extension services from MASA. The PRONEA is one of the major projects of the Extension Master Plan (2007–2016) and contains activities for organizing farmers. It is important that organizing farmers is conducted through integration with the agricultural extension and activities of PRONEA.

In consideration of such past experiences, strategies for organizing farmers should not be formulated with the view of applying the same direction to all the farmers, but should consider the application of different development approaches depending on the scale of agricultural management (development status), which is an indicator of the livelihood of the population and can be measured by farm income.

It is assumed that in current conditions, vulnerable farmers, whose land is about 0.5 ha or less, and who cannot achieve self-sufficiency solely through agricultural production, cannot and will not be able to maintain sustainable agriculture. In this context, external support/input is essential to improve the livelihood of vulnerable farmers. It is of vital importance to continue and expand the supporting activities such as those mentioned above. Moreover, support by SDAE and/or NGOs is required to realize the grouping/organizing of individual vulnerable farmers, since it is difficult for them to carry out such actions by themselves.

(3) Explaining the objectives of farmers' organizations

Generally, farmers' organizations are composed of groups, which range from 10 to 60 members, who meet for one or several shared objectives. The organizations officially have their own statutes and members paying membership dues. However, in reality, they mostly act based on the customary rules.

When establishing farmers' organizations, it is important to ensure that farmers identify their development issues and recognize the need to organize themselves as an effective means to solve these issues. By acknowledging the benefits of an organization, a possibility of the ownership of an organization will be increased which leads to long- term sustainability.

To achieve organizing farmers by the mid-term of the Master Plan (2021), developing the human resources capacity of the core members of the farmers' organization is indispensable.

(4) Human resource development for farmers' organizations

The insufficient number and capacity of human resources to lead the farmers' organizations and the lack of financial resources are critical issues for the sustainability of activities of the farmers' organizations. Therefore, human resources development is an essential activity, and the values of traditional knowledge and community organization are fundamental for the development of human resources.

One of the approaches of organizing farmers would be to select potential lead farmers by recommendation of the traditional leaders, or leaders of the youth groups in the community.

Contents of the training curriculum for human resource development should cover items directly linked to improving the livelihood of small-scale farmers, such as agricultural technologies related to improving production (inputs such as improved seed, fertilizers, pesticides and agricultural practices), organizational operations (leadership, management, accounting, marketing and negotiating), environmental considerations, and literacy education.

Because of limitations relating to access to education in the Nacala Corridor region, training should adopt a pedagogic approach, demanding more time but assuring a sustainable and efficient transfer of technology.

As the objectives and activities of the human resource development program proposed in the Master Plan are similar to those of PRONEA, it is recommended to join the implementation of both initiatives by the end of the PRONEA in 2017.

Sharing knowledge among farmers is advantageous for farmers' organizations and strengthens their ability. FFS, which were introduced in 2009, with support from FAO, aiming to enlighten farmers, have shown positive results. Considering the importance of market-orientated production and changing the mindset from the perspective of subsistence production to agribusiness, it is a concept expected to be useful; thus, activities of FFS are to be included in the capacity development program in the Master Plan.

7.2.2 Necessary Measures

To ensure the comprehensive and proper implementation of the above strategies, the following measures for establishing and developing farmers' organizations will be taken:

1) Establishing and enhancing the management of farmers' organizations through developing a model of modern agricultural cooperatives, together with the existing associations.

7.2.3 Components of the Agricultural Development Master Plan

The component for the establishment of farmers' organization is included in the component for establishing and developing modern agricultural cooperatives (II-4) described previously in Chapter 5.

7.3 Capacity Development of Communities through the Support from Community Development Activities

7.3.1 Development Strategy

More than 99% of local rural residents are family farmers who have not yet acquired enough capacity to cope with the challenges related to the improvement of livelihood and agriculture production. Community development activities should be strengthened along the Nacala Corridor. Taking the circumstances into consideration, it should be assumed that the local population could acquire experience and develop the capacity to solve problems relating to project planning, through engaging the community in development activities with proper provision of means, such as technical and financial support. It should also be considered that decision-making within communities is largely influenced by the traditional governance systems.

To achieve a better life for the local rural population, the community should obtain the broad capacity to improve the living conditions of the population and their local society. The required capacity of the communities for family farmers to grow are the following: 1) capacity to correspond to challenges relating to improved living conditions and to increasing agriculture production; 2) capacity of planning with their future vision in mind; 3) ability of self-governance to manage land and other natural resources; and 4) negotiating abilities to preserve the farmers' rights and interests, etc.

Therefore, opportunities for decision-making, project planning and implementation should be provided if/when possible for each of the proposed activities of the Master Plan: for instance, the activities relating to technical extension and support, irrigation development, farmers' organizations, community-led development of social infrastructure, etc. Furthermore, the model project for community development activities is considered to provide opportunities for capacity development through the implementation of various activities for community development, such as: development of community infrastructure by residents' groups. In the project, the Government will allocate a budget for community development funds and the community will decide on the planning and implementation of actual investment, using the fund with technical assistance from the public sector.

In addition, it is necessary to establish a mechanism for cooperation widely covering public entities, partners, and NGOs, among others, who actively engage in community development in the project area.

7.3.2 Necessary Measures

To ensure the proper implementation of the above strategies, the following measures regarding the capacity development of communities through the support of community development activities will be taken:

1) Improving the livelihood of residents in the Nacala Corridor through continuous implementation of community development activities by self-organized groups.

7.3.3 Components of the Agricultural Development Master Plan

To ensure the effective and efficient implementation of the above strategies, the following actions regarding the promotion of the capacity development of communities will be implemented:

IV-2: Support for Community Development Activities

Objectives	To promote the development of the capacity of the local population (groups of local residents) for participatory planning and project management through the implementation of community development activities such as the development of small scale community infrastructure.														
Goals	Strengthened livelihood of local residents in the intervention area through continuous implementation of community development activities.														
Expected Outputs	1. Self-organizing capability of local residents (groups of local residents) is strengthened; 2. Problem-solving and decision-making ability of local residents (groups of local residents) is improved; 3. Capacity for implementing community development activities (planning, implementation and monitoring) of local residents (groups of local residents) is built.														
Main Activities	1. Setting up the Community Development Fund (CDF) and develop its operational framework; 2. Developing an implementation structure for the operational management of CDF, such as recruitment of a group of consultants, opening of field offices, preparation of operational manuals and application forms, etc.; 3. Conducting an orientation session on CDF at each district; 4. Analyzing proposals and selection of projects to be funded by CDF; 5. Conducting regular monitoring of the progress of activities for the projects funded by CDF and provide technical assistance if necessary; 6. Carrying out monitoring and evaluation of the results of activities.														
Implementation Period	2016	'17	'18	'19	'20	'21	'22	'23	'24	'25	'26	'27	'28	'29	2030
	■	■	■	■	■										
Priority Areas (candidate)	All districts (19 districts).														
Expected Beneficiaries	Direct Beneficiaries					Indirect Beneficiaries						Others			
	Approx. 5.000 households for family farming.					Approx. 50,000 households.						-			
Implementing Agency and Related Organizations	MASA, DPASA in Nampula, Niassa and Zambezia, SDAE, ProSAVANA Implementing Agency, ProSAVANA-PEM, and other related government offices														
Remarks	• The maximum amount of the fund from CDF is around 0.5~1 million MT for each project. A specific amount will be decided by reviewing the components of each proposed project; • Implementing one project at each administration post in all districts every year (approximately 50~60 projects per year) is expected;														

	• The aim is to support different types of community infrastructure development projects that are beneficial to solve development issues in the area; ✧ The expectation is to support projects with agriculture-related activities (such as development of small scale irrigation systems), construction and rehabilitation of rural roads and water supply facilities (such as water wells), and other small scale infrastructure (such as a warehouses, communal workspaces, etc.) that lead to the improvement of education, health and hygiene and living conditions. • A project addressing gender equality is highly considered during the selection process for CDF funding; • A secretariat of CDF is established, tasked with overseeing the entire fund operations including project formulation, technical assistance, progress monitoring, etc.; • A steering committee composed of representatives of MASA, DPASAs, SDAEs and other related authorities is formed, acting as a decision-making body for selection of projects, approval of budgets and evaluation of progress and outcomes; • The project period is from 2016 to 2020 for five years. However, the call for proposals for CDF funding will be officially launched in 2017, since the first year in 2016 is regarded as a preparatory period for establishing the implementation structure. • CDF is expected to obtain loans from donors as a source for funding its operations.

7.4 Improving Social Infrastructure

7.4.1 Development Strategy

To achieve the vision of ProSAVANA for the improvement of the living conditions of the inhabitants in the Nacala Corridor, enhancement of social infrastructure should be considered in the implementation of the Master Plan through the formulation of new mechanisms of cooperation between MASA, sector government ministries, the private sector, civil society organizations, and NGOs. The application of the CSR for improvement of social infrastructure is one of the alternatives considered in the Master Plan.

(1) Social infrastructures required in rural areas

Development of social infrastructure required in rural areas can be categorized into: 1) basic social infrastructure such as water supply and electricity, and 2) infrastructure to be combined with soft components such as health and education facilities.

1） Infrastructure to be implemented in combination with soft components

- Enhancing education facilities in rural areas and securing the necessary number of well-trained teaching staff;
- Promoting adult education, focusing on the literacy of women;
  - Strengthening measures to fight HIV/AIDS(Human Immunodeficiency Virus/ Acquired Immune Deficiency Syndrome), to avoid the increase in the prevalence of the infection;
- Enhancing medical facilities in rural areas and securing the necessary number of medical staff;
- Developing human resources in the medical sector at the national level in terms of quality and quantity.

2） Basic social infrastructure

- Increasing rural water supply facilities to improve access to safe water;
- Promoting rural electrification using renewable energy (strengthening Energy Fund:FUNAE);
- Developing the capacity of communities and local governments aiming at the implementation of community-driven infrastructure development.

(2) Improving community infrastructure through CSR

The Master Plan will promote the development of mechanisms to strengthen the relationships between investors and local communities, in which both parties will duly respect the terms of partnership agreements of agricultural investment projects of any size. For this purpose, the Master Plan proposes to establish an Independent Committee including representatives of the farmers' organizations, civil society organizations, and members of academia. The committee has the task to participate in community consultations and supervise the process to enhance the transparency of negotiations. An important hint can be drawn from Resolution no. 70/2008 Procedure for Application and Evaluation of Investment Proposals Involving Land Larger than 10,000 hectares, which requires the investors to describe in their proposals the plan of social infrastructures, such as schools, health facilities, roads, power supply, water supply, etc. to be provided for the local community affected by the intended project. However, it is important to continuously maintain its finance for human resources to avoid discontinuity of services by the end of the project.

(3) Social infrastructure required for supporting agribusiness development

Consumption of electricity in Nampula and Nacala has almost reached the full capacity of the power supply network. Also, the water supply is near its limits in Nampula, Nacala, Cuamba and Lichinga.

In promoting agribusiness development, the required water supply could be secured from the supplementary use of groundwater, as long as there are no large-scale investments requiring very large volumes of water such as beverage factories or breweries. However, dam construction for the efficient use of surface water, as described in the Feasibility Study (F/S) of the Water Supply Development Plan mentioned in section 2.10.2, should be implemented.

With regard to power supply, strengthening the distribution facilities in the Nampula substation has high priority because electricity for the eastern part of the Study Area, including Nacala, is supplied through Alto Molocue and Nampula. Building a new distribution line will be advantageous considering the increasing demand from large-scale development.

7.4.2 Necessary Measures

In order to ensure steady implementation of the above strategies, the following measure regarding the improving social infrastructure will be taken:

1) Strengthening of activities to develop a social infrastructure by governmental institutes in cooperation with stakeholders such as development partners, NGOs, CSOs and others.

2) As a part of the partnership agreement of the agricultural investment project, development of infrastructure for rural communities, such as health post, schools, roads, power supply, water supply, etc. will be carried out as CSR.

CHAPTER 8 Implementation, Monitoring and Evaluation Plan

8.1 Components of the Agricultural Development Master Plan

The 34 components of the Master Plan were prepared taking into consideration the combination and similarity of measures aiming at the realization of the objectives. The components of the Master Plan and related pillars, strategies, and measures are summarized in Table 8.1.1.

The characteristics of the activities of the components and their expected outputs indicate that most of the proposed components can be considered as platform-type plans. They may also be regarded as supporting family farming directly or indirectly.

The components are mostly interconnected and implemented in all the zones that are described in section 2.13. In addition, some components are expected to have an impact on the specific zones or the farming economy in the Study Area by making full use of regional potential and generating added value to commodities, as well as promoting and revitalizing specialty products of the regions.

Capacity development of human resources and enhancement of administrative and technical capacity of local governments (DPASA/SDAE) will be achieved through implementing each component and establishing the implementation structures. Furthermore, consideration for socially vulnerable groups in agricultural development will be carefully given due consideration for the activities in each component.

The relation and expected contribution of each Master Plan component to PEDSA are shown in the next section 8.2.

Table 8.1.1 Components of the Agricultural Development Master Plan in the Nacala Corridor

Pillars	Development Strategy	No.	Master Plan Component
I. AGRICULTURAL PRODUCTIVITY - Increased agricultural productivity, production and competitiveness, and contributing to food security and adequate nutrition -	Improving the technical assistance systems	I-1	Strengthening of Agricultural Research
		I-2	Strengthening of Agricultural Extension Services
		I-3	Agricultural Training Centers
		I-4	Model for the Development of Lead-Farmers in the Communities
		I-5	Development of Agriculture based on Respect for Gender Equality
	Improving access to agricultural inputs	I-6	Improvement of Accessibility to Fertilizer
		I-7	Promotion of the Production of Quality Seed at the Regional Level
		I-8	Promotion of Agricultural Machinery Service Centers
	Improving access to agricultural financing and credit	I-9	Establishment of Financial Support Systems for Small and Medium–Size Agribusiness Enterprises, Farmers' Organizations, and Individual Farmers
	Irrigation development	I-10	Rehabilitation and Construction of Irrigation Systems

Pillars	Development Strategy	No.	Master Plan Component
		I-11	Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities
		I-12	Vegetable Production Models with small pumps and simple irrigation systems
II. MARKET ACCESS - Services and infrastructure for better access to markets, and development framework directed towards agricultural investments -	Improving market access by farmers	II-1	Establishment of a Proper Legal Framework for Out-grower Schemes
		II-2	Improvement of Market Access of Small-scale Farmers
		II-3	Improvement of Access to Market Information
	Supporting the establishment and development of modern agricultural cooperatives	II-4	Formulation and Development of Modern Agricultural Cooperatives
	Promoting adding value to agricultural products	II-5	Strengthening the Institutional Role in Promoting and Supporting Value Chain Development
		II-6	Capacity Development of Business Development Services
		II-7	Quality Standardization of Agricultural Products
		II-8	Cashew Production Development
		II-9	Fruits Promotion for Small Scale Farmers
		II-10	Tea Industry Revitalization
		II-11	Rural Agro-Industry Development
		II-12	Multiplication of Quality Seed
	Developing infrastructure for logistics	II-13	Improvement of Access Roads for Agricultural Activities
		II-14	Rehabilitation of Agricultural Storage Facilities and the Construction of Silos
		II-15	Support to Development of Agricultural Industries
III. NATURAL RESOURCE - Sustainable and integral use of land and water resources, forests and fauna -	Land management	III-1	Promotion of Land Registration for Communities and Family Farmers
		III-2	Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement
	Realization of appropriate investments by the private sector through the adoption of principles of “rai”	III-3	Incorporation of “Responsible Investment for Agriculture and Food Systems - rai” in Legal Structure and Administrative System of Government Institutions
	Water resources development and management	III-4	Basic Study for Water Resources Management
	Forest resources development and management	III-5	Sustainable Forest Maintenance with Supporting Financial Mechanism
IV. INSTITUTIONS - Strengthening agricultural institutions -	Strengthening coordination of institutions related to agriculture and food security	IV-1	Improvement of Agricultural Statistics System for the Nacala Corridor
	Capacity development of communities through the support from community development activities	IV-2	Support for Community Development Activities

8.2 Relevance of the Master Plan to PEDSA

The development pillars presented in the Master Plan are fully aligned to the following four pillars of PEDSA. In addition, each component consists of several activities with inter-sector characteristics. The relevance of the components proposed in the Master Plan to sub-items of the four pillars of PEDSA is summarized in the following table.

Table 8.2.1 (1) Relevance of the Master Plan Components and Sub-items of PEDSA (1/2)

No.	Master Plan Components	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	1.2 Increase the capacity of extension services to provide advanced technologies and practices effectively and to draw appropriate programs for food security	1.3 Strengthen the system of research to develop or adapt and provide technologies and advanced agricultural practices	1.4 Improve the availability and management of water for agricultural production	1.5 Improve soil fertility	1.6 Improve control of pests and diseases of crops and livestock	1.7 Increase the agrarian mechanization and the use of efficient technologies	1.8 Encourage the participation of enterprises in market-oriented crop production in food production	2.1 Improve rural infrastructure (network of roads, storage facilities, markets)	2.2 Improve regulatory capacity and compliance with standards and quality assurance of agricultural products and animals	2.3 Added value to agricultural products, livestock and forestry	2.4 Improve post-harvest management and strategic food reserve	2.5 Improve the ability of players throughout the value chain (farmers, processors of agricultural products, merchants) to participate in domestic and international markets	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)	2.7 Policies consistent with the objectives of the sector	2.8 Strengthen land information system	2.9 Strengthen policies to support markets for inputs	3.1 Improve usage practices and techniques of natural resources – land, water, forests and fauna	3.2 Improve capacity to formulate policies and programs related to land, water, forests and climate change	3.3 Improve administration and management of the land	3.4 Forest resources are used sustainably	3.5 Increase the capacity of rural communities to prevent and control forest fires	3.6 Improve the ability of rural communities and wildlife professionals for sustainable management of these resources and reduction of human-wildlife conflict	3.7 Improve responsiveness to the effects of climate change	4.1 Strengthening farmers' organizations	4.2 Develop Human Capital	4.3 Strengthen coordination of institutions related to agriculture and food safety
I-1	Strengthening of Agricultural Research	◎	○	◎		○	○		○																	○		◎	
I-2	Strengthening of Agricultural Extension Services	◎	◎		○	○	○	○	○				○													○	◎	◎	◎
I-3	Agricultural Training Centers	◎	◎	○	○	○	○	○							○												○	◎	
I-4	Model for the Development of Lead-Farmers in the Communities	◎			○	○	○	○																			◎	◎	
I-5	Development of Agriculture based on Respect for Gender Equality	◎	○																								◎	◎	
I-6	Improvement of Accessibility to Fertilizer	○				○													◎										
I-7	Promotion of the Production of Quality Seed at the Regional Level	○							◎						◎				◎										
I-8	Promotion of Agricultural Machinery Service Centers	○						◎							◎				◎										
I-9	Establishment of Financial Support Systems for Small and Medium -Size Agribusiness Enterprises, Farmers' Organizations and Individual Farmers	◎	○					○			○			◎	◎												○		
I-10	Rehabilitation and Construction of Irrigation Systems	◎	◎		◎															○							◎		
I-11	Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities	◎	◎		◎															○							○		
I-12	Vegetable Production Models with small pumps and simple irrigation systems	◎	◎					◎				○															◎		
II-1	Establishment of a Proper Legal Framework for Out-grower Schemes		◎					○			◎			◎													○		
II-2	Improvement of Market Access of Small-scale Farmers	○							◎	◎	◎	○	○	◎			○										◎		
II-3	Improvement of Access to Market Information	○							○		◎	○	○	○															○
II-4	Formulation and Development of Modern Agricultural Cooperatives		○								○	○	○	○	○												◎	◎	○

Table 8.2.1 (2) Relevance of Components of the Master Plan and Sub-items of PEDSA (2/2)

No.	Master Plan Components	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	1.2 Increase the capacity of extension services to provide advanced technologies and practices effectively and to draw appropriate programs for food security	1.3 Strengthen the system of research to develop or adapt and provide technologies and advanced agricultural practices	1.4 Improve the availability and management of water for agricultural production	1.5 Improve soil fertility	1.6 Improve control of pests and diseases of crops and livestock	1.7 Increase the agrarian mechanization and the use of efficient technologies	1.8 Encourage the participation of enterprises in market-oriented crop production in food production	2.1 Improve rural infrastructure (network of roads, storage facilities, markets)	2.2 Improve regulatory capacity and compliance with standards and quality assurance of agricultural products and animals	2.3 Added value to agricultural products, livestock and forestry	2.4 Improve post-harvest management and strategic food reserve	2.5 Improve the ability of players throughout the value chain (farmers, processors of agricultural products, merchants) to participate in domestic and international markets	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)	2.7 Policies consistent with the objectives of the sector	2.8 Strengthen land information system	2.9 Strengthen policies to support markets for inputs	3.1 Improve usage practices and techniques of natural resources – land, water, forests and fauna	3.2 Improve capacity to formulate policies and programs related to land, water, forests and climate change	3.3 Improve administration and management of the land	3.4 Forest resources are used sustainably	3.5 Increase the capacity of rural communities to prevent and control forest fires	3.6 Improve the ability of rural communities and wildlife professionals for sustainable management of these resources and reduction of human-wildlife conflict	3.7 Improve responsiveness to the effects of climate change	4.1 Strengthening farmers' organizations	4.2 Develop Human Capital	4.3 Strengthen coordination of institutions related to agriculture and food safety
II-5	Strengthening the Institutional Role in Promoting and Supporting Value Chain Development										○			◎				○										○	○
II-6	Capacity Development of Business Development Services								○					◎	○													◎	◎
II-7	Quality Standardization of Agricultural Products	○							○		◎	○	○	○															○
II-8	Cashew Production Development	◎				○						◎		◎								◎					○		
II-9	Fruits Promotion for Small Scale Farmers	◎	○	◎					○		○																○		
II-10	Tea Industry Revitalization		○								○	○		◎													○		
II-11	Rural Agro-Industry Development								◎			◎		◎	◎												○		
II-12	Multiplication of Quality Seed								○		○			◎	◎			○											
II-13	Improvement of Access Roads for Agricultural Activities									◎				○														○	
II-14	Rehabilitation of Agricultural Storage Facilities and the Construction of Silos									◎			◎	○													○		
II-15	Support to the Development of Agricultural Industries									◎		○		◎															
III-1	Promotion of Land Registration for Communities and Family Farmers	○				○												◎		◎	◎	◎							
III-2	Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement								○		○							○			◎	◎	○					◎	
III-3	Incorporation of "Responsible Investment for Agriculture and Food Systems - rai" in the Legal Structure and Administrative System of Government Institutions							○	○	○							◎			○	◎	◎	○						○
III-4	Basic Study for Water Resources Management				○															◎	◎								
III-5	Sustainable Forest Maintenance with Supporting Financial Mechanism											○								◎	○		◎	○					
IV-1	Improvement of Agricultural Statistics System for the Nacala Corridor																				○	○	○					○	
IV-2	Support for Community Development Activities									○																		◎	○

Legend: ◎Direct Relation, ○ Relation

8.3 Intervention Areas and Master Plan Components

Based on the analysis of the contribution of each component to achieve the goals of the Master Plan concerning the direction of agricultural development by zones described in section 2.13, target zones of the components are defined as shown in Table 8.3.1.

Table 8.3.1 Intervention Areas of the Master Plan Components

Master Plan Components	National Level	All Areas in Nacala Corridor	Agricultural Zone						Specific District/Institution
			I	II	III	IV	V	VI	
I-1 Strengthening of Agricultural Research		◎		○				○	IIAM-NE & NW
I-2 Strengthening of Agricultural Extension Services		◎	○	○	○			○	Out of PRONEA
I-3 Agricultural Training Centers		◎					○		Cuamba
I-4 Model for the Development of Lead-Farmers in the Communities		◎							9 communities
I-5 Development of Agriculture based on Respect for Gender Equality		◎							
I-6 Improvement of Accessibility to Fertilizer	◎	○							
I-7 Promotion of the Production of Quality Seed at the Regional Level		◎							IIAM-NE &NW
I-8 Promotion of Agricultural Machinery Service Centers		◎							
I-9 Establishment of Financial Support Systems for Small and Medium -Size Agribusiness Enterprises, Farmers' Organizations and Individual Farmers	◎	○							(DIF)
I-10 Rehabilitation and Construction of Irrigation Systems		◎	○	◎	◎		○	○	
I-11 Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities		◎	○	○	○		○	○	
I-12 Vegetable Production Models with small pumps and simple irrigation systems		◎	◎	◎	◎		◎	◎	
II-1 Establishment of a Proper Legal Framework for Out-grower Schemes		◎							
II-2 Improvement of Market Access of Small-scale Farmers		◎							
II-3 Improvement of Access to Market Information		◎							
II-4 Formulation and Development of Modern Agriculture Cooperatives		◎							
II-5 Strengthening the Institutional Role in Promoting and Supporting Value Chain Development		◎							Nampula
II-6 Capacity Development of Business Development Service		◎							
II-7 Quality Standardization of Agricultural Products	◎	○							
II-8 Cashew Production Development			◎	◎					
II-9 Fruits Promotion for Small Scale Farmers				◎					
II-10 Tea Industry Revitalization						◎			Grue
II-11 Rural Agro-industry Development							◎		Malema
II-12 Multiplication of Quality Seed					◎				Lalaua
II-13 Improvement of Access Road for Agricultural Activities		◎					◎	◎	
II-14 Rehabilitation of Agricultural Storage Facilities and the Construction of Silos		◎							
II-15 Support to the Development of Agricultural Industries							◎		Cuamba
III-1 Promotion of Land Registration for Communities and Family Farmers		◎	◎				◎		
III-2 Strengthening of the Supervision Mechanism for Land and Environment Law Enforcement		◎					◎		Cuamba N'Gauma

Master Plan Components	National Level	All Areas in Nacala Corridor	Agricultural Zone						Specific District/Institution
			I	II	III	IV	V	VI	
III-3 Incorporation of "Responsible Investment for Agriculture and Food Systems - rai" in the Legal Structure and Administrative System of Government Institutions	◎	◎							
III-4 Basic Study for Water Resources Management		◎	◎	◎					ARA-CN ARA-N
III-5 Sustainable Forest Maintenance with Supporting Financial Mechanism		◎							Gurue
IV-1 Improvement of Agricultural Statistic System for the in Nacala Corridor	◎	◎							
IV-2 Support for Community Development Activities		◎							

Legend : ◎ the first priority, ○ the second priority, ▭ target zone

8.4 Tentative Implementation Schedule of the Agricultural Development Master Plan

Achieving agriculture development in the Nacala Corridor proposed in the Master Plan is targeted for 2030, with activities beginning in 2015. Considering the present status of agriculture practices in the Study Area, the development stage has been divided into the following three phases that allow for the intensive use of resources by the target sectors during implementation of the Master Plan.

- Phase I - Start-up period (2016–2020)
- Phase II - Growth period (2021–2025)
- Phase III - Maturation period (2026–2030)

The main actors on the implementation of the components of the Master Plan are the public sector, the private sector, and NGOs.

The implementation stage of each component of the Master Plan is tentatively decided based on: 1) their priority, 2) the target of each phase, 3) the required period and allocation of limited resources such as local manpower and budget. Because of the long period required to cover all target areas, some components, such as irrigation system rehabilitation, are categorized to start during Phase I, even though they are not prioritized for implementation in this phase.

The tentative implementation schedule of the 34 components of the Master Plan is summarized in Table 8.4.1.

Table 8.4.1 Tentative Implementation Schedule of Master Plan

Master Plan Components	Phase-1: Start-up Phase					Phase-2: Growth Phase					Phase-3: Maturation Phase				
	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
I-1 Strengthening of Agricultural Research	ProSAVANA-PI														
I-2 Strengthening of Agricultural Extension Services	PRONEA														
I-3 Agricultural Training Centers															
I-4 Model for the Development of Lead-Farmers in the Communities															
I-5 Development of Agriculture based on Respect for Gender Equality															
I-6 Improvement of Accessibility to Fertilizer															
I-7 Promotion of the Production of Quality Seed at the Regional Level															
I-8 Promotion of Agricultural Machinery Service Centers															
I-9 Establishment of Financial Support Systems for Small and Medium -Size Agribusiness Enterprises, Farmers' Organizations and Individual Farmers															
I-10 Rehabilitation and Construction of Irrigation Systems															
I-11 Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities															
I-12 Vegetable Production Models with small pumps and simple irrigation systems															
II-1 Establishment of a Proper Legal Framework for Out-grower Schemes															
II-2 Improvement of Market Access of Small-scale Farmers															
II-3 Improvement of Access to Market Information															
II-4 Formulation and Development of Modern Agriculture Cooperatives															
II-5 Strengthening the Institutional Role in Promoting and Supporting Value Chain Development															
II-6 Capacity Development of Business Development Service															
II-7 Quality Standardization of Agricultural Products															
II-8 Cashew Production Development															
II-9 Fruits Promotion for Small Scale Farmers															
II-10 Tea Industry Revitalization															
II-11 Rural Agro-industry Development															
II-12 Multiplication of Quality Seed															
II-13 Improvement of Access Road for Agricultural Activities															
II-14 Rehabilitation of Agricultural Storage Facilities and the Construction of Silos															
II-15 Support to the Development of Agricultural Industries															
III-1 Promotion of Land Registration for Communities and Family Farmers															
III-2 Strengthening of the Supervision Mechanism for Land and Environment Law Enforcement															
III-3 Incorporation of "Responsible Investment for Agriculture and Food Systems - rai" in the Legal Structure and Administrative System of Government Institutions															
III-4 Basic Study for Water Resources Management															
III-5 Sustainable Forest Maintenance with Supporting Financial Mechanism															
IV-1 Improvement of Agricultural Statistic System for the in Nacala Corridor															
IV-2 Support for Community Development Activities															

Implementation Monitoring Preparation

8.5 Tentative Budget of the Agricultural Development Master Plan

The budget of the agricultural components of the Master Plan is estimated based on actual amount required for the implementation of interventions in the Nacala Corridor Area. The estimated budget is summarized in the table 8.5.1.

Table 8.5.1 Summary of the Tentative Estimated Budget of Components of the Agricultural Development Master Plan for the Nacala Corridor

No.	Master Plan - Component Plans	Total Amount (MT)	Of which (MT)		
			Construction, Equipment and Materials	Operational Cost	Other (Contingency 10%)
I-1	Strengthening of Agricultural Research	280,000,000	120,000,000	130,000,000	30,000,000
I-2	Strengthening of Agricultural Extension Services	170,000,000	10,000,000	150,000,000	10,000,000
I-3	Agricultural Training Centers	270,000,000	100,000,000	150,000,000	20,000,000
I-4	Model for the Development of Lead-Farmers in the Communities	100,000,000	10,000,000	80,000,000	10,000,000
I-5	Development of Agriculture based on Respect for Gender Equality	190,000,000	0	170,000,000	20,000,000
I-6	Improvement of Accessibility to Fertilizer	2,310,000,000	0	2,100,000,000	210,000,000
I-7	Promotion of the Production of Quality Seed at the Regional Level	20,000,000	0	15,000,000	5,000,000
I-8	Promotion of Agricultural Machinery Service Centers	20,000,000	5,000,000	10,000,000	5,000,000
I-9	Establishment of Financial Support Systems for Small and Medium–Size Agribusiness Enterprises, Farmers' Organizations, and Individual Farmers	50,000,000	0	45,000,000	5,000,000
I-10	Rehabilitation and Construction of Irrigation Systems	1,230,000,000	1,030,000,000	90,000,000	110,000,000
I-11	Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities	20,000,000	0	15,000,000	5,000,000
I-12	Vegetable Production Models with small pumps and simple irrigation systems	50,000,000	25,000,000	20,000,000	5,000,000
II-1	Establishment of a Proper Legal Framework for Out-grower Schemes	20,000,000	0	15,000,000	5,000,000
II-2	Improvement of Market Access of Small-scale Farmers	26,000,000	9,000,000	15,000,000	2,000,000
II-3	Improvement of Access to Market Information	20,000,000	5,000,000	15,000,000	0
II-4	Formulation and Development of Modern Agricultural Cooperatives	110,000,000	5,000,000	95,000,000	10,000,000
II-5	Strengthening the Institutional Role in Promoting and Supporting Value Chain Development	115,000,000	5,000,000	100,000,000	10,000,000
II-6	Capacity Development of Business Development Services	10,000,000	0	10,000,000	0
II-7	Quality Standardization of Agricultural Products	30,000,000	5,000,000	20,000,000	5,000,000
II-8	Cashew Production Development	20,000,000	5,000,000	10,000,000	5,000,000
II-9	Fruits Promotion for Small Scale Farmers	20,000,000	0	18,000,000	2,000,000
II-10	Tea Industry Revitalization	20,000,000	5,000,000	10,000,000	5,000,000
II-11	Rural Agro-Industry Development	15,000,000	0	10,000,000	5,000,000
II-12	Multiplication of Quality Seed	940,000,000	470,000,000	380,000,000	90,000,000
II-13	Improvement of Access Roads for Agricultural Activities	1,010,000,000	730,000,000	190,000,000	90,000,000
II-14	Rehabilitation of Agricultural Storage Facilities and the Construction of Silos	460,000,000	350,000,000	70,000,000	40,000,000
II-15	Support to the Development of Agricultural Industries	70,000,000	30,000,000	30,000,000	10,000,000
III-1	Promotion of Land Registration for Communities and Family Farmers	700,000,000	10,000,000	630,000,000	60,000,000
III-2	Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement	120,000,000	20,000,000	90,000,000	10,000,000
III-3	Incorporation of "Responsible Investment for Agriculture and Food Systems - rai" in the Legal Structure and Administrative System of Government Institutions	120,000,000	0	110,000,000	10,000,000
III-4	Basic Study for Water Resources Management	50,000,000	20,000,000	20,000,000	10,000,000
III-5	Sustainable Forest Maintenance with Supporting Financial Mechanism	390,000,000	5,000,000	350,000,000	35,000,000
IV-1	Improvement of Agricultural Statistics System for the Nacala Corridor	100,000,000	5,000,000	85,000,000	10,000,000
IV-2	Support for Community Development Activities	290,000,000	190,000,000	70,000,000	30,000,000
	Total	9,371,000,000	3,169,000,000	5,318,000,000	884,000,000

8.6 Roles of Main Stakeholders in the Implementation of the Master Plan

8.6.1 Roles of Key Stakeholders

In the implementation of the Master Plan, different stakeholders, such as farmers, associations, cooperatives, public institutions, the private sector, civil society, NGOs, etc., will play important roles. Moreover, partnerships among these entities will be promoted whenever necessary.

(1) Farmers

Farmers are the main actors in the development of the Nacala Corridor. Interventions should promote the improvement of farming techniques, and achieve increases in agricultural production, productivity and farming system/crop diversification through proper support from the public and private sectors.

As aforementioned, farmers are categorized into several groups according to their production scale, farm management and available resources. The role of each group of farmers is expected as follows:

Groups		Characteristics of each Group	Roles
Small-Scale Farmers	1) Vulnerable farmers	Less than 0.5 ha of cultivated land, and with difficulty to achieving food self-sufficiency.	To improve farming to become a member of a farmers' organization. To take special training, targeting female farmers to learn farming techniques applicable with limited resources.
	2) Typical family farmers	Cultivating 1.5 ha in general at subsistence level. Surplus of produce may be sold to local markets.	To improve farming as a group.
	3) Emerging farmers	Cultivating relatively larger areas from 1.5 to 10 ha, with larger production. Cultivating cash crops with food crops to sell in the markets.	As leaders of the community or farmers' organizations, learn improved technology for farming and practice it accordingly.
4) Middle-scale farmers		Cultivating from 10 to 50 ha. Commercial farming.	As leaders or cores of the community or farmers' organizations, learn improved technology and better practices. Communicate with SDAE, NGO or market. Independently collect information and share with the community.
5) Large-scale farmers		Cultivating more than 50 ha. Commercial farming	Like private farmers, expected to apply out-grower schemes with surrounding community members.

(2) Public institutions

The role of public institutions is to create favorable conditions for the farmers and the local private sector to carry out their activities in an effective and efficient manner. These institutions will provide goods and services, such as agricultural research, agricultural extension, rural finance and specialized services in seed production and sales, plant and animal health, complementing the services provided by the private sector.

Public institutions will also be responsible for ensuring the rule of law and good governance in order to avoid any threat to local farmers in their development.

The MASA will take the initiative to promote the Master Plan and coordinate with their subordinate organizations, other government ministries, other public entities, including financial institutions, the private sector, civil society, development partners and farmers.

(3) Private sector

The private sector is expected to develop improvements to support the implementation of the farmers' activities, namely provide high quality goods and services. The private sector includes traders, agro-processing entities, service providers, corporate farms, surveyors and other professionals, which may provide goods and services complementing the services provided by the public institutions.

In order to develop input supply networks and value chains in post-harvesting, growth of the private sector, especially expansion of the trading network and agro-processing, is required. Through the development of the value chain, it will be possible to add value to agricultural products, to increase opportunities for employment and income generation.

Sectors	Roles
1) Trader	To improve market access through expansion of the network. Appropriate competitiveness of traders reduces operation cost.
2) Agro-processing entities	To create market demand for local agricultural products for processing. To create new employment opportunities. To increase the value of agricultural products and expand regional economic activities. The profits will be circulated in the area.
3) Service provider	To supply agricultural inputs or related services for farmers. To provide new farming technology, agricultural inputs or credit through out-grower schemes.
4) Corporate farm	To provide new farming technology, agricultural inputs or credit through out-grower schemes. To purchase products from farmers in the area based on cooperation and generate synergies. To provide CSR activities based on agreed matters with the community after consultation.

(4) Civil society

CSOs including non-governmental organizations and universities are expected to play a fundamental role in developing human and social capital. They will be participants in the implementation of the Master Plan projects and are expected to act as project partners.

CSOs, NGOs and the academia should participate in the monitoring of the Master Plan by participating in regular meetings. Furthermore, it is expected to involve such organizations in conducting additional studies for the Master Plan implementation, support the consultation processes in the communities, support in the solution of eventual conflicts between the

communities and private investments, and support the process of land registration and DUAT concessions.

(5) Development partners

The cooperation partners are expected to participate in the implementation of the Master Plan and co-funding it.

(6) Universities and agricultural schools

The universities in the Nacala Corridor area are expected to participate in the agricultural research activity of the Master Plan. The universities and agricultural schools in the area are expected to collaborate on agricultural extension service and training of farmers planned in the Master Plan, too.

8.6.2 Task Allocation among Stakeholders

The Master Plan will be implemented not only by the public sector, but also by the private sector including farmers, NGOs, etc. Correlation between each stakeholder and the Master Plan components is shown in Table 8.6.1. The planned implementation agency for the Master Plan will be responsible for the overall coordination and management of the components.

Table 8.6.1 Correlation between each Stakeholder and the Master Plan Components

	Title of Plan	Local community	Farmer						Private sector		Public institution		Local Government		CSO and NGO	Other stakeholder
			Vulnerable Farmer	Typical Farmer	Emerging farmer	Middle-Scale Farmer	Large-Scale Farmer	Organization	Trader, Processor	Service provider	MASA and its subordinate organs	Others	Province	District		
I-1	Strengthening of Agricultural Research		△	△	△	△	△				IIAM; INCAJU; IAM					ProSAVANA-PI Team, Universities
I-2	Strengthening of Agricultural Extension Services	○	○	○	○	△	△	○		Technical assistance service provider	DNEA		DPASA; SPEA	SDAE	○	Universities, Agricultural schools
I-3	Agricultural Training Centers		△	△	○						IIAM		DPASA	SDAE	Youth association	Agricultural schools
I-4	Model for the Development of Lead-Farmers in the Communities	○	△	△	○			○			IIAM			SDAE	○	
I-5	Development of Agriculture based on Respect for Gender Equality	○	○	○	○			○			DNEA	MMSA	DPASA	SDAE	○	OMM
I-6	Improvement of Accessibility to Fertilizer		○	○	○	○	○	○	Fertilizer trader		○	MIC				
I-7	Promotion of the Production of Quality Seed at the Regional Level			△	△			○	Seed company		IIAM		DPASA	SDAE		
I-8	Promotion of Agricultural Machinery Service Centers		○	○	○	○				Tractor service provider & operator	○		DPASA	SDAE		
I-9	Establishment of Financial Support Systems for Small and Medium–Size Agribusiness Enterprises, Farmers' Organizations, and Individual Farmers		△	△	○	○	○	○		Financing institution	○		DPASA			Donor; DIF operation unit
I-10	Rehabilitation and Construction of Irrigation Systems		*	*	*	*	*	○			INIR		DPASA	SDAE		
I-11	Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities		△	○	○	○	○	○			INIR		DPASA	SDAE		
I-12	Vegetable Production Models with small pumps and simple irrigation systems		○	○	○			○			FDA		DPASA	Administrator's office; SDAE; FDD		
II-1	Establishment of a Proper Legal Framework for Out-grower Schemes		△	○	○	○		○			CEPAGRI		DPASA	SDAE	○	ProSAVANA-PEM team; Lawyer; Chamber of commerce
II-2	Improvement of Market Access of Small-scale Farmers		○	○	○	○		○	Small-scale business operator (Trader, Retailer, etc.)		CEPAGRI		DPASA	SDAE	○	
II-3	Improvement of Access to Market Information		△	○	○	○	○	○	Small-scale business operator		SIMA		DPASA; DPIC			
II-4	Formulation and Development of Modern Agricultural Cooperatives		○	○	○	○		○			DNEA		DPASA		○	AMPCM
II-5	Strengthening the Institutional Role in Promoting and Supporting Value Chain Development					△	○	○			CEPAGRI	CPI; GAZEDA; IPEX; IPEME	DPASA			Donor; Chamber of commerce

	Title of Plan	Local community	Farmer						Private sector		Public institution		Local Government		CSO and NGO	Other stakeholder
			Vulnerable Farmer	Typical Farmer	Emerging farmer	Middle-Scale Farmer	Large-Scale Farmer	Organization	Trader, Processor	Service provider	MASA and its subordinate organs	Others	Province	District		
II-6	Capacity Development of Business Development Services						○	○			CEPAGRI	IPEME; CPI; GAPI; IPEX				Provincial chamber of commerce
II-7	Quality Standardization of Agricultural Products		△	△	○	○	○	○	○		○	MIC				Academic institution
II-8	Cashew Production Development		○	○	○	○		○	Cashew company		INCAJU; IIAM			SDAE		
II-9	Fruits Promotion for Small Scale Farmers		○	○	○	○		○	Trader, Retailer, Agro-processing business operator		CFF-Nampula		DPASA	SDAE	○	
II-10	Tea Industry Revitalization				○	○		○	Tea company				DPASA	SDAE		
II-11	Rural Agro-Industry Development			○	○	○		○	Operator of cassava processing facility					SDAE		
II-12	Multiplication of Quality Seed			△	○	○	○	○	Operator of seed processing unit		IIAM			SDAE		
II-13	Improvement of Access Roads for Agricultural Activities		○	○	○	○	○					ANE; MPD; MTC; MOPHRH	DPASA; DPTC	SDAE; SDPI		
II-14	Rehabilitation of Agricultural Storage Facilities and the Construction of Silos						△	△		Operator of rental storage	ICM; IIAM	MIC	DPASA			
II-15	Support to the Development of Agricultural Industries						△	△		Operator of logistics center		GAZEDA; MPD		District Government; Municipality		
III-1	Promotion of Land Registration for Communities and Family Farmers	○	○	○	○	△	△				CEPAGRI		DPASA; SPGC	SDAE		MCA; ITC
III-2	Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement	○	○	○	○	○	○			Private environmental auditor	DNTF; CEPAGRI	MITADER; CPI; ARA; FUNAB	DPASA; SPGC; SPFFB; DPCA	SDAE; SDPI	○	
III-3	Incorporation of “Responsible Investment for Agriculture and Food Systems - rai” in the Legal Structure and Administrative System of Government Institutions	○	○	○	○	○	○			Financing Institutions	DNTF, CEPAGRI	CPI, MITADER ARA	Provincial Gov.	District Gov.	○	○
III-4	Basic Study for Water Resources Management		△	△	△	△	△					ARA-CN; ARA-N	DPASA			
III-5	Sustainable Forest Maintenance with Supporting Financial Mechanism	○	○	○	○	△	△			Operator of nursery		FUNAB	SPFFB	SDAE; SDPI; Administrative post	○	GEF
IV-1	Improvement of Agricultural Statistics System for the Nacala Corridor			/	/	/	/	/			DE, IIAM, INCAJ		DPASA	SDAE		
IV-2	Support for Community Development Activities	○	○	○	○	○						X	DPASA	SDAE	○	

○: Direct benefit, △indirect benefit, ＊ : Direct benefit depends on location, / no relation

8.7 Institutional Framework for the Implementation of the Master Plan

8.7.1 Necessity of Coordination Institution for Implementation and Management of the Agricultural Development Master Plan

The Agricultural Development Master Plan in the Nacala Corridor is prepared based on PEDSA, a program to improve the livelihood of the inhabitants of the Nacala Corridor through inclusive and sustainable agriculture and regional development. The Master Plan covers 19 districts in three provinces, involving different sectors to address a variety of development issues, such as environmental, land ownership, infrastructure, human resource development and agricultural & agribusiness development.

The Master Plan will be implemented by the Ministry of Agriculture and Food Security of the Government of Mozambique, in collaboration with other relevant government ministries, provincial and district governments with technical and financial assistance from donors and development institutions. In order to effectively implement and oversee the agricultural development projects and activities proposed in the Master Plan, a coordinating body should be established as a public authority to act as an inter-agency consultative board for information sharing and coordinating of activities among the different parties in the three provinces. Also, the coordinating body will play a facilitating role, helping to coordinate support from other development partners and maintain linkages with stakeholders, including farmers, private partners and civil society during the implementation of the Master Plan. In addition, it will have a separate unit to monitor/audit the status of agricultural and agribusiness investments in terms of their environmental and social aspects in order to realize the concept of introducing responsible agricultural investment for the development of the Nacala Corridor.

Therefore, to effectively and efficiently implement and oversee the agricultural development components and activities proposed in the Master Plan, it is better to be implemented under a public coordinating agency acting as an inter-institutional consultative board for information sharing and coordinating of activities among different parties in Nacala Corridor. Under the agency, an implementation unit of the Agriculture Development Master Plan will be formulated.

8.7.2 Experience in Institutions for Regional Agriculture Development

Among the six agricultural growth corridors identified in PEDSA, the Zambezi Corridor development is managed by the Zambezi Valley Development Agency (ADVZ) as a public institution, and the Beira Corridor development has a different management structure. They are described as follows:

(1) Zambezi Valley Development Agency

The ADVZ was established as public institution for the development of the Zambezi Valley, of four provinces, under the supervision of the Ministry of Economy and Finance on 30 June 2010. The headquarters are based in Tete Province, with branches in Zambezia, Manica, Sofala and Maputo Provinces. ADVZ has a Managing Directorate and Board of Directors bodies. The revenue of ADVZ includes funds allocated in the state budget.

The agency's aims are:

1) Carrying out studies and presentations of strategies for economic and social development for the national part of the Zambezi River watershed;
2) The technical and financial assistance to social and economic development initiatives for the national part of the Zambezi River watershed, including fund-raising and fund channeling to the beneficiaries;
3) Assistance to local governments in the incorporation of components of planning and territorial arrangements and local socio-economic development.

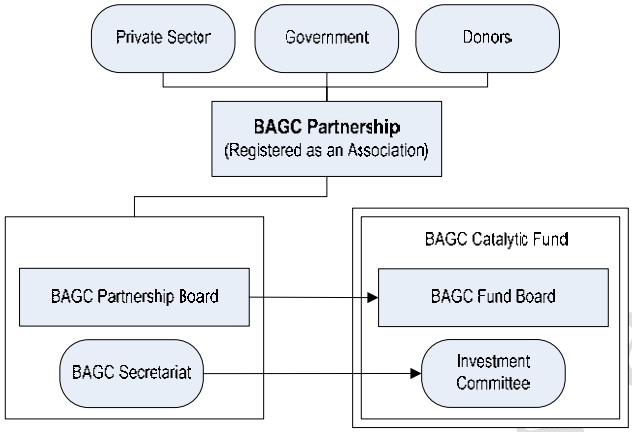
In the inception stage, ADVZ employed staff through a combination of 31 government civil servants and temporary contract-based staff, including four specialists, providing supportive functions. 12 local technical staff was deployed in Tete, Maputo and in Caia (Sofala), additionally three supporting staff were assigned in these three offices.

From 2012 to 2014, ADVZ was allocated for different projects, exceeding USD 200 million, which were provided by the Government of Mozambique, Exim Bank from India, China, World Bank, Netherlands and Norway. At present, ADVZ is managing the grants of FinAgro (programme in agribusiness funded by USAID) under TechnoServe.

(2) Beira Agriculture Growth Corridor

The organizational structure of the BAGC, known as the “BAGC Partnership” is illustrated in Figure 8.7.1. The role of the BAGC Partnership is incorporated as a non-profit “association” to facilitate coordinated investments in order to support commercially viable agribusinesses. There are two main functionaries under the BAGC Partnership: the BAGC board and BAGC Secretariat. The BAGC board acts as the decision-making body represented by the public and private sectors to support their interests in promoting investments in commercial agriculture in the Beira Corridor. In contrast, the BAGC Secretariat provides a platform for the coordination and facilitation of operational support in the work of the BAGC Partnership. The Catalytic Fund, which is registered as an investment company managed by AgDevCo (a project development company) and supports to promote the funds of the BAGC Secretariat, invests in early-stage farming and agro-processing businesses, which incorporates small- and medium-scale farmers. Technical staff of the Catalytic Fund provides intensive support to the clients of the fund in relation to production and business management, as well as advisory services to small to medium enterprises who initiate and expand commercial agriculture.

In summary, the roles of the BAGC Partnership's Secretariat are limited to coordination and public relations activities for the creation of a network among public and private partners, while the Catalytic Fund takes proactive and practical roles in promoting and expanding commercial agriculture and agribusiness in the area, providing extensive advisory and monitoring support.



Source: Beira Agriculture Growth Corridor

Figure 8.7.1 Organizational Structure of the BAGC Partnership

8.7.3 Expected Institutional Framework for the Implementation of the Master Plan

As described in the previous section, to effectively implement and oversee the agricultural development programs (components) and activities proposed in the Master Plan, a coordinating body should be established to act as an inter-agency consultative board for information sharing and coordinating of activities among the different stakeholders in the three provinces. Considering that the Master Plan will be carried out through multi-sector initiatives, it is necessary to establish a coordinating body structure with a management / advisory board and secretariat, in order to ensure collaborative decision making and information sharing. Reflecting the case of the BAGC Partnerships among the private sector stakeholders, including farmers, government and donors, a forum (advisory committee) involving different stakeholders will be formulated to give advice to the coordination Agency.

The expected implementation framework under the coordination agency is shown in Figure 8.7.2, while specific tasks are summarized as follows:

(1) Expected function of the coordination agency

The coordination agency is expected to act as follows:

- Hold annual board meetings
- Monitor overall progress of programs and projects carried out in the Nacala Corridor
- Organizing coordination among related ministries, development donors, NGO/CSOs and other stakeholders for implementing programs.
- Prepare an annual plan and budget for the activities of the Agency

(2) Expected function of the Implementation Unit of the Agriculture Development Master Plan

The role of the implementation unit is to facilitate coordination between the agricultural development projects/activities carried out by different entities, both public and private.

The implementation unit requires different functions of planning and implementation, monitoring and evaluation, coordination and public relations, and administration. The important roles for the implementation unit of the Master Plan to be considered are recommended as the following:

1) Planning and Implementation

- To contribute to formulating general policies and strategies of agriculture development in the Nacala Corridor;
- To provide necessary information and support to different partners to promote agriculture development in the Nacala Corridor;
- To facilitate MASA and its related institutions in order to implement agricultural improvement projects and activities as supporting family farming, extension service, marketing of agricultural products and development of necessary infrastructure;
- To coordinate with government organizations and other partners in the area of technology innovation (agricultural research), social and economic infrastructure development;
- To identify and introduce legal, administrative and financial measures/incentives to monitor domestic and foreign investment projects in accordance with guidelines on “rai”;
- To ensure that all partners are participating in decision making and information sharing, involving stakeholders;
- To provide recommendations on amendments and revisions for the Master Plan based on the results of joint evaluations with stakeholders;

2) Monitoring and evaluation

- To monitor overall progress of projects and investments developed for and implemented in the Nacala Corridor;
- To discuss issues of institutional or regulatory reform necessary for agriculture/ agribusiness development in the Nacala Corridor;
- To monitor/audit agricultural and agribusiness investments in terms of their social and environmental aspects, and warn investors and encouraging them to take remedial action if serious offenses are observed;

3) Public relations, coordination and management

- To conduct public relations activities to broadly disseminate information on agricultural development in the Nacala Corridor based on the communication strategy of ProSAVANA;

- To facilitate coordination between the agricultural development projects/activities and investments carried out by different entities, both public and private;
- To organize a forum consists of farmers' representatives, civil societies, NGOs, and other stakeholders as a platform to disseminate information and to discuss related issues.
- To form independent committees in case of conflicts regarding land tenure, out-grower scheme or other critical issues relating to agricultural development, involving representatives of farmers' organizations, civil society, NGOs and other partners;
- To monitor procedures for investments in agriculture and related land use activities from an early stage and to supervise implementation of activities in the private sector;
- To conduct mediation or arbitration for the resolution of the conflicts related to the out-growers scheme.

(3) A forum for agricultural development in the Nacala Corridor to be established in coordination with other stakeholders

A platform for the implementation unit will be established in the form of "Forum for agricultural development in the Nacala Corridor (hereinafter called "the Forum")," composed of representatives of farmers' organizations, civil society organizations, NGOs, private sectors like service providers and agribusiness firms and other stakeholders.

They will be assembled before the general assembly or extraordinary assembly and give advice to the implementation unit. More specifically, the forum has the tasks of presenting recommendations on agriculture development policies and its work plan, examining the agricultural investment plan and implementation status, proposing potential measures for solving any issues related to agriculture practice and investments, and implementing periodic joint project evaluation and monitoring. Furthermore, the forum will offer a set of recommendations on amendments and revisions of the Master Plan based on the results of joint evaluations.

(4) Grievance mechanism to be established for the implementation of the Master Plan

In accordance with the development progress, many changes, influences and impacts will occur for inhabitants in the Nacala Corridor Area. Some negative impacts might be happen. Therefore, grievance mechanisms should be considered as parts of the implementation structure of the Master Plan, regardless of the involvement of governmental institutions or not.

1) Community level grievance system and report channel to local government (Traditional Leaders)

Traditional rural society has generally three tiers of structure with respective leadership/ authority in each tier. The first level leader, mostly called Regulo, manages a wide area. The second level leaders manage villages and the third level leaders manage settlements.

The traditional leaders play a major role in solving social problems at a grassroots level. Only the cases that cannot be solved within them shall be taken on by public administration.

In the Master Plan, this traditional network is used as one of information channels for grievance. The leaders will receive training about gender equality, land tenure and out-grower scheme as basic knowledge to settle several issues and will establish a communication network with SDAE.

2) Land management committee (formulated in component III-1)

As described in section 6.1.1, establishing the land management committee will be promoted through the implementation of the component III-1.

The committee will be formed from community members, half of whom should be women, and be trained regarding the land law, rights of community, usage of natural resources and discussion with neighbors and delimitation. The committee will responsible for consultation regarding land use in the community with investors and support land registration in the community, as well as settle disputes when they happen.

3) DPASA, SDAE and local government such as district and locality

DPASAs and SDAEs, including extension workers and local governments, will be trained regarding the handling of grievances from inhabitants.

The SDAE and local government will receive the grievances from the local levels through traditional leaders, the land committees, farmers associations and others. Moreover, the SDAE will receive information from NGOs, CSOs and private entities. When the grievances are related to the out-grower scheme and land issues, the grievances will be informed to the DPASA without any judgment from SDAE.

Opinion boxes placed at SDAEs will be used to gather the comments and grievances for the Master Plan. The reported comments and grievances shall be sent to the implementation unit of the Master Plan without any judgment from SDAE.

The DPASAs will be informed about any grievances by SDAEs and other stakeholders such as CSOs, NGOs, and private entities at the provincial level. DPASA will organize coordination meetings with necessary stakeholders to settle the issues. If the issues are related to land, the out-grower scheme and other complex issues, they will inform the implementation unit.

4) CSOs and NGOs who have sites in the district

CSOs and NGOs will be involved in the grievance mechanism to support the inhabitants from a natural position. In particular, the organizations which actually have direct relations with the communities, for example they carry out some project in the community, the organization will be certified as an official third party for the community by SDAE and will be involved the solving issue related to the community.

5) Independent Committee to settle the issue

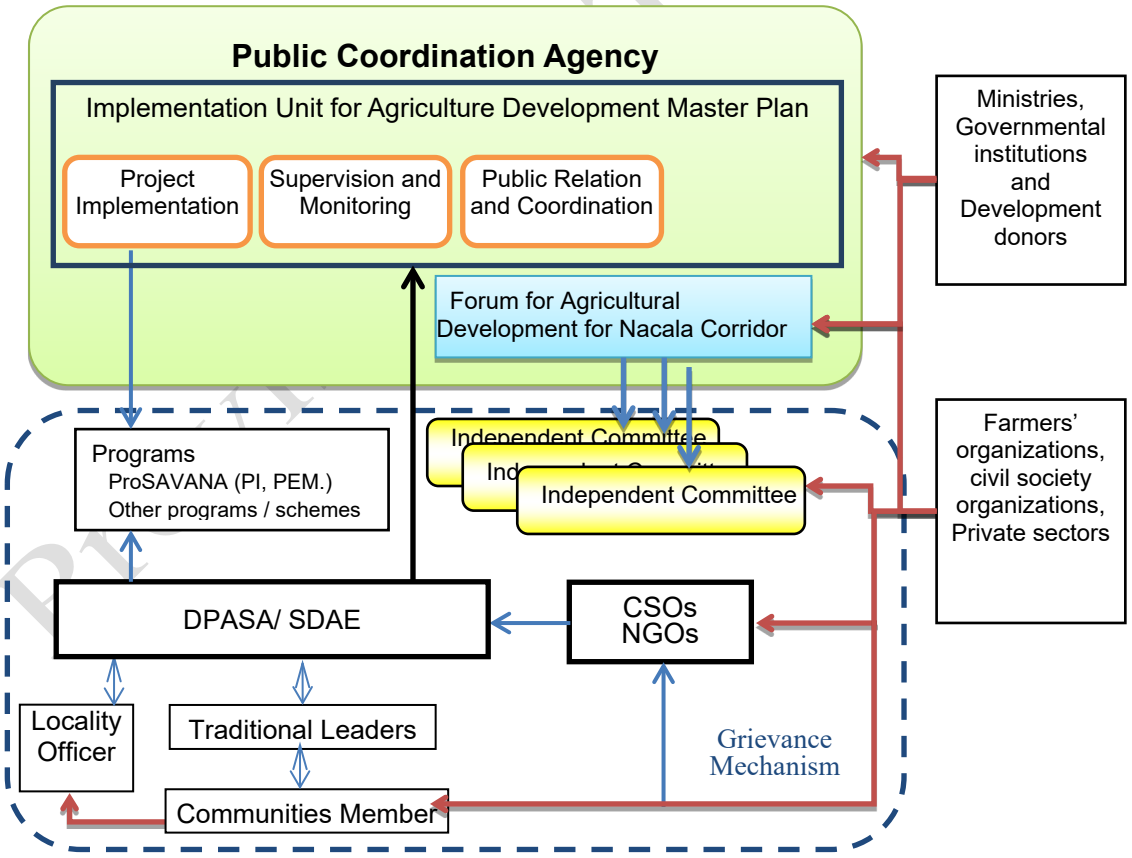
When the grievances and issues are brought to the implementation unit, an independent committee for the issue will be formed upon request from the implementation unit in order to settle the issue.

The independence committee will be a lower organization of the forum, therefore, the committee will be composed of representatives of the forum and an ad hoc panel. The committee will be formed in accordance with the specific issues to be discussed involving representatives of farmers' organizations, civil society, NGOs and other third-party members nominated by the Forum and the implementation unit case by case.

The committee has the specific tasks as follows:

- Monitoring agriculture investments and aiding the reconciliation of conflicts;
- Conducting mediation or arbitration for the resolution of the conflicts related to contract farming between out-growers and agribusinesses;
- Land management in the community, in some cases with the agricultural investment and/or among local inhabitants;
- Issues related to others.

  Conducting mediation or arbitration for the resolution of the



Source: JICA Study Team

Figure 8.7.2 Expected Implementation Framework for Implementation of Agricultural Development Master Plan

8.8 Monitoring and Evaluation

The main objectives of monitoring and evaluation during the implementation of the Master Plan include the managing of progress, promotion of results and outcomes, assessment of unintended impacts (especially negative ones), timely modification of measures or remedial actions in conflict situations (especially conflict related to land use or contract farming), and feedback of lessons learned from direct and indirect stakeholders. The monitoring and evaluation mechanism will have two levels, one for the Master Plan and another for the components.

At the program level, regular monitoring to evaluate the implementation of the Master Plan will be carried out to determine that the program is achieving which level of its objectives, involving 1) the public sector-Central and local government; 2) the private-sector farmers, breeders, foresters and service providers; 3) CSOs, NGOs, community organizations, academic institutions and the general public; and 4) development partners. The mechanism of participatory monitoring will be established. The results of monitoring and evaluation will be fed back to the revision of the Master Plan periodically and it will be publicly accessible.

For this purpose, social assessment/customer satisfaction surveys will be carried out before starting the Master plan and after implementation periodically. These assessments would help receiving feedback from local communities on the project service quality. The assessment would be a useful instrument for 1) collecting the baseline data and setting the indicators; 2) understand the changing attitudes and behaviors towards the project; and 3) identify the needs of vulnerable groups in the country, e.g. women, people with illiteracy and youth.

At the project level, each implementing agency will be responsible for its own self-monitoring and evaluation mainly targeting the direct beneficiaries at each implementation site at the most opportune timing and frequency for each project. Monitoring and evaluation of donor-supported project implementation will follow each donor's own system and these mechanisms shall be acceptable and respected.

The public coordination agency for agricultural development in the Nacala Corridor that will take the responsibility of overall management and supervision of monitoring and evaluation activities, providing guidelines and support for the implementing agencies of each component to allow proper realization of monitoring and evaluation with the desired quality.

The monitoring of the implementation of the Master Plan lies in the following general areas:

- **Implementation of the activities of the Master Plan**- it is very important for monitoring the efficiency, effectiveness and impact of the implementation of activities in all areas of priority intervention at the level of beneficiaries.
- **Performance of the agricultural sector**- involves monitoring the performance of the agricultural sector and from the perspective of farmers. On this basis it is crucial to develop a stronger capacity in monitoring and evaluation.
- **Consist with the PEDSA and other governmental plans** – it is critical that programs,

activities and components are consistent with PEDSA. The criteria for being consistent with PEDSA include:

- Contribution to the objectives of the PEDSA
- Implementation in accordance with the principles of PEDSA
- Specific activities and projects included in specific subprograms.

- Impact on food security and nutrition, access to markets and in the use of natural resources
- Impact on socio-economic aspects, GDRP, gender-aggregated employment-rate, gender-equality indicators, poverty incidence, and conflict related to any investment.

CHAPTER 9 Strategic Environmental Assessment

9.1 Objective and Target of SEA Study

9.1.1 Objectives

Strategic environmental assessment (SEA) refers to "an assessment implemented at the policy, planning and program levels, but not at a project-level EIA" (JICA Guidelines for Environmental and Social Considerations, 2010) or "a range of analytical and participatory approaches that aim to integrate environmental considerations into policies, plans and programs and evaluate the inter-linkages with economic and social considerations" (Overseas Economic Cooperation Fund (OECD)/ Development Assistance Committee (DAC), 2006).

The application of SEA has been instrumental, especially at the very early stages of decision-making for development. It is a tool used to asses possible impacts in which the implementation of a plan, policy or program might cause on the existing and future environmental conditions. It also assesses socio-economic effects. The SEA is intended to influence the plan so as to improve environmental outcomes.

From these perspectives, SEA is applied to the planning process of the Agricultural Development Master Plan in the Nacala Corridor, with the following actions:

(1) To conduct stakeholder analysis;
(2) To contribute to the early integration of environmental issues into the formulation of an agricultural development plan for the Nacala Corridor region
(3) To assess development scenarios and essential strategies in respect of their environmental impact;
(4) To assess draft Master Plan in respect of potential adverse impacts; and,
(5) Recommend the core strategies for the Draft Master Plan that implies significant and/or irreversible adverse impacts.

9.1.2 Targets of SEA Study

The targets of the SEA study are development scenarios and draft Master Plan, while their detailed discussions are contained in chapter 3 and chapter 8.

The Master Plan is a plan toward improving the livelihood of the inhabitants of the Nacala Corridor through inclusive and sustainable agricultural and regional development by 2030. Therefore, target scenarios of assessment for alternative developments are set as entire strategies for planning.

(1) Development scenarios

Development scenarios are prepared based on major two factors as follows;

- Dissemination of improved cultivation practices
- Private sector's agricultural production

Table 9.1.1 Targets for Alternatives of Development Scenarios for Agricultural Development

Scenario Name.	Dissemination of improved cultivation practices	Private sector's agricultural production
1. Zero Option	Some improvement based on traditional cultivation practice	No additional development
2. Cautious development	Slow applying of the practices among farmers	Very limited parts
3. Gradual development	Smooth applying of the practices among farmers	Certain extent
4. Phased development	Smooth applying of the practices among farmers	Advanced
5. Positive development	Rapid applying of the practices among farmers	Advanced

(2) Draft Master Plan

Under the four pillars for agricultural development, compatible with PEDSA, 34 components are proposed in the draft Master Plan.

Table 9.1.2 Components of the Agricultural Development Master Plan in the Nacala Corridor

Pillars	Development Strategy	No.	Master Plan Component
I. AGRICULTURAL PRODUCTIVITY - Increased agricultural productivity, production and competitiveness, and contributing to food security and adequate nutrition -	Improving the technical assistance systems	I-1	Strengthening of Agricultural Research
		I-2	Strengthening of Agricultural Extension Services
		I-3	Agricultural Training Centers
		I-4	Model for the Development of Lead-Farmers in the Communities
		I-5	Development of Agriculture based on Respect for Gender Equality
	Improving access to agricultural inputs	I-6	Improvement of Accessibility to Fertilizer
		I-7	Promotion of the Production of Quality Seed at the Regional Level
		I-8	Promotion of Agricultural Machinery Service Centers
	Improving access to agricultural financing and credit	I-9	Establishment of Financial Support Systems for Small and Medium–Size Agribusiness Enterprises, Farmers' Organizations, and Individual Farmers
	Irrigation development	I-10	Rehabilitation and Construction of Irrigation Systems
		I-11	Improvement of Irrigation Technology and Construction Quality for Irrigation Facilities
		I-12	Vegetable Production Models with small pumps and simple irrigation systems
II. MARKET ACCESS - Services and infrastructure for better access to markets, and development framework directed towards agricultural investments -	Improving market access by farmers	II-1	Establishment of a Proper Legal Framework for Out-grower Schemes
		II-2	Improvement of Market Access of Small-scale Farmers
		II-3	Improvement of Access to Market Information
	Supporting the establishment and development of modern agricultural cooperatives	II-4	Formulation and Development of Modern Agricultural Cooperatives
	Promoting adding value to agricultural products	II-5	Strengthening the Institutional Role in Promoting and Supporting Value Chain Development
		II-6	Capacity Development of Business Development Services

Pillars	Development Strategy	No.	Master Plan Component
		II-7	Quality Standardization of Agricultural Products
		II-8	Cashew Production Development
		II-9	Fruits Promotion for Small Scale Farmers
		II-10	Tea Industry Revitalization
		II-11	Rural Agro-Industry Development
		II-12	Multiplication of Quality Seed
	Developing infrastructure for logistics	II-13	Improvement of Access Roads for Agricultural Activities
		II-14	Rehabilitation of Agricultural Storage Facilities and the Construction of Silos
		II-15	Support to Development of Agricultural Industries
III. NATURAL RESOURCE - Sustainable and integral use of land and water resources, forests and fauna -	Land management	III-1	Promotion of Land Registration for Communities and Family Farmers
		III-2	Strengthening of the Supervision Mechanism for Land and Environmental Law Enforcement
	Realization of appropriate investments by the private sector through the adoption of principles of “rai”	III-3	Incorporation of “Responsible Investment for Agriculture and Food Systems - rai” in Legal Structure and Administrative System of Government Institutions
	Water resources development and management	III-4	Basic Study for Water Resources Management
	Forest resources development and management	III-5	Sustainable Forest Maintenance with Supporting Financial Mechanism
IV. INSTITUTIONS - Strengthening agricultural institutions -	Strengthening coordination of institutions related to agriculture and food security	IV-1	Improvement of Agricultural Statistics System for the Nacala Corridor
	Capacity development of communities through the support from community development activities	IV-2	Support for Community Development Activities

9.2 Methodology of SEA Study

9.2.1 SEA Process

The SEA study proceeded in parallel with the formulation of the Agricultural Development Master Plan. The initially identified environmental impacts were given as feedback to the Planning Team in the formulation of development strategies. The final development strategies were then assessed in the course of the SEA study. This process of revision further ensures that impacts are considered and minimized as much as possible. The process is shown in the figure below.

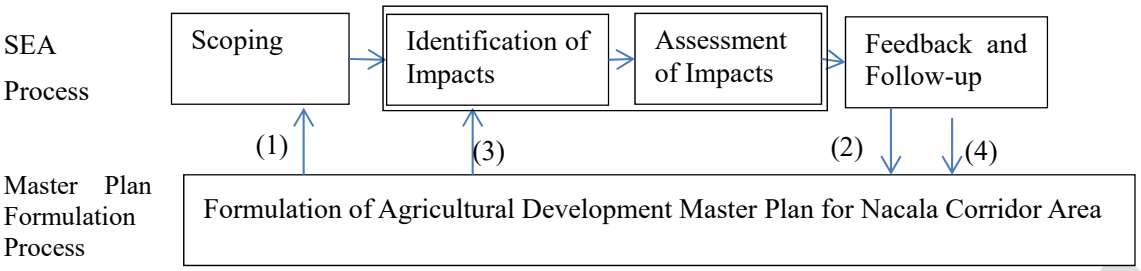


Figure 9.2.1 Process of Development Strategies Formulation and SEA Study

9.3 Engagement of Stakeholders in the SEA Study

9.3.1 Stakeholder Analysis

The stakeholders of the Master Plan are determined as follows:

- Producers: Local farmers, local population, agricultural associations, private enterprises (agricultural enterprises, agricultural product-processing enterprises), other enterprises in the productive value chain
- Public organizations: IIAM, National Directorate of Agrarian Service (DNSA), DNEA, National Directorate of Veterinary Service (DNSV), IAM, INCAJU, and others

However, it is evident that there exists a broader range of stakeholders. Table 9.3.1 is an attempt to describe the stakeholders in a wider context to the Target Area.

Table 9.3.1 Extended Stakeholders

Producers: - Associations (registered/non-registered) - Forums, unions, and federations - Cooperatives (first-tier/second-tier) - National-level organizations such as AMPCM and UNAC - Individual farmers can be classified in various ways: by crop, farm size, animals owned, DUAT holding, farming practices (intensive/extensive, manual/mechanized), access to extension/finance/ irrigation/markets, health conditions such as HIV/AIDS, age, gender, ethnic group, language, literacy, religion, poverty level, head of household (male/female), etc.
Private enterprises: - Traditional cash crop companies (cotton, tobacco, sugar cane, oilseed, coconut, etc.) - Agro-processing companies (maize, cassava, rice, cashew nut, chicken, beef, etc.) - Formal/informal traders, transporters, and middlemen - Wholesalers, retailers, supermarkets, and restaurants - Food markets in a city, town or village - Trading companies for import and/or export - Service providers (seed, fertilizer, agrochemical, machinery, equipment, technical assistance, finance, marketing, etc.) - Agribusiness investors (foreign and/or domestic) - Chambers of commerce

Public institutions: - MASA (Cabinet of Minister, DE, DNSA, DNEA, DNSV, DNTF, etc.) - MITADER (National Directorate of Land Planning and Management (DNAPOT), National Directorate of Environmental Impact Assessment (DNAIA), etc.) - MOPHRH, ARA - ANE - CPI, GAZEDA - GAPI - Institutions related to MASA (IIAM, INCAJU, IAM, ICM, CEPAGRI, CENACARTA, Training Institute of Land and Cartography (INFATEC), FDA, etc.) - Provincial governments, especially DPA, National Directorate of Land Planning and Management (DPOPH), Provincial Directorate of Industry and Commerce (DPIC), Provincial Directorate of the Coordination of Environmental Action (DPCA) - District governments, especially SDAE and SDPI - Chiefs of Administration Posts
Civil society organizations, NGOs and Donors: - Provincial platforms of civil society organizations - Consultative councils at different levels (District, Administration Post, Locality, Village (Povoação)) - Official/traditional leaders of locality, village or community - Representatives of women, youth, religious groups, educational institutions, etc. - NGOs (international or national) - Multilateral donors (WB, ADB, IFAD, UNDP, etc.) - Bilateral donors (JICA, ABC, USAID, MCA, SIDA, Swiss Agency for Development and Cooperation (SDC), Finnish Department for International Development Cooperation (FINNIDA), etc.)

Source: The Study Team

These stakeholders are characterized by different levels of participation in the decision- making process, their consultative positive and/or negative influence and susceptibility, and direct/indirect impacts on the Master Plan. A correlation matrix of the stakeholders and the Master Plan projects is presented in section 8.6.

9.3.2 Meetings for Involving Stakeholders

A variety of meetings were organized in order to involve a wide range of people in the course of the formulation of the Agricultural Development Master Plan for Nacala Corridor. In the stakeholder meetings during the early to middle phases, most government officers were involved in order to discuss the purpose of development concepts and strategies. In the district meetings and dialogue meetings at the local level, farmers, local administrations, representatives of non-governmental stakeholders including civil society organizations and private business groups were involved in the meetings. Each type of meetings is described in the sections below.

(1) Stakeholder meetings

Stakeholder meetings were held three times from the beginning of the study in 2012. The 1st meetings were held in April 2012, 2nd meetings were in November 2012 and 3rd meetings were in March 2013.

The purpose of the meetings was to share the ideas and progress of the study for stakeholders through the explanation of prepared reports at that time and collect comments on the

stakeholders. The meetings were held in the Nacala Corridor Area and Maputo, the capital of Mozambique.

Table 9.3.2 List of the Stakeholder Meetings

Name of Meeting	Purpose	Location	Date	Number of participants
1st stakeholder meetings	Explanation of the ideas of the inception reports	Nampula	11 April 2012	46
		Lichinga	2 April 2012	43
		Quelimane	9 April 2012	10
		Alto Molocue	10 April 2012	33
2nd stakeholder meetings	Explanation of the ideas of the report of Overall Picture (Interim report-No.2)	Nampula	16 November 2012	41
		Maputo	22 November 2012	40
3rd stakeholder meetings	Explanation of the ideas of the report of QIPs (Interim report –No.3)	Nampula	22 March 2013	38
		Maputo	18 March 2013	52

(2) District meetings

In the early 2013, explanatory meetings aiming to share information about the basic information of the ProSAVANA program for farmer and local administration staff at the district level were organized. The meetings started in Nampula and Zambezia provinces. Basically, two meetings were held in same district, one was for farmers and the other was for local administration staff. In May 2013, the meetings were carried out in districts in the Niassa provinces. In Niassa, one combined meeting was carried out for each district.

Table 9.3.3 List of the District Meetings

Province	District	Name of the meeting	Meeting with Consultative Council	
			Date	Participants
Nampula	Monapo*	Meeting with Consultative Council	12 April 2013	16
		Meeting with Farmers	12 April 2013	25
	Muecate	Meeting with Consultative Council	13 June 2013	53
		Meeting with Farmers	27 March 2013	68
	Mecuburi	Meeting with Consultative Council	22 February 2013	43
		Meeting with Farmers	4 March 2013	76
	Meconta	Meeting with Consultative Council	28 February 2013	34
		Meeting with Farmers	5 March 2013	104
	Mogovolas	Meeting with Consultative Council	16 April 2013	50
		Meeting with Farmers	3 April 2013	62
	Rapale	Meeting with Consultative Council	21 February 2013	46
		Meeting with Farmers	1 March 2013	61
	Murrupula	Meeting with Consultative Council	1 March 2013	39
		Meeting with Farmers	13 March 2013	46
	Ribaue	Meeting with Consultative Council	9 April 2013	42
		Meeting with Farmers	19 February 2013	88
	Lalaua*	Meeting with Consultative Council	15 March 2013	36
		Meeting with Farmers	15 March 2013	23
	Malema	Meeting with Consultative Council	10 May 2013	39
		Meeting with Farmers	19 March 2013	107
Zambézia	Alto Molocue	Meeting with Consultative Council	27 February 2013	15
		Meeting with Farmers	27 February 2013	78
	Gurue	Meeting with Consultative Council	4 March 2013	13
		Meeting with Farmers	28 February 2013	63
Niassa	Cuamba	Joint Meeting with Consultative Council and Farmers	29 May 2013	81
	Mecanhelas	Joint Meeting with Consultative Council and Farmers	22 May 2013	55
	Mandimba	Joint Meeting with Consultative Council and Farmers	21 May 2013	84

	N'Gauma	Joint Meeting with Consultative Council and Farmers	23 May 2013	84
	Majune	Joint Meeting with Consultative Council and Farmers	23 May 2013	76
	Chimbonila	Joint Meeting with Consultative Council and Farmers	20 May 2013	54
	Sanga	Joint Meeting with Consultative Council and Farmers	24 May 2013	94

(3) Civil society dialogue meetings

From late 2012, several criticisms regarding information disclosed on the ProSAVANA program were shown. In order to correspond to the criticisms, ordering to provide information and making dialogue with civil society organizations in the Nacala Corridor region, the civil society dialogue meeting was held in Nampula. The first meeting was organized in March 2013 in cooperation with the civil society platform of Nampula. The civil society organizations from Niassa and Zambezia Provinces participated in the meetings by arrangement of the civil society organization platform in Nampula. The second meeting was organized three months after the first meeting in June 2013. The same procedures were taken to arrange the meeting, but the civil society organizations in Niassa could not come to the meeting due to weak communication between the civil society platforms in Nampula, Niassa and the Study Team.

Table 9.3.4 List of the Civil Society Dialogue Meetings

Name of Meeting	Purpose	Location	Date	Number of participants
Civil Society Platform Meeting	Explanation of basic idea of ProSAVANA Obtaining concerns from civil society organizations for the ProSAVANA	Nampula	21 March 2013	48
2nd Civil Society Platform Meeting	Discuss about future join activities to prepare the Master Plan	Nampula	19 June 2013	37

(4) Consultation meetings on the concept of ProSAVANA Master Plan

After the second civil society dialogue meeting, a discussion was expected regarding continuous procedures to prepare the Master Plan with civil society organizations. However, many criticisms were made about the process to prepare the Master Plan and that idea became impossible to be carried out. Therefore, in order to correspond to the criticisms on the process, it was decided that the process to prepare the Master Plan would be re-started from discussion about its concept.

For this purpose, in September 2013, a Concept Note of ProSAVANA Master Plan, describing the proposed concept of the Master Plan, was prepared. From September to October, several meetings to hear the comments on it from local inhabitants and civil society organizations were held at the district level and provincial level in Niassa and Zambezia provinces. In Niassa, district level meetings were held in Cuamba and Sanga. Participants were invited from surrounding districts to the meetings. In Zambezia, the district meetings were held in Gurue and

Alto Molocue, separately. After the district-level meetings, provincial-level meetings were organized in Lichinga and Quelimane.

In Nampula Province, efforts to organize the meetings in cooperation with the Civil Society Platform in Nampula were taken. Through five times meetings, opinions of the platform on the concept note were explained and discussions on the 26 items were held with members of the platform. They did not agree to organize the consultation meetings on the Concept Note with local inhabitants. Therefore no meetings on concept note were held with other stakeholders in Nampula province.

Table 9.3.5 List of the Consultation Meetings on the Concept of ProSAVANA Master Plan

Name of Meeting	Location	Date	Number of participants
Consultation meetings on the Concept of ProSAVANA Master Plan at district level	Cuamba	23 September 2013	49
	Sanga	9 October 2013	72
	Gurue	3 October 2013	72
	Alto Molocue	7 October 2013	70
Consultation meetings on the Concept of ProSAVANA Master Plan at provincial level	Lichinga	30 October 2013	42
	Quelimane	16 October 2013	23

(5) Public hearing meetings on the Master Plan draft version zero

In March 2015, based on the conducted studies and obtained comments through the activities above, the preliminary draft of the Master Plan was prepared in the name of "the Master Plan draft version zero" (hereinafter called draft-zero). The draft-zero was based on the discussions regarding the Master Plan and public hearing meetings on the draft-zero which were conducted from April 2015 at district, province and capital levels.

In April 2015, basically two public hearing meetings were organized in each of the 19 districts. After the district meetings of each province, provincial level meetings were held at Nampula, Lichinga and Quelimane in May 2015. Finally, the public hearing meeting in Maputo was carried out in June with participating civil society organizations at the national level.

Table 9.3.6 List of Public Hearing Meetings on the Master Plan Draft Version Zero

Type of Meetings	Province	District	Location	Date	Number of participants*
District Level Meeting	Nampula	Rapale	Rapale sede	20 April 2015	70
			P. A. Namaita	20 April 2015	70
		Monapo	Monapo sede	21 April 2015	83
			P.A. Netia	21 April 2015	73
		Meconta	Meconta sede	23 April 2015	65
			P A. Corrane	22 April 2015	56
		Muecate	Muecate sede	24 April 2015	54
			P.A. Imala	24 April 2015	56
		Mecuburi	Mecuburi sede	24 April 2015	60
			P.A. Namina	23 April 2015	56
		Mogovolas	Mogovolas sede	21 April 2015	175
			P.A. Iolute	22 April 2015	115
		Ribaue	Ribaue Sede	29 April 2015	73
			P.A. Iapala	29 April 2015	34
		Murrupula	Murrupula sede	29 April 2015	43
			P.A. Kazuzu	29 April 2015	45
		Lalaua	Lalaua sede	28 April 2015	96*2

		Malema	Malema sede	27 April 2015	52
			P.A. Mutuali	28 April 2015	79
	Niassa	Cuamba	Cuamba Sede	24 April 2015	38
			P.A. Lurio	25 April 2015	36
		Mecanhelas	Mecanhelas Sede	27 April 2015	53
			P.A. Entre Lagos	28 April 2015	74
		Mandimba	Mandimba Sede	22 April 2015	81
			P.A. Mitande	23 April 2015	53
		N'Gauma	N'Gauma Sede	27 April 2015	94
			P.A. Ngauma	28 April 2015	39
		Chimbonila	Chimbonila Sede	21 April 2015	86
			P.A. Lione	21 April 2015	33
		Sanga	Malulu	22 April 2015	40
			P.A. Lussimbesse	23 April 2015	64
		Majune	Majune Sede	24 April 2015	64
			P.A. Nairubi	24 April 2015	38
	Zambezia	Alto Molocue	Alto Molocue Sede	20 April 2015	105
			P.A. Nauela	21 April 2015	129
		Gurue	Gurue Sede	22 April 2015	127
			P.A. Lioma	23 April 2015	123
Provincial Meeting	Nampula	Nampula	Nampula	10 May 2015	149
	Niassa	Niassa	Lichinga	8 May 2015	100
	Zambezia	Zambezia	Quelimane	20 April 2015	76
Maputo Meeting	Maputo	Maputo	Maputo	10 June 2015	162

*Note: Number of participants is a counted number from an attendance list compiled by MASA. Those who did not sign the list could not be included in it.

9.3.3 Potential Adverse Impacts and Considered Measures

Through the meetings with stakeholders, many concerns and comments regarding expected risks and negative impacts for farmers were stated.

With the comments and concerns, in order to avoid or reduce the potential adverse impacts by implementing the projects, several measures need to be considered in their components. The most concerning potential adverse impacts, as well as the measures considered to counteract them in the Master Plan, are summarized in the table below.

Table 9.3.7 Potential Adverse Impacts and Considered Measures for their Avoidance / Reduction

Items	Causes	Negative impact, risks and concerns	Countermeasures considered in the Master Plan
Transformation of farming system	Improvement of farming technology	Small-scale family farmers do not have much experience in improving their farming practices. They may not be able to stabilize their production under the prevailing conditions.	● Strengthening research on how to optimally improve extensive farming practices; ● Enhancing technical assistance to improve farming practices; ● Establishing and managing demonstration farms; ● Building the capacity of agricultural extension staff and emerging farmers.
		Technologies of improved farming are not widely understood and negative impacts can result from excessive use of inputs or result in soil loss or fertility from erosion.	
		Necessary inputs are unavailable or too expensive for small-scale family farmers to buy.	● Enhancing the skill level of local seed producers; ● The Government provides subsidies for fertilizer for a period of time; ● Promoting and supporting service providers of agricultural machinery and equipment; ● Providing support for management, skills and technologies, and finance for targeted small and medium agricultural inputs distribution enterprises; ● Promoting joint purchases of inputs by farmers' organizations.
		Family farmers may be concerned that they are forced into implementing improved farming practices.	● Farmers will not be forced to practice improved farming. Farmers can decide applying it based on providing information regarding appropriate varieties and suitable farming practices by research institute through extension services.
	Promotion of agricultural mechanization	Expansion of agricultural mechanization, such as use of tractors, may bring unemployment.	● Lack of qualified labor and non-qualified labor is one of challenges of agriculture in the area. Applied mechanization in the Master Plan aims to promote efficiency of works among small scale farmers. The demand of hand labor for weeding and land preparation may be reduced due to mechanization. However, the need of labor for other parts of farming practice will be increased according to the expansion of crop area and increase of agricultural production. Thus, the promotion of mechanization may decrease employment for weeding and land preparation but will increase for other parts of farming practice. ● Moreover, ProSAVANA aims at fostering self-sustaining farmers and making various support to increase such farmers. As a result of the promotion of machinery and growing of farmers, the farmer will expand her/his crop area and obtain enough income from their own fields. So they will not need to find off-farm jobs, such as plowing other's farms. ● The agriculture promoted in ProSAVANA focus on family farmers, not on large scale mechanized farming.
Food security	Promotion of out-grower scheme as an alternative of market for small scale farmers	A certain mono-culture will be compelled or be conductive farmers to cultivate. The agricultural production may have vulnerability by expansion of mono-culture.	● Farmers will not be forced to any cultivation and they will conserve their rights to decide farm management. ● Agricultural extension will support farmers to obtain knowledge of appropriate crop selection, introduction of crop rotation, and farm management to reduce risk. ● Under the out-grower scheme, the contractor will provide technical instruction

Items	Causes	Negative impact, risks and concerns	Countermeasures considered in the Master Plan
			to farmers including crop rotation in order to maintain the productivity of the land. In order to achieve such mechanism, the Government promote proper framework for out-grower scheme.
Price of Produce		Unfair low price of produce will be imposed on farmers.	● Strengthen the capacity of farmers for negotiating contract conditions through organizing and strengthening farmers' organization, improvement for farmers' access to market and market information through strengthen of extension services. ● Establishing a proper legal framework for the out-grower scheme. ● Preparation of operational guidelines for the out-grower scheme and dissemination.
Land Management	Expansion of agricultural investment	Farmers are afraid of losing their land by land grabbing of private investment with large scale land occupation.	● Light of land use for community and farmers will be secured through registration of DUATs and enhancing their awareness on the rights based on the land law. ● Private investments under ProSAVANA will follow recommendations /guidelines for its performance observing respect /assurance of land use right by the local people (farmers). ● ProSAVANA will establish a supervising structure on the investment in order to avoid negative influences on the local farmer and community such as land grabbing as their concern so far.
	Promotion of DUAT registration to community and individual farmers	Intra- and inter-community conflicts may arise when DUAT decides on borders of land for use by each community or individual, or land is unfairly distributed. It may be difficult to secure farmland through flexible arrangements because of changes in population (natural increase, migration after marriage, and other reasons) or because of improved intensive farming.	● Strengthen enforcement of land law and environment law will help to avoid such disputes. ● Clearly determining in advance the standards and procedures of dispute arbitration with the full participation of the representatives of civil society and farmers; ● Establishing systems of autonomous land management in communities (based on customs and by ensuring transparency);
	Promotion of farming technical transformation	Family farmers doubt or suspect that the main purpose of the farming system transformation is securing land for the promotion of large-scale private investments, which will force them of their land (they fear that their customary rights to land access will be taken away by force)	● Before starting projects for land registration (DUAT) the following measures should be taken: ➢ Widely discuss how to make effective and efficient use of land and ensure the rights of farmers through the participation of the representatives of civil society and farmers; ➢ Make a detailed implementation plan of projects during the discussions. ● Promoting simultaneous acquisitions of both individual and community DUATs based on the customary land rights; ● Strengthening capacity in land management and supervision by the Government.
Forest protection	Progress of agricultural investment	Uncontrolled deforestation due to unasked for development by agricultural investment may occur.	● ProSAVANA estimated balanced development to achieve targeted economic development with appropriate and sustainable use of natural resources, means no-decreasing forest from current level.

Items	Causes	Negative impact, risks and concerns	Countermeasures considered in the Master Plan
			● To apply land law and environmental laws appropriately through strengthening enforcement of the existing supervision mechanism of the Land Law and Environment Law (III-2) in harmony with development at local communities and environmental conservation. ● With the approach of i) compliance with the “rai” and VGGT and ii) enforcing application of PDUT (Land Use Plan of Distract).
	Without any interventions	Uncontrolled deforestation or fragmentation of forest due to agricultural land development caused by the population increase	● Support of farmers to farming technology in order to increase productivity and to conserve land fertility. ● Delimitation of community territory and then identify the land belonging to each household through the promotion of DUAT registration. During the process to determine the territory of community and individuals, lands not attributed to any particular household will be primarily reserved for common use or for the expansion of future generations.
		Farmers may lose to access to firewood or other resources collected from the common land in their community	● Promoting simultaneous acquisitions of both individual and community DUATs based on the customary land rights. ● Reducing the pressure of forest exploitation and protecting the forests from further fragmentation, through establishing local forests for the supply of firewood under a government initiative. ● The intervention will be designed to contribute to income increase of family farmers through diversifying economic activity.
Conservation of water resources	Expansion of regional economy and industry	Uncontrolled development of water resources due to rapid development of regional economy and industry may cause conflict between water users.	● Formulating a water management plan for the river basin where intensive development is expected to take place, in order to contribute to the realization of harmonized development and use of water resources. ● Strengthen the enforcement of the existing supervision mechanism of the Land Law and Environment Law so that the water management plan will be adhered appropriately.
	Expansion of agro-processing and other industry	River water and groundwater may contaminated by industrial effluent, and it will make if difficult for farmers to use water for domestic water and irrigation.	● To apply environmental laws appropriately through strengthening enforcement of the existing supervision mechanism of the Land Law and Environment Law. ● Enterprises of agro-processing and other industries will be guided to comply with the principals of “rai” and VGGT. ● Application of the water management plan and monitoring under the plan.
	Transformation of farming technology of the majority of farmers	Contamination of river water and groundwater due to increased use of chemical fertilizers and pesticides may occur.	● Contamination of water will not occur if agricultural fertilizers and pesticides are used appropriately. Farmers will obtain knowledge and apply farming technology for the appropriate use of them through enhanced agricultural extension activities including FFS and training of farmers. ● Activities of NGOs and the private sector are considered to cooperate with public extension. ● Suppliers of agricultural inputs are also expected to have a role to provide knowledge to farmers regarding the use of fertilizers and pesticides. Necessary capacity development will be provided to suppliers.
Widening disparity	Expansion of development and	Economic disparity among inhabitants in the area and/or community will be widening.	● The Master Plan intends to minimize the widening disparity of inhabitants in the area and/or in the community through considering family farmers as the

Items	Causes	Negative impact, risks and concerns	Countermeasures considered in the Master Plan
	growth of regional economy		main target group of the program. In addition, special consideration will be given to female farmers, youth and other vulnerable groups to achieve inclusive development and to avoid disparity between gender, generations, regions and areas. ● In order to let interventions to directly reach family farmers, especially to vulnerable farmers, the Master Plan will approach them through organizing groups or associations that consequently strengthen the interaction with other farmer groups or associations. ● The farmers' groups improve its activities aiming to get more benefits for its group, through applying various methods according to their objectives, location, characteristics of members and their socio-economic and natural environment. The organization is self-reliant, so that they are able to access extension services, and markets not only to sell their produce but also to purchase inputs by utilizing various supports from NGOs, development and aid organizations, etc. Access to finance will be realized by the group. ● During the implementation of program, the situation of disparity shall be monitored by the implementation structure together with representatives of farmers, CSOs/NGOs and relevant stakeholders. The Master Plan will be modified periodically according to the monitoring results. Necessary mechanisms will be established by ProSAVANA.

9.4 Assessment for Alternative Scenarios

9.4.1 General

The target of the SEA study is development scenarios which are summarized as below and the details are described in section 3.4.2 of this Master Plan.

(1) Development scenarios

The following two factors are those which should prepare different development scenarios.

- Factor 1: Dissemination of improved cultivation practices among family and medium-scale farmers
- Factor 2: Private sector investment in agricultural production after establishing a proper management mechanism[75] on it

Scenarios are set based on combining factor 1 and 2 for benchmark years 2020 and 2030. However, there are some important assumptions included in the scenarios which are follows:

1) Forest areas, including both natural conservation forest and production forest, will be maintained at a similar level as the current forest area.
2) Agricultural production by private investment will be approved after establishing a governmental mechanism to supervise the investment in order to avoid any conflicts with local inhabitants. Therefore, in the scenarios considering the private investment, the management mechanism of land and natural environment is already being worked on.

As shown in Table 9.4.1, there are five scenarios for agricultural development. One of the scenarios is a zero option, which is a condition that the Master Plan will not be implemented but other governmental activities are carried out as same as the current level.

The assessments of the development scenarios are undertaken by using risk identification analysis and sustainability tests. These tools will be used for the assessment of risks involved and overall sustainability levels to be associated with the adoption of the proposed scenarios and their impacts on the economic, social and environmental conditions.

[75] The capacity of the government is sufficiently strengthened to supervise the private investment in compliance with the relevant legal instruments to be set up according to "Responsible Investment for Agriculture and Food Systems: rai" which has its basis on the "Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security (VGGT)" by FAO.

Table 9.4.1 Alternatives for Agricultural Development

Scenario Name.	Factor 1: Dissemination of improved cultivation practices among family and medium-scale farmers		Factor 2: Private sector Additional investment in agricultural production	
	Year 2020	Year 2030	Year 2020	Year 2030
1. Zero Option	Some improvement based on traditional cultivation practice	Some improvement based on traditional cultivation practice	No additional investment	No additional investment
2. Cautious development	Some improvement based on traditional cultivation practice	40% of farmers applied improved practice	No additional investment	Very limited
3. Gradual development	30% of farmers applied improved practice	40% of farmers applied improved practice	Very limited	Certain extent
4. Phased development	30% of farmers applied improved practice	40% of farmers applied improved practice	Certain extent	Advanced
5. Positive development	30% of farmers applied improved practice	All farmers applied improved practice	Certain extent	Advanced

The expected development level of cultivation practices are as follows[76]:

- Improvement based on traditional cultivation practice: Increasing the productivity of each crop about 10% from the present condition;
- Improved practice: Increasing the productivity of each crop close to the average of the surrounding African countries, which are also about half of the productivity in South Africa or Brazil; and
- Agricultural investment: Increasing the productivity of maize and soybean to the same level as the above improved practice by 2030.

9.4.2 Risk Identification Analysis for Alternative Development Scenarios

The five development scenarios are assessed from the viewpoints of the economic, social and environmental aspects. Table 9.4.2 shows the results of the analysis. Based on the results, the following impacts should be noted:

(1) Scenario 1: Zero Option

The "zero option scenario" for the Draft Master Plan is the assumed condition that there are no certain additional interventions for the agricultural development in the Nacala Corridor but continuing governmental activities like extension services and other projects at same level as the present. The current situations and trends will continue till 2030, and social and environmental impacts caused by the development will occur only from the aspect that no-measures are taken for the challenges.

This scenario speculates the continuation of prevalent subsistence agriculture by small-scale farmers and the development of private investment projects without any guidance. They increase pressure on land, forests and other natural resources against the background of a rapidly growing population. Therefore, the negative aspects caused by no-taking measures are expected in land reclamation, forest degradation and conflict with private investments.

[76] Detailed number is explained in Table 3.4.1

(2) Scenario 2: Cautious Development

Under this scenario, the applying of improved practices among farmers is expected in slow pace and additional private investment for agriculture is limited. Therefore, social and environmental impacts caused by the development will be very limited.

On the other hand, due to the limited interventions, the target goal of PEDSA will not be achieved in 2030. The agricultural sector is a major employment sector in rural areas and if development speed of this sector is slower than other sectors, rural inhabitants will be left behind in the improvement of life and the widening of disparity may occur. Moreover, because of such gaps people may shift from rural areas to urban areas for seeking better opportunities, which will open the way for social destabilization.

(3) Scenario 3: Gradual development

In scenario 3, the dissemination and applying of improved farming practice will be expanded to farmers gradually, and agricultural production by private investment is carried out to certain extent from 2020. Because of both improvements, the income of farmers will increase continuously and the target goal of PEDSA will be barely achieved.

In 2030, 40% of farmers will apply the improved practice, which means the remaining 60% of farmers will continue current traditional practices. Therefore, the risk of widening social disparities will exist, and will need some approaches to mitigate the disparities.

Due to the large increasing agricultural productions by both family sector and private sector, the total amount of agricultural products will be increased and it will contribute to national food security and develop value chains in the Nacala Corridor Area. However, establishing a supervising structure for agricultural investment before promoting the investments is essential in order to prevent conflicts between private investments and local farmers.

(4) Scenario 4: Phased development

In scenario 4, the dissemination and applying of improved farming practice will be expanded farmers gradually, and agricultural production by private investment will be carried out widely from 2020. Thus, the income of farmers will be increased continuously the same as scenario 3 and the target goal of PEDSA will be achieved.

However, the expected increasing agricultural production by mainly private investment and also family sector is larger than scenario 3, therefore both positive and negative impacts will strongly appear. The positive impacts on the economic aspects will become larger for the development of the value chain. As a result, increasing new job opportunities will be assumed. On the other hand, even if the investments will be managed by an established supervising structure for agricultural investment, risks for conflicts regarding private investments and land grabbing will be more than in scenario 3, because 60% of farmers will still continue current traditional farming practices, which need wider fallow areas, in 2030.

(5) Scenario 5: Positive development

In scenario 5, the dissemination and applying of improved farming practice will be expanded rapidly for all farmers by 2030. Also, the same as scenario 4, agricultural production by private investment will be carried out widely from 2020. Due to both the developed production in small scale farmers and in private sectors, the target goal of PEDSA will be achieved easily.

The average income of farmers will be increased more than in scenario 3 and 4 because the improved practice will become widely used among farmers. However, the rapid dissemination of applying fertilizers and agricultural chemicals may have risks of speed-before-quality dissemination of the practices without informing dangerousness of excessive use of them that will be causes to harm the natural environment and human health..

The agricultural production by private investment is expected to be the same as scenario 4, risks for conflicts between private investments and local farmers will become lower than scenario 4 because all farmers will already be practicing improved farming.

Table 9.4.2 Evaluation of Alternative Development Scenarios

Scenario Name.	Dissemination of improved cultivation practices	Additional Private sector investment in agricultural production	Economic Benefits/Impact	Social Impacts	Environmental Impact
1. Zero Option	Slightly improved based on the traditional cultivation practice	No additional investment	**Negative Aspect:** There is a large gap to the goal of PEDSA even if productivity will be increased based on traditional practices. **Negative Aspect:** Since development of the agriculture sector will be slow, risks to occur population drain to urban area will be high. **Slight Negative Aspect:** Produced amounts of staple crops will slightly cover food demands of the region. But, surplus of the crops will be small and value chains of them will not be developed due to the small quantity trading.	**Negative Aspect:** Conflicts about land use and land reclamation between farmers in the community will be increased in high population density areas. **Negative Aspect:** Conflicts with private investment will be increased because improved mechanism and enforcing the governmental institutions will not be applied. **Slight Negative Aspect:** Farmers' household income may be decreased according to the decreasing of cultivated areas by 2030 because of high population growth and no development of other industries in rural area. **Slight Negative Aspect:** Foods security will be slightly kept but situation will be worse than current because of population growth. **Positive Aspect:** The social impacts caused by the development will be limited.	**Negative Aspect:** Forest degradation caused by land reclamation or soil degradation causes shorter fallow periods and overuse of land will be increased after 2020 because of growth in the number of farmers who need land in fallow cultivation practices. **Positive Aspect:** Since development will be limited, negative environmental impacts by use of agricultural chemicals or developed industries will be limited.
2. Cautious development	Not developed by 2020 and 40% of farmers applied to it by 2030	Very limited area by 2030	**Negative Aspect:** Goal of PEDSA will not be achieved even if productivity will be increased. **Slight Negative Aspect:** Development speed of agriculture sector will be slower than other sectors. **Slight Negative Aspect:** Produced amounts of staple crops will be able to cover food demands of the region. But, surplus will be limited as not to develop value chains.	**Slight Negative Aspect:** Risk to widening social disparities will exist, since more than half of family farmers still practice traditional farming. **Positive Aspect:** Risk of land conflict will be limited because of small expected areas of agriculture production by private investment.	**Positive Aspect:** Pressure for land reclamation will be decreased by increasing efficiency of land use. **Positive Aspect:** Since development will be limited, risks of environmental impacts by developed industries will be limited. **Slight Negative Aspect:** Risks of improper use of agricultural chemicals will exist.

3. Gradual development	30% of farmers applied to it by 2020, and 40% by 2030	Some investment by 2030	**Positive Aspect:** Goal of PEDSA will be achieved. Development of the agricultural sector will be harmonized with the pace of development of the national economy. **Positive Aspect:** Produced amounts of crops will cover food demands of the region. Surplus will contribute for food securities of other regions and for developing value chains in the area.	**Positive Aspect:** Due to the development of the agricultural sector and regional economy, the accessibly of inputs, infrastructure and services will be improved. **Slight Positive Aspect:** Business opportunities and job opportunities will increase from current situation. **Slight Negative Aspect:** Risk to widening social disparities will exist, since more than half of family farmers still practice traditional farming. **Slight Negative Aspect:** Risk of land conflicts will be limited but will exist because the expected total area for agriculture production by private investors is at the same level as the total area where agricultural DUATs have been acquired.	**Positive Aspect:** Pressure for land reclamation will be decreased by increasing the efficiency of land use. **Slight Negative Aspect:** Risks of improper use of agricultural chemicals will be increased. **Slight Negative Aspect:** Risk to occurrence of land degradation will increase by developing large farm plots in the investment with fewer considerations for soil erosion.
4. Phased development	30% of farmers applied to it by 2020, and 40% by 2030	Advanced	**Positive Aspect:** Goal of PEDSA will be achieved. Development of the agricultural sector will contribute to the development of the regional economy. **Positive Aspect:** Produced amounts of crops will cover food demands of the region and surplus will contribute to the food securities of other regions and developing value chains. **Positive Aspect:** Large amounts of agricultural productions by private farms will be linked to the development of agro-processing and value chains.	**Positive Aspect:** Due to the development of the agricultural sector and regional economy, accessibly of inputs, infrastructure and services will be largely improved. **Positive Aspect:** Business opportunities and job opportunities will expand. **Slight Negative Aspect:** Risk to widening social disparities will exist, since more than half of family farmers will still practice traditional farming. **Negative Aspect:** Possibility of land conflicts will not be cleared due to applying advanced agricultural investment even if a supervising mechanism will work.	**Positive Aspect:** Pressure for land reclamation will be decreased by increasing the efficiency of land use. **Slight Negative Aspect:** Risks of improper use of agricultural chemicals. **Slight Negative Aspect:** Risk of occurrence of land degradation will increase by developing large farm plots in the investment with fewer considerations for soil erosion. **Negative Aspect:** Reclamation or segmentation of forest will occur because of advanced agricultural investments.
5. Positive development	30% of farmers applied to it by 2020 and all farmers applied by 2030	Advanced	**Positive Aspect:** Goal of PEDSA will be achieved. Development of the agricultural sector will contribute to the development the regional economy. **Positive Aspect:** Produced amounts	**Positive Aspect:** Due to the development of the agricultural sector and regional economy, accessibly of inputs, infrastructure and services will be largely improved.	**Positive Aspect:** Pressure for land reclamation will be decreased by increasing the efficiency of land use. **Negative Aspect:** Risks of

			of crops will cover food demands of the region and surplus will contribute to the food securities of other regions and developing value chains. **Positive Aspect:** Large amounts of agricultural productions from private farms will be linked to development of agro-processing and value chains. **Negative Aspect:** It will need larger budgets to achieve dissemination and applying improved farming practice for all small scale farmers by 2030.	**Positive Aspect:** Business opportunities and job opportunities will expand. **Negative Aspect:** Possibility of land conflicts will not be cleared due to applying advanced agricultural investment even if a supervision mechanism will work.	environmental impacts by improver use of agricultural chemicals because of rapid apply of improved practice for large number of farmers. **Slight Negative Aspect:** Risks of environmental impacts by development of industries. **Slight Negative Aspect:** Risk of occurrence of land degradation will increase by developing large farm plots in the investment with fewer considerations for soil erosion. **Negative Aspect:** Reclamation or segmentation of forest will occur because of advanced agricultural investments.

9.4.3 Sustainable Test

The sustainability of each scenario is assessed from the view point of natural resources, social and cultural conditions, economic aspects and institutional aspects. The results are shown in Table 9.4.3 and the description of scoring is shown in Table 9.4.4.

For the assessment of the five scenarios, a five-scaled score (1 to 5) was created. The high score will show if the five development scenarios support or are against the sustainability aims. The scales of the score are as follows:

Scale 1: The scenario works strongly against the aims;

Scale 2: The scenario works against the aims;

Scale 3: The scenario on balance has neutral effect on the aims;

Scale 4: The scenario supports the aims; and

Scale 5: The scenario strongly supports the aims.

(1) Effects on natural resources

In Scenario 1, there are no certain additional interventions for the agricultural development excluding continuing present governmental activities, therefore, the current situations and trends will continue till 2030. The trends are not only positive aspects but also negative aspects such as degradation of natural environment.

On the other hands, such negative impact on natural environment might be able to avoid in Scenario 2 to 5, because of implementation of measures proposed in the Master Plan for the issues. For example, in Scenario 2 to 5, it is assumed that a supervising mechanism will function to manage appropriate use of lands and other natural resources according to the land law and the environmental law of Mozambique. Due to that, management capacity of the natural environment will be encouraged. However, even the strengthen enhancement of the laws, probability to give negative effects on natural environment will increase by the development of economy, value chains, agro processing and other industries in Scenarios 4 and 5 because of their rapid development.

(2) Effects on society and culture

The social and cultural situations in Scenario 1 will have no significant changes in the future and keep current trends. In the Scenario 2 to 5, dissemination of the improved agricultural practices and various interventions will be carried out in order to strengthen the capacity of community. Most of the interventions will take approaches which organize farmers into group or strengthen existing groups, or also take approaches to enhance internal connections in the community. Through the activities, the cohesion of community will be strengthened.

Condition of gender equality will be improved by gender trainings for both sexes, dissemination of the right of land use defined in the land laws and direct approaches for women empowerment in the community, which will be carried out together with dissemination of improved farming practices. In

the present circumstance, women face difficulty to find non-agricultural income sources, therefore, increasing job opportunities by economic development will contribute to improve the situation. Moreover, promoting women's participation in development activities, which are carried out together with dissemination of improved practices will contribute to improve the situation of the gender equality. Therefore, the effects in Scenario 2 to 5 were evaluated higher than Scenario 1.

Generally, situation of food and nutrition in community will be improved by increasing agricultural productions and its diversification. However, because pace of population growth will be faster than the increasing productions in Scenario 1, therefore it is evaluated that the scenario is against the aim. On the other hands, the situation will be improved in Scenario 2 to 5, because increasing amount of agricultural production will be able to fill increased demands for food by local population. Moreover, malnutrition rate of children is high, even they have enough amount of food crops because of traditional customs and insufficient dissemination of the knowledge about nutrition, implementation of gender education with lectures about nutrition will contribute to improve malnutrition of children, too.

From view point of increasing opportunities for income-generating, many people can participate in these opportunities under Scenario 5, because of large economic development. The increasing job opportunity will contribute improving livelihoods and also participation of the society for women through their empowerment.

Regarding land access, it is assumed that private investment will be managed under an established supervising mechanism. Therefore, the effects of the established mechanism in Scenarios 2 to 5 are evaluated as positive. More, it is assumed that the expected total area of agricultural production by private investment in Scenario 3 is same level as current areas already obtained agricultural DUATs for private investment. Therefore, new DUAT acquisitions for agricultural land might be limited in Scenario 3 and also Scenario 2, then the effects of development are scored positive. On the other hands, in Scenarios 4 and 5 advanced private investments are expected and it may include some risks for land conflict with the local people, therefore their scores become a balanced "3".

By 2030, the share of farmers applying the improved farming practices will be about 40 % of the total farmers in Scenarios 2 to 4, including some vulnerable farmers who can be involved in the community activities or farmers groups. However, many of remaining 60% farmers who will not apply improved practices until 2030 might be have some disadvantage for development like they live in remoted areas, they are aged or lower acceptability of practices new for them, etc. They might have little linkages with outside of their community such as SDAEs and private sectors and are not organized well, or in vulnerable groups in the communities. Therefore, the equity and equality of the development will be limited in these scenarios.

(3) Effects on economical resources

By increasing the production of agricultural products, economic activities will be diversified and developed. In this context, in terms of equity, wider distribution of benefits created from economic

development is expected from Scenario 5 more than the other scenarios. However, the required budget for implementing Scenario 5 is much higher than other scenarios, too.

In Scenario 1, because of the assumption that current forest areas will be maintained and increased population in the region, the average cultivated area of farmers is expected to decrease than the area at present. Income of farmers will also decrease even productivity is improvement.

(4) Effects on institutional aspects

It is an assumption that establishing an appropriate supervising mechanism to monitor private investment in cooperation with stakeholders in Scenario 2 to 5. The mechanism will include grievance redressal system for community people regards the investments and also other issues like out-grower scheme. Therefore, score for governance in scenario 2 to 5 are evaluated as positive. However, because expected investment is relatively large in Scenario 4 and 5, it risks to make conflicts are also increased, therefore their evaluations become balanced as “3”.

Institutional capacity developments are considered in activities in the all scenarios. Especially Scenario 5 required large numbers of extension workers and other personnel and their equipment in order to achieve enough dissemination of improved practices for all of farmers. Therefore, score of scenario 5 is higher among other scenario 2 to 4.

Table 9.4.3 Result of Sustainable Tests for Development Scenarios

Category of Sustainability	Effect	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Effect on Natural Resources	Forest and wildlife: should be conserved and there resources should be enhanced where practical.	1 **2** 3 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 **3** 4 5
	Degraded Land Area: areas vulnerable to degradation should be avoided, and already degraded land should be enhanced.	1 **2** 3 4 5	1 2 **3** 4 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 **3** 4 5
	Pollution: Discharges of pollutants and waste products to the atmosphere, water and land should be avoided or minimized	1 2 **3** 4 5	1 2 **3** 4 5	1 **2** 3 4 5	1 **2** 3 4 5	1 **2** 3 4 5
	River and water bodies: should retain their natural character.	1 2 **3** 4 5	1 2 **3** 4 5	1 2 **3** 4 5	1 **2** 3 4 5	1 **2** 3 4 5
Effect on Social and Cultural Conditions	Local Character: and cohesion of local communities should be enhanced where practical	1 2 **3** 4 5	1 2 **3** 4 5	1 2 **3** 4 5	1 2 **3** 4 5	1 2 3 **4** 5
	Health and Well-being: The Activity should benefit the work force, and local communities in terms of health and well-being, nutrition, shelter, education and cultural expression.	1 **2** 3 4 5	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5
	Gender: The Activity should empower women.	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**
	Job Creation: The Activity should create jobs for local people particularly women and young people.	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**	1 2 3 4 **5**
	Participation: Active participation and involvement of local communities should be encouraged (especially vulnerable and excluded sections)	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**
	Access to Land: Activity should improve access to land and protection of rights of farmers	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 **3** 4 5
	Relocation and Involuntary Resettlement: should avoid involuntary resettlement and negative impacts on their life by relocation.	1 **2** 3 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 **3** 4 5	1 2 **3** 4 5
	Equity: Adverse and beneficial impacts from development should be distributed equitably and should not discriminate against any groups, especially vulnerable and excluded people.	1 2 **3** 4 5	1 **2** 3 4 5	1 2 **3** 4 5	1 2 **3** 4 5	1 2 3 **4** 5
	Vulnerable and Risk: of drought, bush fire, floods crises and conflicts and epidemics should be reduced.	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5
Effect on Economy	Growth: Economic development of the agricultural sector should be strong and stable.	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**	1 2 3 4 **5**
	Benefits of farmers: Increasing production, productivity and diversify should increase the benefits of farmers	1 **2** 3 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**
	Required public budget: Required budget for implementation of the scenario	1 2 **3** 4 5	1 **2** 3 4 5	1 **2** 3 4 5	1 **2** 3 4 5	**1** 2 3 4 5
	Local investments of Capital: Development should encourage the local retention of capital and the development of downstream industries, utilizing local raw materials, products and labor.	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**	1 2 3 4 **5**
	Poverty Reduction: Should reduce poverty in community	1 2 **3** 4 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 **4** 5	1 2 3 4 **5**

Effect on Institutions	Good Governance: should Increase local governance based on capacity of local agencies	1	**2**	3	4	5	1	2	3	**4**	5	1	2	3	**4**	5	1	2	**3**	4	5	1	2	**3**	4	5
	Intuitional Strengthening and Capacity Building: should develop capacity of public institutions, farmers organization and other related stakeholders related to agriculture and rural development	1	2	**3**	4	5	1	2	3	**4**	5	1	2	3	**4**	5	1	2	3	**4**	5	1	2	3	4	**5**
	Inter/Cross-sectoral institutional collaboration: should strengthen cooperation among institutions	1	2	**3**	4	5	1	2	3	**4**	5	1	2	3	**4**	5	1	2	3	**4**	5	1	2	3	**4**	5

Scale 1: The scenario works strongly against the aims,
Scale 2: The scenario works against the aims
Scale 3: The scenario on balance has neutral effect on the aims
Scale 4: The scenario supports the aims
Scale 5: The scenario strongly supports the aims

Table 9.4.4 Description of Scoring for Sustainable Tests of Development Scenarios

Category of Sustainability	Effect	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
Effect on Natural Resources	Forest and wildlife: should be conserved and resources should be enhanced where practical.	2 Expansion of agricultural fields by population growth will be strong in this scenario and it will affect the existing forest and wildlife. Community will continue to use forest as energy resources. But due to population growth, its sustainable use will face difficultly in some areas. Therefore, the score is lower, such as “2”.	4 Expansion of agricultural fields by population growth will be continued by 2020, after that the pressure will be mitigated. Defining the PDUT, environment law enforcement will give better effects for conservation of forest area. Therefore, the score is “4”	4 The effect of private investment in this scenario is same as existing DUAT acquisition areas. Defining the PDUT, environment law enforcement will give better effects for conservation of forest. Therefore, the score is “4”.	3 The effect of private investment in this scenario is relatively larger than others. And applying improved practices is moderate. Defining the PDUT, environment law enforcement will support the protection of forest. The effect of activities is considered to be balanced. Then, the score is “3”.	3 The effect of private investment in this scenario is relatively larger than others. And applying improved practice is also wider. Defining the PDUT, environment law enforcement will support the protection So, the effect of activities is considered to be balanced. Therefore, the score is “3”.
	Degraded Land Area: vulnerable to degradation should be avoided, and already degraded land should be enhanced.	2 Expansion of agricultural fields by population growth will be strong in this scenario and it will affect the existing forest. Therefore, the score is lower, such as “2”.	3 Expansion of agricultural fields by population growth will be continued by 2020, after that the pressure will be mitigated due to the dissemination of improved farming practices. Therefore, the score is “3”	4 The effects of activities under this scenario is considered to be balanced and has a neutral impact on forest and wildlife as the current impact. Therefore, the score is “4”.	3 The effect of private investment in this scenario is relatively larger than others. And applying improved practices is moderate. Environment Law is enforced. The score is “3”.	3 The effect of private investment in this scenario is relatively larger than others. And applying improved practices is also wider. So, the effect of activities is considered to be balanced. Therefore, the score is “3”.
	Pollution: Discharges of pollutants and waste products to the atmosphere, water and land should be avoided or minimized	3 Level of pollution load will not change drastically.	3 Level of pollution load will not change drastically.	2. Pollution load will increase with population, increasing number of farmers applying improved farming and increasing economic	2. Pollution load will increase with population, increasing number of farmers applying improved farming and increasing economic	2. Pollution load will increase with population, increasing number of farmers applying improved farming and increasing economic

				activities in the value chain.	activities in the value chain.	activities in the value chain.
	River and water bodies : should retain their natural character.	3 This scenario will not impact on rivers and other water bodies at the current conditions.	3 This scenario will not impact on rivers and other water bodies at the current conditions.	3 Irrigation systems will be developed but rivers and water bodies will not be affected so much.	2 Private investment in agricultural production may develop irrigation systems in their farms.	2 Private investment in agricultural production may develop irrigation systems in their farms.
Effect on Social and Cultural Conditions	Local Character: and cohesion of local communities should be enhanced where practical	3 Local character of communities will not be changed.	3 Cohesion of communities will be strengthened through many interventions. However, their degrees might be difference between communities.	3 Cohesion of communities will be strengthened through many interventions. However, their degrees might be difference between communities.	3 Cohesion of communities will be strengthened through many interventions. However, their degrees be difference between communities.	4 Cohesion of communities will be strengthened through many interventions.
	Health and Well-being: The Activity should benefit the work force, and local communities in terms of health and well-being, nutrition, shelter, education and cultural expression.	2 Food consumption amount per capita will be decreased from current level in 2030 because population growth rate is larger than increasing production.	3 Food and nutrition of communities will be maintained similar as current level.	4 Food and nutrition of communities will be improved.	4 Food and nutrition of communities will be improved.	4 Food and nutrition of communities will be improved.
	Gender: The Activity should empower women.	3 Gender issues will be the same as the current conditions.	4 This scenario provides opportunities for women in terms of participation and access in society, and economic opportunities.	4 This scenario provides opportunities for women in terms of participation and access in society, and economic opportunities.	4 This scenario provides opportunities for women in terms of participation and access in society, and economic opportunities.	5 This scenario provides more opportunities for women in economic opportunities.
	Job Creation: The Activity should create jobs for local people	3 Job creation for local people will not be	4 The value chain and private sector will be	4 The value chain and private sector will be	5 The value chain and private sector will be more	5 The value chain and private sector will be more

	particularly women and young people.	changed drastically.	developed in balance with increasing productions. It favors job creation for local people.	developed in balance with increasing productions. It favors job creation for local people.	developed than in Scenario-3 and more jobs will be created.	developed than in Scenario-3 and more jobs will be created.
	Participation: Active participation and involvement of local communities should be encouraged (especially vulnerable and excluded sections)	3 The status will not be changed from current conditions.	4 The interventions for rural people will be increased and the involvement of vulnerable groups in development will be progressed. But areas are limited.	4 The interventions for rural people will be increased and the involvement of vulnerable groups in development will be progressed. But areas are limited.	4 The interventions for rural people will be increased and the involvement of vulnerable groups in development will be progressed. But areas are limited.	5 The interventions for rural people will be increased and the involvement of vulnerable groups in development will be progressed.
	Access to Land: Activity should improve access to land and protection of rights of farmers	3 The trend of private investments will continue and the promotion of DUAT for farmers will also be carried out independently of the Master Plan. So that the status will not be changed from current conditions.	4 The various interventions related to securing land use rights of local inhabitants will be promoted. Private investment under the supervision of proper mechanisms will be expected in limited areas.	4 The various interventions related to securing land use rights of local inhabitants will be promoted. Private investment under the supervision of proper mechanisms will be expected at a similar level of current areas where agricultural DUAT has been obtained.	3 The various interventions related to securing land use rights of local inhabitants will be promoted. Private investment under the supervision of proper mechanisms will be expected wider than current agricultural DUAT areas.	3 The various interventions related to securing land use rights of local inhabitants will be promoted. Private investment under the supervision of proper mechanisms will be expected wider than current agricultural DUAT areas.
	Relocation and Involuntary Resettlement : should avoid involuntary resettlement and negative impacts on their life by relocation.	2. Current trend of resettlement will be continued without significant law enforcement and improving monitoring of investment.	4. The mechanism to supervise the investment will be installed to avoid high-pressure procedure and involuntary resettlement.	4, The mechanism to supervise the investment will be installed to avoid high-pressure procedure and involuntary resettlement.	3. The mechanism to supervise the investment will be installed to avoid high-pressure procedure and involuntary resettlement. Even though, expected private investment is large and many farmers will be	3. The mechanism to supervise the investment will be installed to avoid high-pressure procedure and involuntary resettlement. Even though, expected private investment is large and many farmers will be

					continuing extensive farming. So, it will be balanced.	continuing extensive farming. So, it will be balanced.
	Equity: Adverse and beneficial impacts from development should be distributed equitably and should not discriminate against any groups, especially vulnerable and excluded people.	3 The trends will be continued.	2 Only limited people will receive development interventions and opportunities. Therefore the score is negative from view point of equality in development.	3 Only limited people will receive development interventions. But development opportunities will be increased than current level in equitably.	3 Only limited people will receive development interventions. Even though, development opportunities will be increased than current level in equitably.	4 This scenario will promote wider influenced areas of development, so that people will have more opportunities from development interventions.
	Vulnerable and Risk: of drought, bush fire, floods crises and conflicts and epidemics should be reduced.	3 The scenario will not increase risks to generate drought, bush fire and flood.	4 Because of dissemination of improved farming practice, risks to generate bush fire will be decreased.	4 Because of dissemination of improved farming practice, risks to generate bush fire will be decreased.	4 Because of dissemination of improved farming practice, risks to generate bush fire will be decreased.	4 Because of dissemination of improved farming practice, risks to generate bush fire will be decreased.
Effect on Economy	Growth: Economic development of agricultural sector should be strong and stable.	3 Economic development of the agricultural sector will continue in current trends.	4 This scenario will create a more developed and diversified economy in agricultural sectors. However, the influences are limited in this scenario	4 This scenario will create a more developed and diversified economy in agricultural sectors. However, the influences are limited in this scenario	5 This scenario will create a more developed and diversified economy in agricultural sectors.	5 This scenario will create a more developed and diversified economy in agricultural sectors.
	Benefits of farmers: Increasing production, productivity and diversification should increase the benefits of farmers	2 Benefits of farmers will be limited because of limited farming areas and maintained traditional faring practices.	4 Farmers' production and productivity will be increased in this scenario. Benefits will be increased but limited in this scenario	4 Farmers' production and productivity will be increased in this scenario. Benefits will be increased but limited in this scenario	4 Farmers' production and productivity will be increased in this scenario. Benefits will be increased but limited in this scenario	5 This scenario will create more developed and diversified economy in agricultural sectors.

	Required public budget: Required budget for implementation of the scenario	3. Budget is required for agricultural development in current pace.	2. Relatively larger budget is required to disseminate improved farming practice for all farmers.	2. Relatively larger budget is required to disseminate improved farming practice for all farmers.	2. Relatively larger budget is required to disseminate improved farming practice for all farmers.	1. Large budget is required to disseminate improved farming practice for all farmers
	Local investments of Capital: Development should encourage the local retention of capital and the development of downstream industries, utilizing local raw materials, products and labor.	3 Due to not so much investment occurring in the current situation, a similar trend may continue.	4 Investment will not be occurring so much in both family farmer and private farms by 2030. Therefore, there is a some development of value chains but it is very limited.	4 Because of increasing the volume of agricultural production, the regional economy based on development of value chains will become active. But the area may be limited in this scenario.	5 Because of increasing the volume of agricultural production, the regional economy based on development of value chains will become active.	5 Because of increasing the volume of agricultural production, the regional economy based on development of value chains will become active.
	Poverty Reduction: should reduce poverty in community	3. Poverty incidence will be decreasing in current pace.	4. Poverty incidence will be decreasing slightly higher than current pace.	4. Poverty incidence will be decreasing higher than current pace.	4. Poverty incidence will be decreasing higher than current pace.	5. Poverty incidence will be decreasing because of increasing productivity of all family farmers.
Effect on Institutions	Good Governance: should Increase local governance based on capacity of local agencies	2. Due to no specific measures for population growth, coming investment and land degradation, the governance might be worse.	4. Applying supervision of investment in cooperate with stakeholders, including strengthen of grievance mechanisms; will increase governance in rural area.	4. Applying supervision of investment in cooperate with stakeholders, including strengthen of grievance mechanisms; will increase governance in rural area.	3. Applying supervision of investment in cooperate with stakeholders, including strengthen of grievance mechanisms; will increase governance in rural area. On the other hand increasing investment and economic activities may increase risk for negative effects. Therefore, the evaluation is balanced.	3. Applying supervision of investment in cooperate with stakeholders, including strengthen of grievance mechanisms; will increase governance in rural area. On the other hand increasing investment and economic activities may increase risk for negative effects. Therefore, the evaluation is balanced.

	Intuitional Strengthening and Capacity Building: should develop capacity of public institutions, farmers organization and other related stakeholders related to agriculture and rural development	3. Capacity of public institutions and also farmers' organizations will be strengthened in current pace.	4. Capacity of public institutions and also farmers' organizations will be strengthened due to much training involved in components of the Master Plan.	4. Capacity of public institutions and also farmers' organizations will be strengthened due to much training involved in components of the Master Plan.	4. Capacity of public institutions and also farmers' organizations will be strengthened due to much training involved in components of the Master Plan.	5. In order to achieve dissemination of improved practices among all family farmers, capacity of public institutions need highly developed in quality and also quantity aspect.
	Inter/Cross-sectoral institutional collaboration: should strengthen cooperation among institutions	3. Cooperation among institutions will be progressed in current pace.	4 Inter/Cross-sectoral institutional collaboration is progressed.	4. Inter/Cross-sectoral institutional collaboration is progressed.	4. Inter/Cross-sectoral institutional collaboration is progressed.	4 Inter/Cross-sectoral institutional collaboration is progressed.

9.5 Assessment of the draft Agriculture Development Master Plan

9.5.1 Effect Analysis for Draft Master Plan

Examination of the basic concepts of the Draft Master Plan indicates that the possibilities of occurrence of the potential adverse impacts vary from factor to factor. Their magnitude, extent and duration will also not be uniform. Keeping such limited predictability in mind, Table 9.5.1 tries to overlook the Draft Master Plan as a whole and classify the potential adverse impacts in three probability ratings (definite, probable to possible, unlikely) and their main causes. It should be noted that the rating is done without assuming any built-in measures of avoidance, minimization or mitigation of the negative impacts.

Table 9.5.1 Effect Analysis for the Draft Master Plan and their Principal Causes (Natural Environment)

Adverse Impacts	Probability Rating and Principal Causes
Air pollution	- Probable to Possible; by emission from processing factory
Water pollution	- Definite; by effluents from processing factories - Probable to Possible; by drainage and seepage from farm affected by excessive amount of fertilizer, agrochemical or livestock excreta - Probable to Possible; by increased turbidity of discharged water during civil earthworks
Improper waste disposal	- Definite; by deposits of removed earth by civil works (road, irrigation system, factory, etc.) - Probable to Possible; by organic waste from processing factories
Soil contamination	- Probable to Possible; by residual agrochemical - Probable to Possible; by discharged water from civil works
Noise and vibration	- Definite; by operation of processing factories - Definite; by civil works (during construction) - Probable to Possible; by increased traffic on rural roads
Ground subsidence	- Uncertain about the potential occurrence of excessive extraction of groundwater
Offensive odor	- Probable to Possible; by some kinds of processing factories
Sediment contamination	- Probable to Possible; by drainage and seepage from farm affected by fertilizer, agrochemical or livestock excreta - Probable to Possible; by effluents from processing factories
Disturbance of protected areas	- Uncertain about the potential occurrence of inadequate site selection inside or around protected areas
Deterioration of ecosystem and biodiversity	- Probable to Possible; by clearance of forest - Probable to Possible; by massive extraction or diversion of surface water and groundwater - Probable to Possible; by effluent from processing factories - Probable to Possible; by eutrophication - Uncertain about the potential occurrence of inadequate site selection near habitat of protected or threatened species
Change in hydrologic regime	- Probable to Possible; by massive extraction or diversion of surface water and groundwater - Probable to Possible; by development of hydraulic structures for irrigation - Uncertain about the potential occurrence of massive deforestation and reforestation
Soil erosion and siltation	- Probable to Possible; by deforestation and expansion of inadequate farming practices in sloped areas - Probable to Possible; by earth cut-and-fill by civil works

Adverse Impacts	Probability Rating and Principal Causes
Other soil degradation	- Probable to Possible; by accelerated compaction by mechanization - Uncertain about the potential occurrence of soil degradation by consecutive farming without fallow, mulching, fertilization or manure application
Substantial alteration of land-form, geology, landscape	- Uncertain about the potential occurrence by earth cut-and-fill by civil work, construction or large scale reclamation, including quarry, borrow pit and disposal are
Improper management of abandoned sites	- Unlikely to occur
Increased risk of forest fire	- Uncertain about the potential occurrence of the expansion of the agricultural frontier into forest - Uncertain about the potential occurrence of the expansion of tree plantations or tree crop farms near residential areas
Trans-boundary or global effect	- Unlikely to occur

Source: JICA Study Team

Table 9.5.2 Effect Analysis for Draft Master Plan and their Principal Causes (Social Environment)

Adverse Impacts	Probability Rating and Principal Causes
Influence on indigenous peoples or minorities	- Unlikely to occur
Detriment to cultural or historical heritage	- Uncertain about the potential occurrence of an inadequate site selection over known or unknown heritage - Uncertain about the potential occurrence of insufficient initial examination before commencement of activity
Involuntary resettlement	- Unlikely to occur
Limitation of access to natural resources	- Probable to Possible; by setback of settlements by improvement of rural roads - Probable to Possible; by enclosure of terrain by DUAT for construction of facilities for rural industries - Uncertain about the potential occurrence of inundation by construction or rehabilitation of a reservoir - Uncertain about the potential occurrence of conversion of forest into farmland - Uncertain about the potential occurrence of the weak consensus building among community members and the Government
Loss or restriction of livelihood and Serious change in lifestyle	- Unlikely to occur

Marginalization of vulnerable groups
Localization of benefits and damages
Aggravation of conflict of interests
Widening of gender disparity
	- Uncertain about the potential occurrence of the following:
	  - Insufficient and/or delayed compensation
	  - Non-compliance with investor-community partnership agreement
	  - Weak mechanism of grievance redress
	  - Loss of traditional jobs due to improved transport, land-use and natural resource utilization
	  - Capture of benefit by local elites
	  - Lack of fairness and transparency in the criteria and process of beneficiary selection
	  - Lack of preferential employment opportunities for local people

Working conditions and occupational safety	- Probable to Possible; by non-compliance with the relevant legislation for civil works and factory operations - Probable to Possible; by lack of training and awareness creation campaigns on safety and public health
Annoyances during construction	- Definite; by increased interaction between outside laborers and local residents
Risk of accident and	- Probable to Possible; by intoxication by inadequate management of

harm to human health	agrochemicals - Probable to Possible; by effluents from processing factories into rivers and lakes used as sources of drinking water - Probable to Possible; by traffic change - Probable to Possible; by lack of training and awareness creation campaigns on safety and public health for construction workers and increased tractor operators - Uncertain about the potential occurrence of non-compliance with the relevant legislation for civil works and factory operations
Spread of infectious disease, HIV/AIDS	- Uncertain about the potential occurrence of lack of training and awareness creation campaign on safety and public health for construction workers
Offense against children's rights	- Unlikely to occur

Source: JICA Study Team

Rate: Definite or Highly Probable, Probable or Possible, Unlikely to occur and Uncertain.

9.6 Relevance with National Policies, Strategies, Programmes and Plans

As described in Sub-section3.1.1, the overall goal of the Draft Master Plan is based on the strategic objective of PEDSA. The following national policies shown in the table blow have been considered to formulate the Draft Master Plan.

Table 9.6.1 National Policies underlying PEDSA and the Draft Master Plan

Title	Year	Relevance with PEDSA and M/P	Title	Year	Relevance with PEDSA and M/P
Agrarian Policy	1995	High	Youth Policy	1996	Medium to Low
Environment Policy	1995		Labor Sector Policy	1997	
Land Policy	1995		Social Action Policy	1998	
Forest and Wildlife Policy	1997		Disaster Management Policy	1999	
Water Policy	2007		Gender Policy	2007	
Territorial Planning Policy	2007		Bio-fuel Policy	2009	
			Conservation Policy	2009	

Source: JICA Study Team

Based on these policies, the government has developed national strategies to address more specific development sector/sub-sector categories, as shown in the table below.

Table 9.6.2 National Strategies with relation to the Draft Master Plan

Title	Institution	Period	Numerical Indicators of Targets, Projects, Actions and Goals	Approximate Budget (million USD)	Relevance with M/P
Strategy and Action Plan for Food and Nutritional Security	SETSAN (Technical Secretariat for Food Security and Nutrition)	2008 – 2015	Fully presented	232	High
Strategy for Irrigation	MINAG	2010 - 2020	Partially presented	645	
Strategy for Agricultural Mechanization	MINAG	2012 -	Partially presented	11.3 *(only for 1 pilot project)*	
Strategy for Gender in the Agricultural Sector	MINAG	2005 -	Not presented	Not estimated	Medium to Low
Strategy for Employment and Professional Education in	Council of Ministers	2006 – 2015	Partially presented	175.2	

Mozambique					
Strategy for Green Revolution in Mozambique	Council of Ministers	2007 -	Partially presented	Not estimated	
Strategy for Rural Development	Council of Ministers	2007 – 2025	Partially presented	20 *(for phase 1: 2007-2009)*	
National Strategy for Water Resources Management	Council of Ministers	2007 -	Partially presented	Not estimated	
Environmental Strategy for Sustainable Development of Mozambique	MICOA	2007 – 2017	Not presented	Not estimated	
Strategy for Reforestation	MINAG	2009 - 2030	Fully presented	1,360	
Strategy for Management of Human/Wildlife Conflict	Council of Ministers	2009 - 2014	Partially presented	Not estimated	
National Strategy for Adaptation and Mitigation of Climate Change	MICOA	2013 - 2025	Partially presented	142 *(for phase 1: 2013-2014)*	
National Development Strategy	Council of Ministers	2015-2035	Fully presented	Not estimated	

Source: JICA Study Team

These national policies and strategies have been translated into more concrete plans and programs, some of which can be regarded as potential alternatives to the Draft Master Plan. They are not, however, competitive among each other, rather they are complementary.

Table 9.6.3 Potential Alternatives to the Draft Master Plan (at Plan/Program level)

Title	Institution	Period	Numerical Indicators of Targets, Projects, Actions and Goals	Budget (million USD)	Relevance with M/P
PNISA	MINAG	2013 – 2017	Partially presented	4,254	High
Extension Master Plan; and, PRONEA as its implementation program	MINAG IFAD	2007 – 2016	Fully presented (as logical framework)	51 (for PRONEA 2007 - 2014)	
Agribusiness Development Master Plan	MINAG CEPAGRI	2012 – 2020	Fully presented	1,050 (= 37,783.5 million Meticais)	
National Strategic Program of Fertilizer	MINAG	2012 – 2017	Fully presented	1,127	
Rural Market Promotion Program (PROMER) ** Covering 15 districts of the four northern provinces.*	MINAG IFAD AGRA	2009 – 2016	Fully presented (as logical framework)	41	
Provincial Strategic Plan of Niassa	Niassa Prov. Govt.	2008 – 2017	Partially presented	680	
Plan for Provincial Development of Nampula	Nampula Prov. Govt.	2010 – 2020	Fully presented	4,292	
Strategic Plan for Provincial Development of Zambezia	Zambezia Prov. Govt.	2011 – 2020	Fully presented	3,706 *(Ongoing projects are not included.)*	
Action Plan for Prevention and Control of Soil Erosion	MICOA	2008 – 2018	Partially presented	4.4	Medium to Low
Action Plan for Prevention and Control of Forest Fires	MICOA	2008 – 2018	Partially presented	2	

Source: JICA Study Team

9.7 Recommendations

The proposed components in the Master Plan are to promote inclusive agricultural development to utilize the advantage of potentialities as well as to tackle constraints.

From the results of the SEA study, the following recommendations should be considered in the finalization and implementation of these development components in order to avoid or mitigate environmental and social problems in the future.

(1) Environmental Impact Assessment

EIA for each component proposed in the present Master Plan should be carried out according to the "Regulation on Process of EIA (Decree no.45/2004)" under the responsibility of the executing body of each component before start their implementation (refer to Annex for details), and subsequent environmental monitoring too. When any component is supported either technically or financially by outside entities, the safeguard procedures of such entities will be additionally applied.

Environmental and social safeguards in Mozambique are supported by a number of framework laws and specific regulations based on the Republic's Constitution, as well as by international agreements ratified by the government (refer to Annex for details). Most principal, fundamental laws include: Environment Law (no.27/90), Land Law (no.19/97), Forest and Wildlife Law (no.10/99), Conservation Law (no.16/2014), Water Law (no.16/91), Territorial Planning Law (no.19/2007), Cultural Heritage Protection Law (no.10/88), among others.

A comparative analysis between the Mozambican legislation and international safeguard standards used by multilateral donors reveals that requirements of the EIA process and other legal provisions in Mozambique are quite well-devised, and in some aspects even more rigorous, satisfying most international standards. However, it is notable that some issues may need to be legally stipulated or incorporated into the national policies by the government's long-term initiative in order to better address potentially contentious impacts of the present Master Plan. An improved assessment on natural environment will be achieved if transboundary and global environmental aspects are included more explicitly in the potential impacts on the natural environment.

More, different instruments other than normal project-level EIA procedure, for example strategic environmental and social assessment, will be additionally required when a development program is likely to have sectoral or regional impacts, as is the case of the present Master Plan in order to properly conduct analysis and evaluation at larger scale and wider breadth.

(2) Forest conservation

The Master Plan's premises and strategies include such statements as: "The condition of the forests and forest resources shall be properly maintained in terms of acreage and quality by government initiatives" or "Any undertaking of forest clearance to expand farmland, either by local farmers or investment projects, shall follow Mozambican laws". However, reflection on

the trend and current status of the deforestation around the Nacala Corridor leads to the urgent recommendation for the Government of Mozambique: that is, to elaborate a superior framework to regulate the conservation, management, utilization and creation of forests (including forest restoration by reforestation, commercial plantation and replacement of natural forest by artificial plantation), at either national, provincial or watershed levels.

(3) Land management

The fundamental issue lies in harmonizing the respect for traditional land management systems at the community level with the modern land management regulated by law. The Master Plan's premises and strategies include the dissemination of laws, support for improved land governance at the community level, reinforcement of the arbitration system, and so on: however, lack of adequate considerations in these processes could result in provoking undesirable influence on the social capital in different ways, which make the due considerations indispensable.

The recommendation is to further promote the delimitation of community lands, regularization of individual DUATs, and harmonization between the traditional land management system and the modern land management system by law, taking into account the discussions held in "Land Consultation Forum" etc.

(4) Private investment projects requiring DUATs acquisition

Private investment projects which require land acquisition for agricultural production are mainly a concern among family farmers and also civil society organizations, because some conflicts between such private investments and local farmers have occurred in the fields. Therefore, as stated in assumption of the Master Plan, the Master Plan needs to take a position to protect the rights of family farmers and communities for the use of land and other natural resources through supervising incoming private investment projects.

Recommendations include: (i) no promotion of the private investment projects which require DUATs acquisition while enhancing a supervision mechanism on private investments, (ii) dissemination and application of the Guidelines on rai, and (iii) smooth implementation of the support programs to improve the structure and mechanism of law application and its supervision by the government. (iv) Establish a grievance mechanism for the community level in cooperate with civil society organization and other stakeholders. (v) Involve civil society organizations in the process mentioned above. Moreover, the Government is expected to elaborate and publish, based on the discussions held in "Land Consultation Forum" etc., the model of the partnership agreement between the communities and private investment enterprises, as well as the model of the lease contract of community land.

(5) Social environment and compensations

The "Guidelines on Expropriation Process for Territorial Planning (Ministerial Order no.181/2010)" contemplates the expropriation of land or immobile property by the government authorities, and the associated compensation procedures for the loss of such assets as buildings, constructions, perennial crops and annual crops, for the projects of public interest including

public infrastructures, realization of territorial planning and other special purposes such as natural disaster emergency or national defense, and therefore it is not applicable to the projects of economic activity by private sector. This gap could be bridged if a holistic regulation on the compensation for asset loss is legally devised.

There is no legal provision on the compensation for land/farmland itself, since land cannot be sold nor purchased and has no market value in Mozambique. Definition of regulations of land-for-land compensation scheme could be a viable alternative. Also, as per recommended by the Land Consultation Forum, economic valuation of DUAT will have to be assessed by technically qualified organizations as a reference of calculation of the compensation.

Clearer legal provision about the criteria, valuation method and mode of payment of the compensation for the involuntarily resettled people is needed. Such provisions are expected to include also the definition of cut-off date, particular attention to the vulnerable groups, and compensation for the host communities.

(6) Framework to promote Out-grower schemes

Contract farming or Out-grower schemes are carried out but some problems are found in the fields in both farmers and private companies. Major causes of the problems are gaps between private companies and farmers in many aspects. However, farmers and civil society organizations are afraid that farmers are forced into unfair condition in the promotion of contract farming (Out-grower scheme).

On the other hand, the Master Plan's assumption is the utilization of resources, capacities and services of the local private sector in the support of family farming as supplementary forces other than governmental support. Therefore, the Master Plan needs to take an approach to cast aside farmers' concerns regards out-grower scheme.

Recommendations include: (i) Prepare an operational guideline of out-grower scheme for both companies and farmers according to their comprehensions including appropriate contract format (ii) dissemination and application of the guidelines to companies, associations/ cooperatives and Government officials with regard to procedure of out-grower scheme, roles and responsibilities of each parties in cooperation with civil society organizations, and (iii) A mechanism of monitoring and communication methodology (companies and farmers) including a grievance redressal mechanism to address the issues/ complaints of farmers, is established as as to improve the quality of company's intervention to farmers in association with SDAEs.

(7) Gender considerations

The participation of women in the development of projects is fundamental for agricultural and rural development. The following issues should be taken into consideration, so that the exclusion of women from the development activities might not occur, under the current social structure of local society:

- Improvement of the literacy rate and school enrollment of women, in order to prevent their exclusion from the access to opportunities of participation in the development projects, economic activities and income generation.

- Preventive measures or considerations for the gender disparity about access to land as well as land-use right: there is a risk that DUAT registration could result unfairly beneficial for men and prejudicial for women, making their situation even worse than actual, or in terms of another risk of depriving women future opportunities to correct such unfairness by hasty legal recognition and fixing of their current land status.

(8) Widening disparity

A widening disparity by effect of the Master Plan must be avoided. Therefore, the Master Plan sets that family farmers are the leading partners in agricultural development. In this context, the following issues should be taken into consideration:

- Family farmers will be mainstreaming the program and preventive measures or considerations to avoid widening disparity among community and farmers. In this context, special consideration is required for female farmers, youth and other vulnerable groups.
- Fruit of the improvement, such as disseminated improved practices, knowledge or improved access to market, inputs and information will be expanded to the entire community, even leading farmers or farmers groups in the community will be fostered at the beginning of some components. Therefore, it is necessary to include mechanism how the given training of practice for the leading farmers or farmers groups will be disseminated to surrounding farmers and in community.
- Giving necessary considerations for women, youth and other vulnerable groups in religious, in age or in regional aspects for whole activities. Taking approaches to involve such vulnerable people into the target groups to work them together in improvement in order to let interventions to directly reach them.