

Ministry of Economy and Finance
The Republic of Mozambique

THE PROJECT FOR
NACALA CORRIDOR
ECONOMIC DEVELOPMENT STRATEGIES
IN THE REPUBLIC OF MOZAMBIQUE



PEDEC-NACALA

Final Study Report

Main Text: Volume 2

April 2015

Japan International Cooperation Agency (JICA)

Oriental Consultants Global Co., Ltd.
RECS International Inc.
International Development Center of Japan
Kokusai Kogyo Co., Ltd.
Eight-Japan Engineering Consultants Inc.

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LIST OF ABBREVIATION

ABS	Access and Benefit Sharing	DPA	Provincial Directorate of Agriculture
ADCN	Agency for Nacala Corridor Development	DPANE	Provincial Directorate of ANE
ADM	Mozambique Airports	DPCA	Provincial Directorates for the Condition of Environment
AFCAP	African Community Access Programme	DPOT	Department of Territorial Planning
AfDB	African Development Bank	DTI	Department of Trade and Industry of South Africa
AIAS	Management Infrastructure for Water Supply and Sanitation	DUAT	Land Use Right
AIDS	Acquired Immune Deficiency Syndrome	EAP	Economically Active Population
AIFM	Integrated Assessment of Forest in Mozambique	EDM	Mozambique Electricity Company
ANE	National Road Administration	EFA	Education for All
AP	Administrative Post	EIA	Environmental Impact Assessment
APRAP	Action Plan for the Reduction of Absolute Poverty	EL	Dam Crest Elevation
ARA	Regional Water Administration	EMP	Environmental Management Plan
ARA-CN	ARA-Centro Norte	ENDE	National Development Strategy
ARA-N	ARA-Norte	ENH	Mozambique National Hydrocarbons Company
ARA-Z	ARA-Zambeze	EP	Primary Education
ASNANI	Integrated Water Supply and Sanitation Project for Niassa and Nampula	ES	Secondary Education
ASP	Application Service Provider	EU	European Union
ASPS	Agriculture Sector Programme Support	EXIM Bank	Export-Import Bank
ASTRA	Association of Transport	FAO	Food and Agriculture Organization
AU	African Union	FARE	Economic Rehabilitation Support Fund
AusAid	Australian Agency for International Development	FDI	Foreign Direct Investment
CBD	Central Business District	FEED	front end engineering and design
CDM	Clean Development Mechanism	FEMATRO	Mozambican Federation of Association of Road Transporters
CDN	Northern Development Corridor	FIPAG	Investment Fund and Water Supply Asset Holder
CENACARTA	National Remote Sensing & Cartography Centre	FS	Feasibility Study
CEPAGRI	Agriculture Promotion Centre	FUNAE	Energy Fund
CFM	Mozambique Ports and Railways	GAZEDA	Special Economic Zones Office
CFP	Vocational Training Centres	GDP	Gross Domestic Products
CFS	The Committee on World Food Security	GER	Gross Enrolment Ratio
CIDA	Canadian International Development Agency	GIS	Geographic Information System
CIQ	Customs, Immigration, and Quarantine	GMP	Gas Master Plan
COMESA	Common Market for Eastern and Southern Africa	GPS	Global Positioning System
CNAM	National Council for the Advancement of Women	GRDP	Gross Regional Domestic Product
CNG	Compressed Natural Gas	GTL	gas to liquid
CPI	Investment Promotion Centre	HCB	Cahora Bassa Hydro-Power Plant
CSR	Corporate Social Responsibility	HDI	Human Development Index
DANIDA	Danish International Development Agency	HDPE	High-Density Polyethylene
DD	Detail Design	HIV	Human Immunodeficiency Virus
DfID	Department for International Development of United Kingdom	HIZA	Hanoi Authority for Industrial Parks and Export Processing Zones
DICES	National Directorate of Higher Education	ICD	Inland Container Depots
DIMAN	Directorate of Maintenance of ANE	ICT	Information and Communication Technology
DINAPOT	National Directorate of Territorial Planning	IEE	Initial Environmental Evaluation
DINET	National Directorate for Primary Education	IFAD	International Fund for Agricultural Development
DGM	Discussion Group Meeting	IFC	International Finance Corporation
DNEAP	National Directorate of Studies and Policy Analysis, Ministry of Planning and Development	IFTRAB	Integrated Survey on the Labour Force
DNA	National Water Directorate	IFZ	Industrial Free Zone
DNTF	National Directorate of Land and Forestry	IMF	International Monetary Fund
		INAM	National Institute of Meteorology
		INAV	National Institute of Transport
		INATUR	National Institute of Tourism
		INATTER	National Land Transport Institute

INCM	National Institute of Communications	MW	Megawatt
INE	National Statistics Institute	NBIP	Noi Bai Industrial Park
INEFP	National Institute for Employment and Vocational Training	NEDO	New Energy and Industrial Technology Development Organisation
IP	Internet Protocol	NEC	National Environmental Commission
IPEME	Institution for the Promotion of Small and Medium Enterprise	NEMP	National Environmental Management Programme
IPP	Independent Power Producer	NEPAD	New Economic Partnership for African Development
IPPF	Infrastructure Project Preparation Facility	NER	Net Enrolment Rate
ISP	Internet Service Providers	NGN	Next Generation Network
ITR	Interim Report	NGO	Non-Government Organisation
ITU	International Telecommunication Union	NPO	Nonprofit Organisation
IUCN	International Union for Conservation of Nature and Natural Resources	NRW	Non-Revenue Water
IWRM	Integrated Water Resources Management	NSO	National Statistical Office, Malawi
JICA	Japan International Cooperation Agency	OD	Origin-Destination
LAN	Local Area Network	OJT	On the Job Training
LDPE	Low-Density Polyethylene	OSBP	One Stop Border Post
LNG	Liquefied Natural Gas	PAEI	Agricultural Policy and Implementation Strategy
MAE	Ministry of State Administration	PAPA	Food Production Action Plan
MAR	Mean Annual Rainfall	PARP	Poverty Reduction Action Plan
MASA	Ministry of Agriculture and Food Security	PARPA	National Action Plan for the Reduction of Absolute Poverty
MCA	Millennium Challenge Account	PATI	Priority Areas for Tourism Investment
MCC	Millennium Challenge Corporation	PCD	Cabo Delgado Ports
MCJI-TIZ	Matibane-Crusse-Jamali Island Tourism Interest Zone	PECODA	Programme of Education for Environmental Development
MCTUR	Ministry of Culture and Tourism	PEDEC-Nacala	The Project for Nacala Corridor Economic Development Strategies
MDC	Maputo Development Corridor	PEDSA	Strategic Plan for Development of the Agriculture Sector
MDG	Millennium Development Goals	PEI	Poverty Environmental Initiative
ME	Ministry of Energy	PEP	Prvincial Strategic Plan
MEF	Ministry of Economy and Finance	PEPIP	Strategic Plan: Promotion of Private Investment in Mozambique
MIC	Ministry of Industry and Commerce	PES	Payment for Ecosystem Services
MICE	Meetings, Incentives, Conferences, and Exhibitions	PESA-ASR	Strategic Plan for Rural Water Supply and Sanitation
MICOA	Ministry of Coordination of Environmental Affairs	PHC	Primary Health Care
MICS	Multiple Indicator Cluster Survey (UNICEF)	PII	Integrated Investment Programme
MILT	Ministry of Land, Infrastructure, Transport and Tourism of Japan	PIREP	Integrated Programme for Education Reform
MINAG	Ministry of Agriculture	PLMN	Public Land Mobile Network
MINED	Ministry of Education	PPP	Policy, Plan and Programme
MINEDH	Ministry of Education and Human Development	PPP	Public-Private Partnership
MINTRAB	Ministry of Labour	PR	Progress Report
MIPAR	Rural Water Supply Manual	PRISE	Integrated Road Sector Programme
MIREM	Ministry of Mineral Resources	PROMER	Programme for Road Access to Agricultural Markets
MIREME	Ministry of Mineral Resources and Energy	ProPESCA	Programme of Roads under the Promotion of Fishing Craft
MISAU	Ministry of Health	ProSAVANA	Triangular Cooperation for Agricultural Development of the Tropical Savannah in Mozambique
MITADER	Ministry of Land, Environmental and Rural Development	PSAA	Small Water Supply System
MITUR	Ministry of Tourism	PSTN	Public Switched Telephone Network
MoFA	Ministry of Foreign Affairs of Japan	PVC	Polyvinyl Chloride
MOPH	Ministry of Public Works, Housing and Water Resources (former Ministry of Public Works and Housing)	rai	Responsible Investment in Agriculture and Food System
MPD	Ministry of Planning and Development	RD	Record of Discussion
MPI	Ministry of Planning and Investment of Vietnam	REDD	Reducing Emissions from Deforestation and Forest Degradation
mt	Million tons		
MT	Metical		
MTC	Ministry of Transport and Communication		
MTPA	Million Tons Per Annum		

ROW	Right of Way	TIA	National Agricultural Survey
RSA-DTI	Department of Trade and Industry of South Africa	TDM	Telecommunications of Mozambique
RSDIP	Regional Spatial Development Initiative Programme	TEU	Twenty Foot Equivalent Unit
RSS	Road Sector Strategies	TFCA	Trans Frontier Conservation Areas
SADC	South African Development Community	TIZ	Tourism Interest Zones
SADCC	South African Development Coordination Conference	TLIP	Thang Long Industrial Park
SAIDI	System Average Interruption Duration Index	TRL	Transport Research Laboratory
SAIFI	System Average Interruption Frequency Index	TVE	Technical and Vocational Education
SACMEQ	The Southern and Eastern Africa Consortium for Monitoring Educational Quality	TVET	Technical and Vocational Education and Training
SARI	System Average Restoration time Index	UAE	United Arab Emirates
SC	Steering Committee	UCODIN	Coordinating Agency for Integrated Development of Nampula
SCADA	Supervisory Control and Data Acquisition	UK	United Kingdom
SDC	Swiss Agency for Development and Cooperation	UNDP	United Nations Development Program
SDCN	Nacala Corridor Development Company	UNEP	United Nations Environment Program
SDI	Spatial Development Initiatives	UNESCO	United Nations Educational, Scientific and Cultural Organization
SDP	Spatial Development Programme	UN-HABITAT ...	The United Nations Human Settlements Programme
SDPI	District Planning and Infrastructure Service	UNICEF	United Nations Children's Fund
SEA	Strategic Environmental Assessment	UNIDO	United Nations Industrial Development Organisation
SEZ	Special Economic Zone	USA	United States of America
SIDA	Swedish International Development Cooperation	USAID	United States Agency for International Development
SME	Small and Medium-Sized Enterprises	USD	United States Dollar
SNS	National Health Services	VGGT	Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security
SPGC	Provincial Service of Geography and Cadastral	VSIP	Vietnam-Singapore Industrial Park
SPFFB	Provincial Service of Forest and Wildlife	WASIS	Additional Financing of the Water Services and Institutional Support
SVC	Static VAR (Volt-ampere ractive) Compensators	WB	World Bank
SWOT	Strengths, Weaknesses, Opportunities and Threats	WG	Working Group
TAZARA	Tanzania-Zambia Railway Authority	WHO	World Health Organisation
TcF	Trillion Cubic Feet	WWW	World Wide Web
TCTP	Third Country Training Programme	ZAE	Zonamento Agro-Ecologico National
		ZMM-GT	Zambia-Malawi-Mozambique Growth Triangle

PART III

VISION, DEVELOPMENT GOALS AND OVERALL ISSUES



Chapter 9 Vision and Development Goals for the Nacala Corridor Region

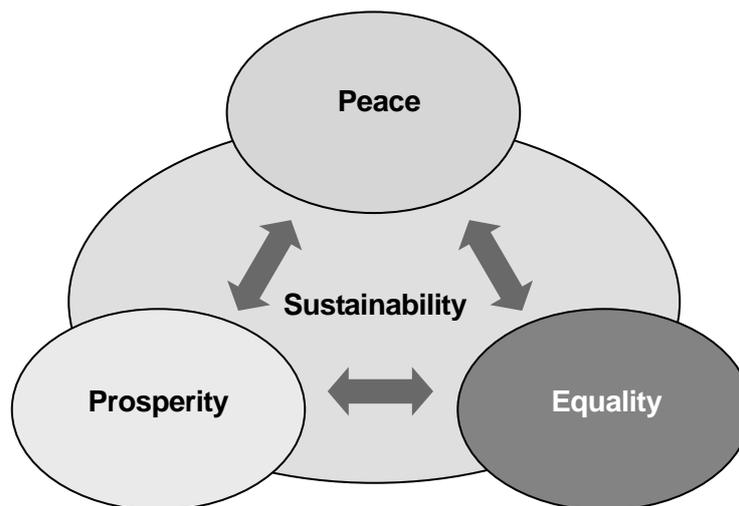
9.1 Vision

9.1.1 Vision for the Future of the Nacala Corridor Region

The vision for the future of the Nacala Corridor Region is defined as:

A peaceful, prosperous, equitable and sustainable region free from poverty in harmony with the environment.

The four key values of “peace”, “prosperity”, “equality” and “sustainability” are integrated into this phrase.



Source: JICA Study Team based on the result of Vision Workshop

Figure 9.1.1 Key Values of the Vision

The implications of each key word are summarised as follows:

- “Peace” was expressed as an important value in the workshops as well as in the current Five-Year Development Plan for Mozambique. It is assumed that the memory of the difficult time during the independence war and the civil war, which lasted for about 30 years, still remains in people’s minds and is reflected in stressing the importance of peace. It is a fundamental condition to secure the other three issues of “equality”, “prosperity” and “sustainability.” At a more familiar level, peaceful relationships between stakeholders such as investors, communities and the government are a prerequisite for sustainable development. A society with fewer crimes also ensures a situation with “peace.”
- “Equality” is an important value in Mozambique inherited from the ancestors. There could be political, social and economic implications of the word “equality.” In the context of

development, “equality” could mean a fair distribution of benefits from economic development among the people. While perfect equality may be difficult, opportunities to participate in development and to get access to health and education services at least should be available for everyone with transparency. Good leadership is needed for this.

- “Prosperity” could imply both success in economic development and the state of people’s minds being satisfied with their living conditions. “Prosperity” ensures a higher level of independence from others: lower level of dependence on international partners for Mozambique and higher level of self-sufficiency of goods and services for the Nacala Corridor Region. It is an important issue for the current generation, but more so for the next generations, because achieving “prosperity” requires many years. “Prosperity”, therefore, should be sustainable. “Prosperity” is the common key word shared by Zambia, Malawi and Mozambique.
- “Sustainability” implies not only sustainability from environmental perspectives, but also social and economic sustainability of societies. The other values in the Vision, namely prosperity, peace and equality, are prerequisite conditions for “Sustainability.” In other words, “Sustainability” embraces peace, equality and prosperity.

9.1.2 Development Directions toward the Vision

To have concrete images for the Vision, development directions in relation to the four values of the Vision should be pursued as follows:

Development Directions for “Prosperity”

- Regional economy grows
- Income disparity is reduced
- Poverty is eradicated

Development Directions for “Peace”

- There is no civil war
- Confrontations are prevented and resolved through a fair and transparent process
- Law and order situation is improved with lower rate of crimes such as robbery and theft

Directions for “Equality”

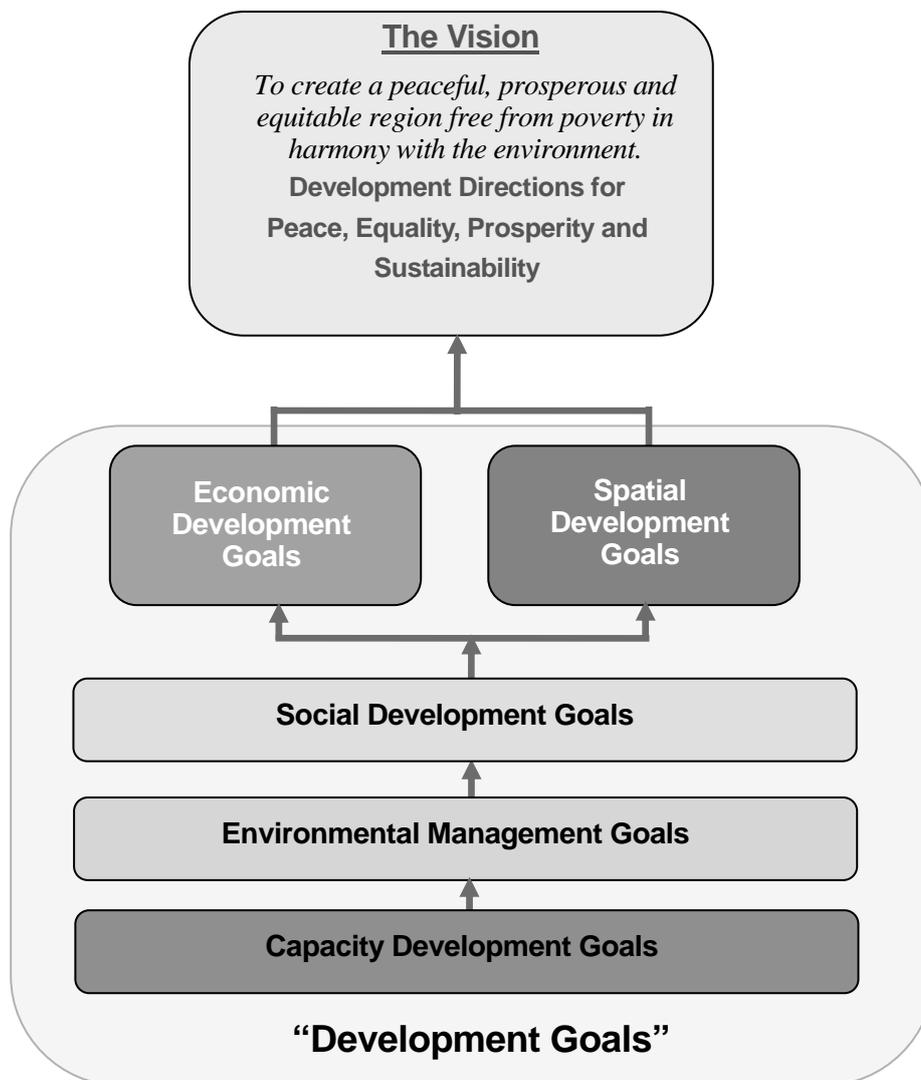
- People have equal opportunities to participate in development
- People have equal access to basic social services, such as health and education

Directions for “Sustainability”

- Adverse impact of development on the natural environment is minimised
- Social environment is not disturbed
- Traditional values are maintained while accepting modernization and development

9.2 Development Goals

Development goals for the Nacala Corridor Region are a set of statements indicating desirable directions of development in order to pursue the Vision of the Nacala Corridor Region. The identified development goals consist of five aspects, namely “capacity development”, “environmental management”, “social development”, “economic development” and “spatial development”.



Source: JICA Study Team

Figure 9.2.1 Vision and Development Goals

9.2.1 Capacity Development Goals

Capacity development is considered at three levels, namely, individual capacity, institutional capacity and social capacity. Considering existing development potential and constraints in the Nacala Corridor Region, the following development goals for capacity development for the Nacala Corridor are identified:

- Capacity Development at the Individual Level
 - Increase of education level of individuals both in urban and rural areas

- Increase of skill level of labourers and farmers for promoting economic development
- Capacity development for government officers for managing endowed resources, such as mineral and water
- Capacity Development at the Institutional Level
 - Strengthening of national, provincial and local government organisations for planning, implementation, monitoring and evaluation
 - Development of government's mechanisms for coordination among different sectors for promoting integrated regional development
 - Strengthening intermediation function of government for better investor-community relations
- Capacity Development at the Society Level
 - Empowered communities to cope with incoming investors into the territories of their communities
 - Development of well-informed societies
 - Development of democratic societies

9.2.2 Environmental Management Goals

The government will need to cope with different kinds of environmental problems to emerge in the Nacala Corridor Region in a balanced manner. In the short term and in the regional context, various environmental impacts will be created by infrastructure projects (railway, road, port, airport, power etc.), expansion of urban areas and private investments. These issues require swift action by the government. On the other hand, efforts at regional environmental problems could also contribute to reduction of CO₂ emission. For example, a regional policy to limit agricultural expansion to a certain extent for maintaining forest coverage is considered to be effective in reducing CO₂ emission.

In the medium to long terms, more efforts and measures will be made directly at global environmental problems including reduction of CO₂ emission and using a new mechanism for sharing the cost of environmental protection. The environmental management goals are summarised as follows:

- To cope with both immediate regional environmental issues and global environmental issues with a good balance
- Strengthening of enforcement of existing systems for environmental regulations including EIA and environmental management for both public and private investments
- Capacity development for environmental management including administrative procedures and technical monitoring

9.2.3 Social Development Goals

Social development goals are cross cutting over the issues of capacity development and economic development. However, they have special perspectives of community empowerment and participation. Considering development potential and constraints inherent in local communities, the social development goals for the Nacala Corridor Region are identified as follows:

- Increase of people's incomes and welfare
- Diversification of opportunities for employment and businesses in local areas

- Promotion of people's participation in local development
- Promotion of basic education and vocational training for local people both in urban and rural areas
- Promotion of creation of the linkage with private companies for job creation for local people, especially for the youth both in urban and rural areas
- Empowerment of urban communities through supporting local people, especially the youth, in starting businesses, as well as in getting jobs
- Empowerment of rural communities by protecting land use rights of local communities and farmers
- Strengthening of the capacity of small-scale farmers practicing family agriculture
- Upgrading of social services (health, education and rural water supply) in rural areas

9.2.4 Economic Development Goals

Investment should be promoted for economic development. There are different views concerning investment in Mozambique including negative ones. Some argue foreign investment only exploits indigenous resources and people for investors' own benefit. The PEDEC-Nacala's stance is positive in that investment should be promoted properly such that it creates positive impact on the regional economy. The question here is "in what way the regional economy could benefit most from investment and what the government should do to make it happen in such a way."

The economic development goals for the Nacala Corridor Region are identified as follows:

- Promotion of foreign and domestic investments for economic development
- Promotion of diversified economic development including not only the mining sector but also manufacturing industries
- Promotion of industrial development by tapping rich natural resources available in the Region and development potential to emerge in the Region
- Improvement of productivity of agriculture production for both small-scale farmers practicing family agriculture and for commercial farmers
- To vitalize private sectors for creating value chain for the agricultural sector in accordance to the "Principles for Responsible Investment in Agriculture and Food System (rai Principles)"
- Promotion of bottom-up development initiatives

9.2.5 Spatial Development Goals

The spatial development goals are set for aiming at transforming the physical characteristics of the Nacala Corridor Region in such a way as to seek economic development goals, while maintaining the principles of the environmental management goals and social development goals. The spatial development goals identified for the Nacala Corridor Region are summarised as follows:

- Development of a region-wide transportation network based on the Nacala Corridor
- Strengthening of urban functions in accordance with an established urban centre hierarchy in relation to the region-wide transportation network
- Strengthening of enforcement of protection and conservation of nature areas
- Establishment and protection of new forest conservation areas where agricultural expansion is not allowed
- To support development of manufacturing industries in urban centres

- Promotion of tourism development utilising nature and cultural tourism potentials in the Region in the course of development a region-wide transportation network and urban centres
- Development of infrastructures necessary to support economic and social development (road, electricity, water, telecommunications and so on)
- Promotion of agricultural development by implementing in the areas along transport corridors to be developed and in the areas close to large-scale mining areas, as coal mining in Tete Province and natural gas exploitation in Cabo Delgado Province

Chapter 10 Overall Issues

10.1 Introduction

There are a variety of resources and development potential in the Nacala Corridor Region. These resources and development potential, as well as the constraints, are analysed in Part II of this report. This analysis was utilised for conducting a SWOT analysis for the Nacala Corridor Region as a whole, as shown in Section 10.2.

In PEDEC-Nacala, through present situation analysis of different sectors using a sector approach, sector issues are identified and defined for further strategy formulation. The lists for summarising those sector issues are compiled in Section 10.3.

Through present situation analysis of different provinces and the Nacala Corridor Region as a whole using a regional approach, overall issues are identified, as shown in Section 10.4.

10.2 SWOT Analysis for the Nacala Corridor Region

For seeking economic and social development in the Nacala Corridor Region, strengths (S) and weaknesses (W), external opportunities (O) and threats (T) are analysed and summarised in Table 10.2.1. This result is a summary of the SWOT analysis based on the key features presented in the previous sections.

The strengths (S) and weaknesses (W) are internal and inherent characteristics of the Nacala Corridor Region, while opportunities (O) and threats (T) are characteristics in response to external factors to be influential in the Nacala Corridor Region.

Table 10.2.1 SWOT Analysis for the Nacala Corridor Region

Strengths	Weaknesses
<ul style="list-style-type: none"> • Peace and stability even though some small conflicts were observed • Abundant mineral resources (including coal and natural gas) that are financially exploitable • Other natural resources with high potential • Fertile farmland with 1,000 mm of annual average rainfall • Relatively rich forests and wildlife in Niassa and Cabo Delgado Provinces • Beaches and other tourism resources • Availability of a young and active labour force • Good geographical location on the eastern coast, which is closer to Asia 	<ul style="list-style-type: none"> • Low population density in inland areas, especially in inland areas of Niassa and Cabo Delgado Provinces • Relatively poor health situation of the people • Lack of opportunities for sufficient quality education and training for the people in the region • Relatively high prices of basic goods and construction material due to poor transportation infrastructure and services • Lack of infrastructure and services to serve long-distance transport of goods and passengers • Inadequate economic infrastructure to support economic and social development in urban and rural areas • Lack of ample water resources for Nacala and Nampula due to small catchment areas of rivers near Nacala and Nampula • Weak capacity for coordination and implementation of policies and public services • Low competitiveness and low productivity of private capital • Low saving rates and absence of development banks to provide sufficient funds for implementing development
Opportunities	Threats
<ul style="list-style-type: none"> • Increased business opportunities for quality domestic firms due to prospective increase in foreign investments and business operations • Inflow of foreign investments by multinational companies in the mining sector • Railway upgrading between Moatize and Nacala Port for transporting coal • Inflow of foreign and domestic investments in the manufacturing sector • Increased demand for tourism, especially eco-tourism, historical and cultural tourism 	<ul style="list-style-type: none"> • Dissatisfaction and social unrest by people whose residential environments are adversely affected by development projects • Land conflicts between investors and rural communities, which might result in insecurity of food for local people and unsustainable development • Macro-economic instability of Mozambique • External shock to commodity prices including coal and natural gas • External shock to interest rates and currency exchange rates • Vulnerability to natural disasters, such as floods, droughts and cyclones in the Nacala Corridor Region • Rapid and unordered expansion of urban areas due to influx of migrants

Source: JICA Study Team

10.3 Sector Issues for Individual Sectors in the Nacala Corridor Region

A variety of problems were found in each sector (for both economic sectors and infrastructure sectors) based on data collection and field reconnaissance. These problems were analysed for defining issues to be tackled for each sector for the purpose of achieving development goals set by PEDEC-Nacala.

“Sector Issues” for different economic sectors, infrastructure sectors, urban sectors, environmental management sector and social sectors were defined and compiled in the main text for the Final Study Report. To solve those sector issues, objectives were defined and strategies were formulated for each sector. Those issues defined for each sector development are discussed in Chapters 14 through 18. The brief description of these sector issues is given in Tables 10.3.1 through 10.3.5.

On the other hand, it is important to consider how to define a set of “Overall Issues” to be tackled for formulating integrated development strategies, as described in the next section.

Table 10.3.1 Issues regarding Economic Sectors

Agricultural Sector	<ul style="list-style-type: none"> a. Small-scale farmers who practice family farming are dominant in the Nacala Corridor Region. Their agricultural productivity is relatively low. b. The small-scale farmers’ agriculture is land and labour intensive and requires shifting of cultivated lands and large fallow areas. c. Prices of existing agricultural products are relatively low partly because the transport conditions are poor and the producers are very far from large markets. d. Prices of existing agricultural products tend to be low partly because the products are of low quality and less diversified. e. Off-farm employment opportunities are also limited in rural areas. f. Farm lands and community lands are neither formally registered nor managed. In this situation, there is an increase in land disputes between local farmers and incoming investors, as well as those between villagers. g. There is no well-established value chain, including input supply, marketing, transport, warehousing, processing industries, and financing.
Forestry Sector	<ul style="list-style-type: none"> a. Railway from Lichinga- Cuamba-Nacala Port is essential for transporting fuel and machines to Lichinga and for transporting harvested timber and processed wood. The rehabilitation work for Lichinga-Cuamba Railway was started, in addition to the mail railway line between Cuamba and Nacala Port. However, its sustainable operation for transporting non-coal cargoes is a critical issue. b. Land conflicts between local communities and tree plantation companies have been increasing in the recent years. c. It seems that the policy for promoting the development of very large-scale tree plantation areas in Niassa Province might have serious local social impacts leading to increasing land conflicts. Due to this situation, the development of industrial tree plantations seems socially unsustainable for local communities and economically unsustainable for tree planting businesses. d. There is no sustainable forest management system to prevent uncontrolled and unnecessary deforestation. Strict regulation has not been well enforced regarding illegal logging and export. There are no clearly designated boundaries by which to prevent agricultural land expansion.
Mining Sector	<ul style="list-style-type: none"> a. Scientific and geological information on mineral resources is lacking, especially in geographically remote areas, discouraging investments in exploration of mineral resources. b. Poor infrastructure, especially infrastructure for transporting minerals to seaports, is discouraging investments in exploration and exploitation of mineral resources. c. Little linkage between large-scale mining projects and the local economy (including domestic companies and local personnel) because most mineral resources are exported as raw material. d. Lack of educated and trained personnel for the government’s mining sector, making it difficult to manage and guide private mining operations. e. Lack of educated and trained personnel who can work for private mining operations, making it difficult to take advantage of increasing employment opportunities for the beginning large-scale mining operations.

	<ul style="list-style-type: none"> f. Mining operation requires resettlement, which has often times caused significant problems for residents when the resettlement process is not appropriately implemented according to the regulations, although a set of regulations for resettlement were prepared recently by the government. g. Substantial environmental problems (coal dust, noise and community severance) are expected in transporting coal by railways, especially in the case of through traffic of coal trains in urban areas of Nampula.
Natural Gas	<ul style="list-style-type: none"> a. Although LNG production and export is the most profitable for natural gas developers, to the best method to promote development of chemical industries and construction of thermal power plants using natural gas are critical issues. b. For smooth and efficient extraction of natural gas from Area 1 and Area 2 of the offshore Rovuma Basin, it is necessary to develop an onshore support base in Pemba. c. For the development of chemical industries in northern Mozambique utilizing natural gas from Area 1 and Area 2 of Rovuma Basin, Palma and Nacala are preferable candidate coastal towns. However, the construction of a long-distance and costly pipeline between Palma and Nacala is required. d. On the other hand, if chemical industries are concentrated in Palma, it will be necessary to develop a support base for chemical industries in Palma because Palma does not have port facilities, electricity, water supply facilities, or urban areas strong enough to support economic and urban development. e. Once a recoverable reserve is discovered offshore of Pemba, Nacala would become a higher potential site for chemical industries. This case would require the construction of a gas pipeline between Pemba and Nacala.
Processing Industry Sector	<ul style="list-style-type: none"> a. Mozambique has imported a lot of processed goods because domestic processed goods are of low quality and their production is of low productivity, although Mozambique is rich in raw materials. b. Mozambique's domestic processing industries are lacking in technology for better quality and productivity for processing, resulting in difficulty in developing markets. c. Mozambique's domestic companies are not good at creating new business areas, resulting in limited contribution to economic development.
Logistics Sector	<ul style="list-style-type: none"> a. High Transportation Costs b. Increased Necessity of Road Maintenance for Transit Transport c. Insufficient Logistics Facilities and Services d. Necessity for Improvement of Customs Operation e. Necessity for Preparing for and Regulating International and Regional Transport on Railways
Tourism Sector	<ul style="list-style-type: none"> a. The number of tourists has not increased much in the Nacala Corridor Region. b. Most of the tourism resources, including the World Heritage Site of Mozambique Island, have not been utilized, while beach tourism resources in Cabo Delgado Province have been developed to a certain level. c. Private investments for developing tourism products and destinations, including accommodations, have been limited in the Nacala Corridor Region. Especially, investments in accommodation development have been limited because infrastructure (roads, electricity and water supply) to support accommodation development also has been limited. d. Training and education institutions for hospitality businesses exist in the Nacala Corridor Region, but their graduates have not been well utilized for existing hotels. e. Tourism Investment Zones (TIZ) are important tools for promoting private investments in tourism development for destinations, products and accommodations. However, proposed TIZs are far from major roads and access roads are not well developed. Moreover, electricity and water supply have not yet been developed for TIZs. f. Potential private investors are concerned about the difficulty in getting land for actual development, because local people still live in and communities still stay in the areas designated for TIZs. g. These issues mentioned above were essentially caused by the limited number of visitors to the Nacala Corridor Region. However, this situation started to change in recent years due to the large increase of international visitors related to the roaring mining businesses in Tete Province and Cabo Delgado Province.

Investment Promotion	<ul style="list-style-type: none"> a. No strategic measures with specific focus on certain sectors or geographical areas have been utilized for promoting private investment in Mozambique as a whole, or to the Nacala Corridor Region, except for Nacala SEZ. b. Investors and existing enterprises are attracted by the strategic location of Nacala because of Nacala Port and Nacala Corridor. However, other rather difficult problems for investors and industrial operators, such as poor infrastructure, difficulty in acquiring land use rights, and increasing crime have not been well resolved. c. For the Nacala Corridor Region, as well as Mozambique as a whole, the infrastructure capacity and management capacity for accommodating incoming investments and supporting actual operations to ensure productive operation is weak.
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Source: JICA Study Team

Table 10.3.2 Issues regarding Infrastructure Sectors

Roads	<ul style="list-style-type: none"> a. Inadequate Accessibility in Rural Areas b. Lack of Reliable Alternative Routes and Redundancy in the Region c. Lack of Suitable Urban Road Network d. Road and Traffic Safety Risk in Major Cities and Railway Level Crossings e. Limited Capacity for Road Maintenance. f. Limited Financial and Technical Capacity of Construction Contractors
Railways	<ul style="list-style-type: none"> a. How to realise benefits by upgrading of railways between Moatize and Nacala through Malawi for promoting development for the Nacala Corridor Region b. How to maintain or upgrade the line capacity of the railways and the railway cargo handling capacity c. How to deal with Social and Environmental Impacts of Coal Trains in Urban Areas d. How to efficiently deal with international operation of trains e. How to transport more non-coal cargoes over the Nacala Corridor Railway f. How to strengthen the railway line between Lichinga and Cuamba
Ports	<ul style="list-style-type: none"> a. Overall: Considering the variety of prospective development opportunities in the coastal areas of the Nacala Corridor Region, it is necessary to have a clear future vision, differentiated roles and functions of the seaports of Nacala Bay, Pemba and Palma in order to promote development of the Nacala Corridor Region. b. Seaports of Nacala Bay: The present Nacala Port does not have enough land or adjacent space to expand its capacity to accommodate the increasing demand for cargoes in the face of the Nacala Corridor Region's development in the future. Considering the possibilities 1) to establish an additional railway line for transporting coal from Tete and 2) to accommodate chemical industries in the coastal areas of Nacala Bay, it is necessary to develop the port facilities by using the whole of Nacala Bay. c. Pemba Port: It is necessary to determine the future roles of Pemba Port and its expansion by considering tourism resort development in Pemba Peninsula and its surrounding areas, the need to support the natural gas exploitation in Palma's offshore gas field, and the possibility of locating LNG plants and other chemical industries if further offshore natural gas reserves are discovered and confirmed near Pemba. d. The tourism resort base will be expanded in Pemba Peninsula and its surrounding areas. At the same time, Pemba Peninsula is expected to accommodate a support base for natural gas exploitation for a certain period. e. Natural Gas and Seaports: It is necessary to consider the roles of the seaports for supporting not only natural gas exploitation but also to support industrial chemical development using natural gas. The natural gas reserve has been confirmed only in the northern Area-1 and Area-4 of the Rovuma Basin. Currently, there is a possibility for Palma to accommodate LNG plants and chemical industries including methanol and ammonia. However, if natural gas reserves are confirmed in other areas in the Rovuma Basin, which are closer to Pemba and Nacala, Pemba and Nacala could accommodate LNG plants and other chemical industries using natural gas. f. Palma Port: Anadarko and other gas holders have secured land for LNG plants and their access to the sea. However, since there is no modern port facility in Palma Area at present, it is necessary to provide people and businesses with access to public port facilities and sea transport.

Water Resources	<ul style="list-style-type: none"> a. Lack of Meteorological and Hydrological Data b. Lack of Overall Water Resources Development Plan c. Difficulty in Implementing Integrated Water Resources Management
Power Sector	<ul style="list-style-type: none"> a. Shortage in Power Supply in Nacala Bay Area and Greater Nampula, in the Near Future b. Accident Risk and Power Loss due to Long Distance Transmission c. Obsolete Data Monitoring System of Power Supply
Telecommunications Sector	<ul style="list-style-type: none"> a. Communication Infrastructure: It is necessary to expand the optic fibre network from the backbone to growing areas. b. Coverage Area: Some Areas are not covered by telecommunications. It is necessary to increase the benefits by expansion of the coverage of telecommunications. c. Quality of Service: It is necessary to improve the quality of service of voice and data communication. d. TV Communication System: It is useful to establish and utilize a TV communication system between provincial governments.
Rural Water Supply	<ul style="list-style-type: none"> a. Two Different Indicators for Evaluating Water Supply Rates b. Usage of Unimproved Drinking Water Sources c. Inadequate Capacity for Maintenance of Boreholes with Hand Pumps d. Poor Hand Pump Spare Parts Supply Network

Source: JICA Study Team

Table 10.3.3 Issues regarding Urban Development

Urban Development of Nacala Bay Area	<ul style="list-style-type: none"> a. Rapid and disorderly urban expansion of Nacala b. Increased traffic congestion due to the poor road network and increasing development activities c. Poor integration of ongoing development projects: for example, port rehabilitation/upgrade projects and road development d. Little guidance regarding sites for industrial factories e. Inadequate economic infrastructure (electricity and water supply) to support not only current industrial development but also future industrial development f. Deteriorating residential environment due to increasing economic activities including port activities
Urban Water Supply for Nacala Bay Area	<ul style="list-style-type: none"> a. Current shortage of water resources available for urban water supply b. Relatively poor service level of water supply c. High cost of getting enough water for people's lives and industrial business operation d. Poor level of urban water supply to attract investors for manufacturing sectors for the future
Solid Waste Management for Nacala Bay Area	<ul style="list-style-type: none"> a. Currently there is not enough capacity to deal with the increasing volume of solid waste. b. The industrial waste from SEZ/IFZ without proper treatment would increase the risks for causing serious environmental damage.
Sewerage & Drainage for Nacala Bay Area	<ul style="list-style-type: none"> a. Currently there is no substantial coverage of a modern sewerage system in Nacala Bay Area b. Poor management and utilisation of septic tanks due to the lack of septage treatment facilities c. Poor level of sanitary situation and sewerage system to attract investment for establishing a 1st-Class City for Business, Industry and Tourism
Urban Development of Greater Nampula	<ul style="list-style-type: none"> a. Increased traffic congestion partly due to increased concentration of through traffic on national roads in the central area, such as National Road No.13 and National Road No.1 and partly due to rapidly increasing development activities b. Poor coordination between ongoing development projects: for example, poor coordination between the upgrading of the railway for coal transport and the improvement of railway crossings c. Rapid and disorderly urban expansion from Nampula Municipality toward surrounding districts d. Inadequate infrastructure (electricity and water supply) for supporting not only the present urban people's lives and economic activities, but also future urban development including economic development

	<ul style="list-style-type: none"> e. Deterioration of the residential environment because it is difficult to provide sufficient infrastructure for maintaining the quality of the residential environment f. Poor preparation of the central area of Nampula Municipality for fulfilling higher urban functions as the regional growth centre
Water Supply for Greater Nampula	<ul style="list-style-type: none"> a. Current shortage of water resources available for urban water supply not only for the present populations and economic activities, but also for the future populations and economic activities b. Relatively poor service level of water supply for the present populations c. High cost of getting enough water for people's lives and industrial business operation d. Poor level of urban water supply to attract investors for manufacturing sectors for the future
Sewerage & Drainage Systems for Greater Nampula	<ul style="list-style-type: none"> a. Currently small coverage of a modern sewerage system in Nampula Municipality b. Poor management and utilisation of septic tanks due to the lack of septage treatment facilities c. Poor level of sanitary situation, sewerage and drainage systems to attract investment for establishing a Regional Growth Centre
Urban Development of Cuamba City	<ul style="list-style-type: none"> a. Difficulty to manage through traffic on roads because the upgraded trunk road (National Road No.13) runs through the central area of the city b. Physical divide of urban areas by two railway lines: namely, Northern Railway (to be upgraded for coal transport) and Lichinba-Cuamba Railway Line (to be rehabilitated) c. Limited land for urban expansion due to the river running on the north side of the exiting urban area d. Weak infrastructure base for future economic development including manufacturing sectors
Urban Water Supply for Cuamba City	<ul style="list-style-type: none"> a. Current shortage of water resources available for urban water supply for the present populations, as well as for the future populations b. Relatively poor service level of water supply for the present populations c. Poor level of urban water supply to attract investors for the manufacturing sectors in the future
Sewerage & Drainage Systems for Cuamba City	<ul style="list-style-type: none"> a. Currently there is no modern sewerage system in Nampula Municipality b. Poor management and utilisation of septic tanks due to the lack of septage treatment facilities c. Inadequate level of sanitation situation, sewerage and drainage systems to attract investment for establishing an Inland Regional Logistics and Industrial Centre

Source: JICA Study Team

Table 10.3.4 Issues regarding Environmental Management

Environmental Management	<ul style="list-style-type: none"> a. Shortage of well-trained staff for administrating EIA in the MICOA and its provincial directorates, especially those for monitoring and guiding the implementation of environmental management plans b. Shortage of well-equipped facilities and well-trained technical staff for environmental monitoring and conducting laboratory tests in the MICOA and provincial governments c. High necessity of comprehensive establishment of the SEA administration and preparation of appropriate environmental considerations at an earlier planning stage while establishing policies/programmes and/or project consensus among various stakeholders d. High necessity for implementing sustainable development programmes, especially for rural people
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Source: JICA Study Team

Table 10.3.5 Issues regarding Social Services, Institutions and Social Development

Education Sector	<ul style="list-style-type: none"> a. Difficult Access to Primary/ Secondary Education b. Poor Quality of Primary/ Secondary Education c. Limitation of Government's Budget and Community Participation for Primary and Secondary Schools d. Disadvantages of Education Opportunities in the Region, especially Difficulty in Less Accessible Areas e. Gender Inequality
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Health Sector	<ul style="list-style-type: none"> a. Lack of Human Resources for Health Sector b. Poor Capacity of Health Facilities c. Difficulty in Providing Health Services due to Rapid Urban Growth and Expansion d. Communication Deficiency between Health Offices and Facilities e. Limited Knowledge of People regarding Health f. Negative Aspect of Transportation and Economic Development including rising HIV infection rates g. Lack of Accurate Information of Health Conditions and Needs in Rural Areas h. Vulnerability of Women
Human Resources	<ul style="list-style-type: none"> a. High and Increasing Demand for Human Resources in the Economic Sectors b. Large Gap in Demand and Supply especially in terms of Quality of Human Resources c. Insufficient Supply of Skilled Workers through TVET Systems d. Less Involvement of Local People in Training Provided by Large-Scale Projects e. Lack of Development of Human Resources due to Poor Development of Domestic Companies f. Insufficient Skills in Agriculture and Marketing of Agricultural Products g. Training Needed for Local Industries and Farmers. h. Shortage in Funding for TVET System
Institutions and Organizations	<ul style="list-style-type: none"> a. The existing coordination mechanisms are limited to the following types: <ul style="list-style-type: none"> ➤ Coordination mechanisms are among central organisations only ➤ Coordination mechanisms are within and among provinces only ➤ Coordination mechanisms are country-to-country initiatives, such as the Zambia-Malawi-Mozambique Growth Triangle (ZMM-GT) b. There are some opportunities where private sectors are involved, but they are not permanent arrangements. c. There is no mechanism in place at present to monitor and coordinate activities by all these stakeholders. d. There is no mechanism to promote community participation in the Nacala Corridor regional development. Such a mechanism becomes more important, especially when it comes to the implementation stage. e. No substantial impact of the gender mainstreaming policy in the Nacala Corridor Region has been felt yet in individual sectors. f. Concerning the state budget, the proportion of internal resources in investment at the central level budget is limited, with large dependence on external investment. g. At the provincial and district levels, the total amount as well as the proportion of investment in their budget is limited, leaving little allocation for new investment. h. A mechanism to give back tax and royalty revenues from economic activities to social and environmental needs in the Nacala Corridor Region is required.
Social Development	<ul style="list-style-type: none"> a. Land Conflicts due to Land Transfer and Resettlement b. Difficulty in Maintaining Food Security of Small-Scale Farmers c. Poor or Limited Support for Small-Scale Farmers' Agriculture d. Importance of Employment Creation and Industrial Promotion in Urban Areas e. Regional Disparity, especially, Difficulty in Less Accessible Areas f. Women's Poverty, Employment and Food Security

Source: JICA Study Team

10.4 Overall Issues for the Nacala Corridor Region

A set of overall issues for promoting development in the Nacala Corridor Region is defined. The overall issues are interrelated with each other. They are summarised below in this section.

(1) Poor Transportation Conditions and Difficulties in Promoting Regional Development

Although the Nacala Corridor Region has various potential, it was difficult to utilise them for economic development in the past. Especially, vast inland areas had poor access to markets, major cities or seaports, due to poor conditions of roads and railways. In the Nacala Corridor Region as a whole, economic sector development has been stagnant so as to create a low level of transport demand for roads, railways and seaports. As a result, transport infrastructure has gradually become deteriorated and has remained unrehabilitated. Transport costs continued to be generally high.

(2) Upgrading of Transport Corridors by Utilising Private-Sector Initiatives

In relation to the issues mentioned above, finding a way to assure the start-ups and sustainability of the operation of the upgraded railway for coal transport from Tete to Nacala Port are the most important issues among the various issues. This issue is very critical because the upgraded railway for coal transport might have seriously negative environmental and social impacts (coal dust, vibration, noise and interruption of road traffic) along the railway line, especially in the central areas of Nampula and Cuamba. It is necessary to implement effective mitigation measures on these environmental and social problems.

Taking advantage of the upgraded railway transport, as well as upgraded trunk roads, transporting non-coal cargoes for the purpose of supporting regional development is another key issue. The establishment of multi-modal integration in cargo transport could contribute to creation of development opportunities and potential for diversified economic sectors in the Nacala Corridor Region.

(3) Promotion of Further Economic Development

It is true that the upgraded transport corridor could enhance development potentials not only in the commerce and logistics sectors, but also in the manufacturing, tourism, agriculture and forestry sectors. However, the upgraded multi-modal transport corridor alone is not enough to improve the business environment for various sectors. Other conditions should be improved.

For example, manufacturing sectors are one of the promising sectors that have increased development potentials due to the upgraded transport corridor. However, they should be supported by a certain quality of electricity and water supply, as well as telecommunications.

The issue of economic development is how to support the development of economic sectors, including by additional infrastructure provision and implementing other soft measures, in order to take advantage of enhanced development potentials due to the upgraded transport corridor.

(4) Region-Wide Transport Corridor and Regional Development

One of the basic issues to be tackled is development of a region-wide and sustainable transport network, which integrates inland areas with seaports, as well as with major urban centres. At the same time, it is necessary to consider how to create transport demand large enough to support such a region-wide transport network.

(5) Inclusive Development to Support Dynamic Development

With economic development strategies to capitalise on the private sector initiatives for upgrading the railway, it is not always possible to tackle a variety of development issues related to social, environmental, human resources and institutional aspects. The following particular issues are important to seek “Dynamic and Inclusive Development”:

- Environmental and social problems to be caused by the upgrading of the railways and the provision of economic infrastructure, such as electricity and water supply
- Land disputes between investors and small-scale farmers, as well as those among rural community members, in the situation of increasing land-based investments
- Increasing necessity to provide prospective economic sectors with more educated and trained human resources Necessity for an institutional mechanism for coordination between different sectors and different actors in promoting regional development

In addition, many social and environmental problems might arise in the course of rapid and large-scale development in the Nacala Corridor Region. It is necessary to address the emerging problems due to development activities, including the following:

- Increasing resettlements due to infrastructure development
- Rapid influx of migrants to urban areas
- An increase in prevailing communicable diseases due to increasing mobility of people and goods
- Environmental pollution due to industrial development
- Urban solid wastes due to large increase in urban population
- Impact on traditional social and cultural values due to modernisation and urbanisation

(6) Inclusive Development Considering Socially Vulnerable People and Geographically Less Accessible Areas

There are various stakeholders in the Nacala Corridor regional development, such as farmers in rural areas, workers in urban areas, local business people and SMEs, foreign investors, government officers and politicians. There are people of different income levels from the poor to the rich. While there are people living in urban areas, there are others living in rural areas and less accessible areas. Prospective economic development does not automatically bring opportunities to socially vulnerable groups of people in the Nacala Corridor Region.

Underdevelopment of inland areas has been serious in the Nacala Corridor Region. This is partly because there are difficulties in providing basic infrastructure and services due to its remoteness and low population density. Since the transport corridors consisting of trunk roads, railways and seaports would be upgraded, such situation of underdevelopment due to remoteness could be somewhat improved. However, even after the upgrading of transport corridors, some less accessible areas would remain underdeveloped.

Therefore, one of the most difficult and fundamental issues is how to tackle such underdevelopment problems of less accessible areas and vulnerable people, which might continue to remain even after the successful upgrading of the transport corridors and related regional development.

(7) Development of Urban Centres

Urban centres play an important role in economic development not only as the distribution centres of goods and services for the surrounding areas but also as the bases for manufacturing production. In the Nacala Corridor Region, there are a number of major urban centres, such as the provincial capitals (Nampula, Lichinga, Pemba and Tete) and strategically important urban centres, such as Nacala, Cuamba and Mocuba. It is necessary to designate and develop appropriate functions in different urban centres of the Nacala Corridor Region for promoting well-balanced region-wide development.

How to put priority on different urban centres and how to implement necessary investment in the development of selected urban centres with the priority on strategically promoting urban centre development in the Nacala Corridor Region, is an important issue.

(8) Environmental Protection and Environmental Management

It is inevitable that a development initiative with such a magnitude as the Nacala Corridor Region's development would affect the environment in some ways. The existing momentum of development should be maintained to the extent possible, while negative impacts of development activities should be minimised or adequately mitigated.

The main issue regarding the environment is how to promote environmental protection and environmental management in the context of increasing economic and development activities. Enforcement of environmental laws and regulations is essential, and proactive implementation of mitigation measures for expected environmental impacts is also important.

(9) Promotion of Agricultural Development across Wide Areas

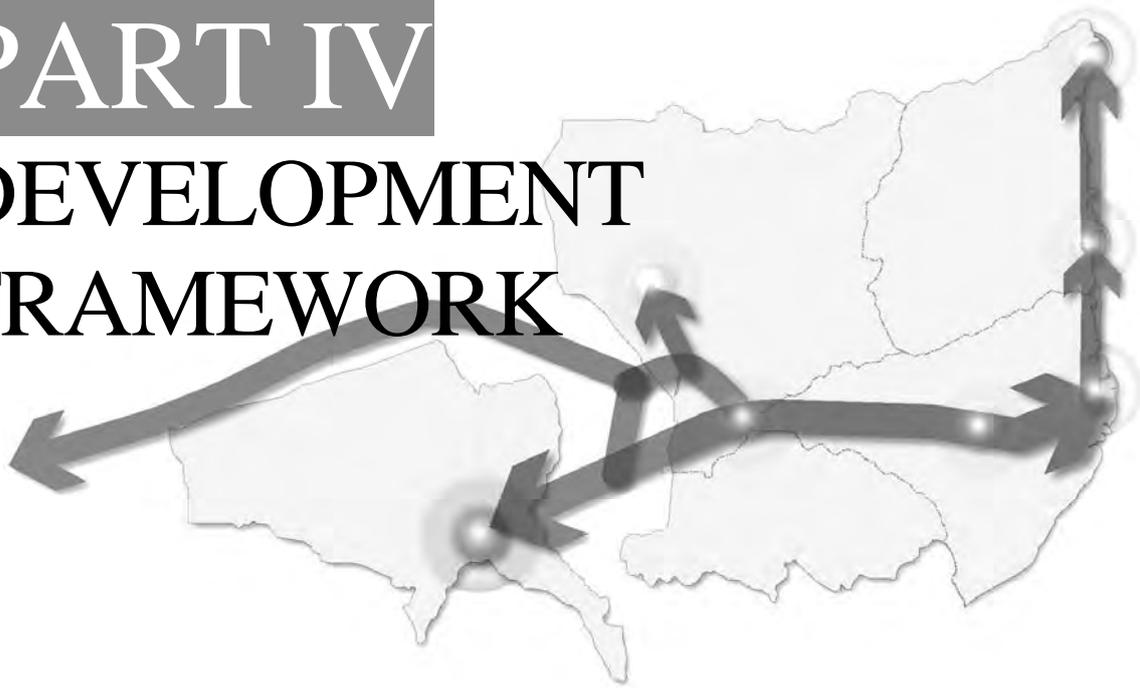
Since the Nacala Corridor Region covers a huge area, which account for 440 thousand km², the accessibility to major roads and urban centres is not good in many areas. The majority of the region's populations live on agriculture in rural areas and they live across wide areas. How to provide support to small-scale farmers not only in agricultural production but also in protection of their land rights, and how to create a value chain for agriculture in these wide areas are critical issues.

(10) Long-Term Sustainability of the Transport Corridor

The expected upgrading of the transport corridors would be initiated and supported by private-sector coal mining. In the next 30 years or so, it might be possible to maintain this situation. However, when it comes to very long-term sustainability beyond 30 years or 50 years, it is necessary to promote diversified regional economies and to generate transport demand large enough to sustain the function of the international and regional transport corridors. For this purpose, regional economic development should be promoted widely not only in inland areas of Northern Mozambique, but also Malawi and the Eastern and Central Provinces of Zambia. This is a very important issue in the very long term.

PART IV

DEVELOPMENT FRAMEWORK



Chapter 11 Socioeconomic Framework

11.1 Target Years for the Socioeconomic Framework for the Nacala Corridor Region

A future socioeconomic framework for the Nacala Corridor Regions is set by the following three parameters for the target years:

- Population by Province
- Gross Regional Domestic Product (GRDP)
- Labour Force by Province

The socioeconomic framework was prepared for formulating the regional development strategies for the Nacala Corridor Region. The socioeconomic framework covers population and economy. The socioeconomic framework indicates the foreseeable level of population growth and economic development as a result of the Nacala Corridor regional development. It is an indicative framework rather than definitive forecast.

The target years for the development strategies for the Nacala Corridor Region were set as follows:

- Short-Term Target Year: Year 2017
- Medium-Term Target Year: Year 2025
- Long-Term Target Year: Year 2035

The short-term target year was set at 2017 in consideration of the progress and prospects of a number of major projects in the Nacala Corridor Region, such as the Nampula-Cuamba trunk road upgrading, Lichinga-Montepuez trunk road upgrading, Moatize-Nacala railway upgrading, Nacala Port rehabilitation/upgrading and off-shore natural gas production in Cabo Delgado Province. These projects are planned to be completed and enter into operation by around 2017 to 2018. Immediate actions need to be taken by this time to link these projects with regional development.

The long-term target year is set at 2035. The year 2035 is the target year used by the National Development Strategy (ENDE), which is prepared by the MPD.

The medium-term target year is set at 2025, 10 years before 2035.

11.2 Population Framework for the Nacala Corridor Region

11.2.1 Population Projection at the National Level

In order to conduct the population projection in the Nacala Corridor Region, the two existing projections are taken in account.

(1) INE's Population Projection

In 2010, INE released the demographic projection of Mozambique during 2007-2040 by province and district level, which is based on the population projection programs of Rural-Urban Projections (RUP) and Aggregation of RUP Projections (RUPAGG) developed by the Bureau of the Census of the United States. Basic parameters of this projection are shown in the table below.

Table 11.2.1 Basic Parameters of INE's Population Projection

	2007	2010	2015	2020	2025	2035
Population (1,000)	20,632	22,417	25,728	29,310	33,165	41,554
Total Fertility Rate	5.7	5.6	5.2	4.8	4.3	3.5
Crude Birth Rate (per 1,000 persons)	42.2	41.6	39.3	36.3	33.4	29.0
Crude Death Rate (per 1,000 persons)	14.6	13.7	12.4	10.9	9.4	7.3
Annual Growth Rate (%)	(1997-07) 2.53	(2007-10) 2.80	(2010-15) 2.79	(2015-20) 2.64	(2020-25) 2.50	(2025-35) 2.28

Source: INE, Population Projection 2007-2040

(2) UN Population Projection

The Population Division, Department of Economy and Social Affairs of the United Nations, as part of the "World Population Prospects: The 2011 Revision" shows a population projection, which is composed of four growth patterns, namely: low variant, medium variant, high variant and constant-fertility variant. Table 11.2.2 and Table 11.2.3 indicates the basic parameters of each growth pattern.

Table 11.2.2 UN Population Projections

	Growth Scenario	2000	2005	2010	2015	2020	2025	2030	2035
Population (1,000)	Low	18,201	20,770	23,391	25,946	28,567	31,253	34,046	36,786
	Medium	18,201	20,770	23,391	26,162	29,177	32,439	35,907	39,459
	High	18,201	20,770	23,391	26,378	29,788	33,625	37,772	42,161
	Fixed TFR	18,201	20,770	23,391	26,494	30,247	34,733	40,020	46,214
Annual Growth Rate (%)	Low	-	2.6	2.4	2.1	1.9	1.8	1.7	1.6
	Medium	-	2.6	2.4	2.2	2.2	2.1	2.0	1.9
	High	-	2.6	2.4	2.4	2.4	2.4	2.3	2.2
	Fixed TFR	-	2.6	2.4	2.5	2.7	2.8	2.8	2.9

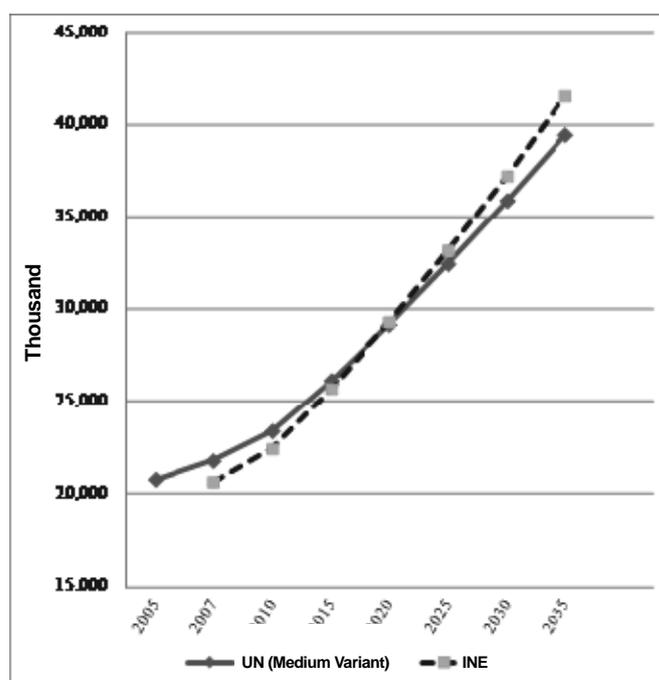
Source: UN Population Division, 2011, "World Population Prospects: The 2011 Revision," UN

Table 11.2.3 Parameters of the UN Population Projection

	Growth Scenario	1995-00	2000-05	2005-10	2010-15	2015-20	2020-25	2025-30	2030-35
Total Fertility Ratio (TFR, per person)	Low	5.9	5.5	5.1	4.5	3.9	3.5	3.2	2.9
	Medium	5.9	5.5	5.1	4.7	4.3	4.0	3.7	3.4
	High	5.9	5.5	5.1	5.0	4.7	4.5	4.2	3.9
	Fixed TFR	5.9	5.5	5.1	5.1	5.1	5.1	5.1	5.1
Crude Birth Rate (per 1,000 persons)	Low	43.3	43.3	39.4	34.5	31.6	29.5	28.0	25.9
	Medium	43.3	43.3	39.4	36.3	34.3	32.8	31.1	29.0
	High	43.3	43.3	39.4	38.1	36.9	35.9	33.9	31.9
	Fixed TFR	43.3	43.3	39.4	39.0	39.2	39.4	39.0	38.6
Crude Death Rate (per 1,000 persons)	Low	17.6	16.7	15.4	13.7	12.2	11.4	10.8	10.3
	Medium	17.6	16.7	15.4	13.8	12.4	11.5	10.7	10.1
	High	17.6	16.7	15.4	13.9	12.5	11.5	10.6	9.9
	Fixed TFR	17.6	16.7	15.4	14.0	12.6	11.6	10.6	9.8

Source: UN Population Division, 2011, "World Population Prospects: The 2011 Revision," UN (<http://www.un.org/esa/population/unpop.htm>)

As shown below, the projected population by INE is larger than that of the UN population division (medium variant) after 2020. This is mainly due to the difference in projected fertility rates and crude birth rates.



Source: JICA Study Team

Figure 11.2.1 Comparison of INE and UN Population Projections

11.2.2 INE's Population Projection in the Nacala Corridor Region

As shown in Table 11.2.4, the population in the Nacala Corridor Region including only seven northern districts of Zambezia amounted to 21,348 thousand in 2035. Among the provinces in the Nacala Corridor Region, the population of Nampula Province is projected to be the largest at 7,503 thousand, followed by Tete (4,964 thousand), seven districts of Zambezia (3,263 thousand), Niassa (3,182 thousand) and Cabo Delgado (2,437 thousand).

Table 11.2.4 INE's Population Projection by Province in the Nacala Corridor Region

Unit: Persons

Province	2007	2010	2015	2017	2020	2025	2035
Niassa	1,213,398	1,360,645	1,656,906	1,789,120	1,998,357	2,369,662	3,182,358
Cabo Delgado	1,634,162	1,731,200	1,893,156	1,952,341	2,036,785	2,173,123	2,436,668
Nampula	4,084,656	4,414,144	5,008,793	5,251,293	5,618,332	6,239,418	7,503,201
Zambezia*	1,808,220	1,968,621	2,252,704	2,365,234	2,529,710	2,786,750	3,262,818
Tete	1,807,485	2,050,242	2,517,444	2,723,010	3,049,800	3,638,891	4,963,508
Nacala Corridor Region	10,547,921	11,524,852	13,329,003	14,080,998	15,232,984	17,207,844	21,348,553
Other Area	10,084,513	10,892,029	12,398,908	13,047,532	14,077,490	15,957,152	20,205,181
Whole Country	20,632,434	22,416,881	25,727,911	27,128,530	29,310,474	33,164,996	41,553,734

Source: INE, Population Projection 2007-2040

Note: *Population from northern 7 districts in Zambezia

Table 11.2.5 shows the comparison of INE's population growth rates by province in the Nacala Corridor Region and UN's growth rates in the whole country.

The annual growth rates by INE between 2007-2010, 2010-2015, 2015-2020, 2020-25 and 2025-35 in the Nacala Corridor Region are 3.00%, 2.95%, 2.71%, 2.47% and 2.18%, respectively. On the other hand, the annual growth rates between 2007-2010, 2010-2015, 2015-2020, 2020-25 and 2025-35 in the whole country are 2.80%, 2.79%, 2.64%, 2.50% and 2.28%, respectively.

As for UN's projection with high variance, the annual growth rates between 2010-2015, 2015-2020, 2020-25 and 2025-35 in the whole country are 2.43%, 2.46%, 2.45 and 2.29%, respectively.

It should be noted that population growth rates in the Nacala Corridor Region are higher than the national growth rate until 2020 and also higher than the high-variance fertility pattern of UN projection until 2025.

Table 11.2.5 Comparison of INE's Population Growth Rates by Province in the Nacala Corridor Region and UN's Growth Rates of the Whole Country

(1) Annual Growth Rate (%) of the Provinces by INE's Projection

	97-07	07-10	10-15	15-20	20-25	25-35	07-35
Niassa	4.13	3.89	4.02	3.82	3.47	2.99	3.50
Cabo Delgado	1.70	1.94	1.80	1.47	1.30	1.15	1.44
Nampula	2.92	2.62	2.56	2.32	2.12	1.86	2.20
Zambezia*	2.88	2.87	2.73	2.35	1.95	1.59	2.13
Tete	3.96	4.29	4.19	3.91	3.60	3.15	3.67
Nacala Corridor Region	3.01	3.00	2.95	2.71	2.47	2.18	2.55
Other Area	2.04	2.60	2.63	2.57	2.54	2.39	2.51
Whole Country	2.53	2.80	2.79	2.64	2.50	2.28	2.53

Source: INE Population Projection 2007-2040

(2) Annual Growth Rate (%) of the Whole Country by UN's Projection

Pattern	-	05-10	10-15	15-20	20-25	25-35	05-35
Medium variance	-	2.41	2.26	2.21	2.14	1.98	2.16
High variance	-	2.41	2.43	2.46	2.45	2.29	2.39

Source: UN Population Division, 2011, "World Population Prospects: The 2011 Revision," UN

<http://www.un.org/esa/population/unpop.htm>

Note: *Population from northern 7 districts in Zambezia

Table.11.2.6 shows major demographic indicators of INE's population projection by province in the Nacala Corridor Region.¹

Table 11.2.6 Major Indicators of INE's Population Projection by Province in the Nacala Corridor Region

(1) Total Fertility Rate (per person)

	2007	2010	2015	2020	2025	2030	2035
Niassa	6.9	6.8	6.4	5.8	5.1	4.3	3.9
Cabo Delgado	5.7	5.6	5.2	4.6	4.1	3.6	3.2
Nampula	5.8	5.6	5.2	4.6	4.1	3.6	3.3
Zambezia	6.4	6.3	5.9	5.3	4.7	4.0	3.7
Tete	6.9	6.8	6.5	6.0	5.4	4.7	4.5
Whole Country	5.7	5.6	5.2	4.8	4.3	3.8	3.5

(2) Crude Birth Rate (per 1,000)

	2007	2010	2015	2020	2025	2030	2035
Niassa	47.7	48.2	45.9	41.2	36.3	32.1	30.3
Cabo Delgado	41.2	40.7	37.6	33.9	31.0	28.5	26.8
Nampula	42.2	41.6	38.8	35.0	31.5	28.4	26.6
Zambezia	46.1	45.9	43.2	39.1	35.0	31.4	29.7
Tete	46.3	46.3	44.7	41.9	38.5	34.9	34.0
Whole Country	42.2	41.6	39.3	36.3	33.4	30.5	29.0

(3) Crude Death Rate (per 1,000)

	2007	2010	2015	2020	2025	2030	2035
Niassa	14.5	13.3	11.1	9.4	7.9	6.9	6.1
Cabo Delgado	16.5	16.1	15.7	14.2	12.4	10.9	9.7
Nampula	13.4	12.8	12.0	10.7	9.3	8.2	7.4
Zambezia	14.5	13.9	12.8	11.3	9.7	8.5	7.6
Tete	14.0	12.6	10.9	9.3	8.0	6.9	6.1
Whole Country	14.6	13.7	12.4	10.9	9.4	8.3	7.3

Source: INE, Population Projection 2007-2040

Reviewing INE's population projection, the three indicators used for the provincial population projection do not take into consideration the future provincial social migration.

Additionally, the past population change in Mozambique has been affected greatly by the Mozambican Civil War and therefore the population increase occurring between 1997 and 2007 in some areas are assumed to be caused by returning citizens who evacuated during the war. However, since the social migration is not part of the indicator, the crude birth rate in provinces such as Niassa, Zambezia and Tete may be much higher than they actually are.

11.2.3 Population Projection in the Nacala Corridor Region by Province

(1) Method of Projection

For the future population framework of the Nacala Corridor Region, it is also necessary to consider the development planned in each province based on PEDEC-Nacala strategies.

¹ INE experts indicate that Population Projection 2007-2040 is the first trial for the long-term population estimation in Mozambique. As a result, it is said that at the national level the projections are rather accurate, but, at the provincial and district levels, some projections may vary mainly due to the lack of the exact past trend of population at the lower administrative levels.

Consequently, the INE's population projection has been revised for each province in the Nacala Corridor Region with the following perspectives:

- Niassa Province will continue to have higher crude birth rates than the other provinces, but considering the development of other provinces, out-migration will occur.
- It is assumed that the Cabo Delgado Province has been experiencing out-migration in the past, but with the development expected to occur in Pemba and Palma, the out-migration population is expected to decrease.
- Nampula Province has a lower TFR compared to other provinces due to its urban population, but it is expected that in-migration will occur with the development of the Nacala Corridor in Greater Nampula and Nacala Bay Area.
- The expected phenomenon in the northern seven districts of the Zambezia Province will be similar to that of the Niassa Province.
- Tete Province will continue its current trend with high TFR and in-migration, but Tete Province will have lower TFR than projected by INE.

The total population projection of Mozambique by INE was used for the future socioeconomic framework since the country's population projection does not need to consider migration between provinces. The adjusted population growth rate for each province can be seen in Table 11.2.7.

Table 11.2.7 Adjusted Population Growth Rates by Province in the Nacala Corridor Region

Province	Unit: %							
	97-07	07-10	10-15	15-17	17-20	20-25	25-30	30-35
Niassa	4.14	3.53	3.34	3.07	2.87	2.56	2.18	1.79
Cabo Delgado	1.70	2.21	2.30	2.28	2.26	2.24	2.20	2.17
Nampula	2.92	3.08	2.99	2.69	2.69	2.48	2.22	1.97
Zambezia*	3.59	3.11	2.98	2.62	2.62	2.37	2.06	1.76
Tete	3.96	4.11	4.00	3.66	3.66	3.44	3.15	2.87
Nacala Corridor Region	3.13	3.18	3.11	2.82	2.82	2.62	2.38	2.13
Other Area	1.93	2.41	2.48	2.41	2.41	2.36	2.31	2.25
Whole Country	2.53	2.80	2.81	2.63	2.63	2.50	2.34	2.19

Source: JICA Study Team based on INE's Statistics 2007 Population and Housing Census

Note*: Population from northern 7 districts in Zambezia

(2) Result of Projection

Table 11.2.8 indicates the result of the population projections and population growth rates of the Nacala Corridor Region by province until 2035.

Table 11.2.8 Population Projection by Province in the Nacala Corridor Region

	Population (1,000)				Annual Growth Rate (%)	
	2007	2017	2025	2035	2007-2025	2007-2035
Niassa Province	1,213	1,686	2,083	2,535		
Annual Growth Rate (%)	-	3.3%	2.7%	2.0%	3.0%	2.7%
Cabo Delgado Province	1,634	2,046	2,444	3,034		
Annual Growth Rate (%)	-	2.3%	2.2%	2.2%	2.3%	2.2%
Nampula Province	4,085	5,480	6,707	8,252		
Annual Growth Rate (%)	-	3.0%	2.6%	2.1%	2.8%	2.5%
Zambezia Province*	1,808	2,425	2,946	3,561		
Annual Growth Rate (%)	-	3.0%	2.5%	1.9%	2.7%	2.4%
Tete Province	1,807	2,675	3,528	4,747		
Annual Growth Rate (%)	-	4.0%	3.5%	3.0%	3.8%	3.5%
Nacala Corridor Region	10,548	14,312	17,707	22,129		
Annual Growth Rate (%)	-	3.1%	2.7%	2.3	2.9%	2.7%
Other Area	10,084	12,846	15,508	19,425		
Annual Growth Rate (%)	-	2.4%	2.4%	2.3%	2.4%	2.4%
Mozambique	20,633	27,158	33,215	41,554		
Annual Growth Rate (%)	-	2.8%	2.5%	2.3%	2.7%	2.5%

Source: JICA Study Team based on INE's Statistics and 2007 Population and Housing Census

Note*: Population from northern 7 districts in Zambezia

11.2.4 Population Projection of Selected Municipalities/Districts in the Nacala Corridor Region: 2025 and 2035

PEDEC-Nacala identified the following areas as municipalities with urgent need for planning due to their prospective roles as growth poles in the Nacala Corridor Region:

- Nacala Bay Area consisting of the territories of Nacala Municipality, Nacala-a-Velha District and adjoining areas
- Greater Numpula area consisting of the territory of Nampula Municipality with adjoining areas,
- Cuamba City consisting of the entire administrative area of Cuamba Municipality which is the urbanised area in Cuamba District
- Tete-Moatize area
- Lichinga Municipality area
- Pemba Municipality area

The projected population growth rates of these municipalities and districts, which are shown in Table 11.2.9, are based on the INE's projection adjusted by the growth rate of the whole province.

Table 11.2.9 Population Projection of Selected Municipalities in the Nacala Corridor Region

Municipality/District	Province	Population (1,000)					Annual Growth Rate (%)	
		1997	2007	2017	2025	2035	2007-2025	2007-2035
Cidade de Lichinga	Niassa	86	142	241	336	467		
Annual Growth Rate (%)		-	5.6%	5.1%	4.2%	3.4%	4.4%	4.0%
Cuamba*	Niassa	57	79	133	189	267		
Annual Growth Rate (%)		-	3.3%	5.4%	4.4%	3.5%	5.0%	4.4%
Cidade de Pemba	Cabo Delgado	85	168	219	312	474		
Annual Growth Rate (%)		-	5.0%	4.6%	4.6%	4.3%	4.6%	4.5%
Cidade de Nacala-Porto	Nampula	158	212	319	440	635		
Annual Growth Rate (%)		-	3.0%	4.2%	4.1%	3.7%	4.1%	4.0%
Cidade de Nampula	Nampula	303	484	729	941	1,180		
Annual Growth Rate (%)		-	4.8%	4.2%	3.2%	2.3%	3.8%	3.2%
Nacala-a-Velha	Nampula	78	91	131	189	300		
Annual Growth Rate (%)		-	1.6%	3.7%	4.7%	4.7%	4.1%	4.4%
Cidade de Tete	Tete	102	156	230	303	409		
Annual Growth Rate (%)		-	4.3%	4.0%	3.5%	3.0%	3.8%	3.5%
Moatize*	Tete	27	39	68	104	158		
Annual Growth Rate (%)		-	3.9%	5.7%	5.5%	4.3%	5.6%	5.1%

Source: JICA Study Team based on 2007 Population and Housing Census

Note*: Based on urban population in 2007

11.2.5 Labour Force Projection for the Nacala Corridor Region

Table 11.2.10 shows the projection of the number of economically active population (or labour force) by economic sector in the Nacala Corridor Region in 2017, 2025 and 2035. This calculation is based on the projection of (i) GRDP by economic sector in the Nacala Corridor Region, which is discussed in the next section, and (ii) per capita labour productivity (value added amount divided by number of workers in the labour force) utilizing INE's labour force survey in 1997 and 2007. It should be noted that the numbers of workers in agriculture, livestock, fishery & forestry will gradually decrease, while those of manufacturing, construction and services will be increasing instead.

Table 11.2.10 Labour Force Projection by Economic Sector in the Nacala Corridor Region

Economic Sector	2007		2011		2017		2025		2035	
	Labour Force (1,000 persons)	Share (%)	Labour Force (1,000 persons)	Share (%)	Labour Force (1,000 persons)	Share (%)	Labour Force (1,000 persons)	Share (%)	Labour Force (1,000 persons)	Share (%)
Agriculture, Livestock, Fishery & Forestry	3,249	84.8	3,701	84.6	4,390	83.7	5,535	81.7	7,382	76.8
Mining	12	0.3	12	0.3	20	0.4	52	0.8	72	0.7
Manufacturing	90	2.3	117	2.7	135	2.6	204	3.0	385	4.0
Energy	4	0.1	4	0.1	6	0.1	9	0.1	22	0.2
Construction	49	1.3	57	1.3	73	1.4	111	1.6	281	2.9
Commerce & Finance	259	6.8	300	6.9	374	7.1	520	7.7	792	8.2
Transport & Communication	19	0.5	29	0.7	28	0.5	39	0.6	79	0.8
Other Services	151	3.9	149	3.4	218	4.2	303	4.5	621	6.4
Total	3,833	100.0	4,369	100.0	5,243	100.0	6,772	100.0	9,635	100.0

Source: JICA Study Team based on INE's statistics

Note: For all of the economic sectors except agriculture and mining, it is assumed that labour productivity will annually increase by 3%. In agriculture, it is assumed that labour productivity will annually increase by 4% until 2025, then by 3% until 2035. Number of workers in the mining sector is a preliminary figure.

11.3 Economic Framework for the Nacala Corridor Region

11.3.1 GDP and GRDP Growth in the Existing Plans and Projections

In order to set the GRDP growth targets in the Nacala Corridor Region in 2025 and 2035, the following existing development plans or projections were reviewed and analysed:

- Action Plan for Reducing Poverty (PARP): 2011–2014
- National Development Strategies (ENDE): 2015-35²

(1) Action Plan for Reducing Poverty (PARP): 2011–2014

PARP states that growth in itself does not guarantee the distribution of wealth or poverty reduction. Also, RARP estimates the incidence of absolute poverty will reduce from 55% of the population in 2009 to 42% in 2014, assuming the growth of per capita consumption of 5% annually, with a neutral effect on income distribution. If the economy does not achieve growth rates equal to or greater than 5% per year, the goal cannot be achieved. Thus, the following annual growth rates as shown in Table 11.3.1 are targeted.

Table 11.3.1 GDP Growth and Other Indicators by PARP

	2009	2010	2011	2012	2013	2014
Real GDP (2003 constant prices)	172,054	183,207	196,826	212,058	228,552	246,112
Annual Growth Rate (%)	6.4%	6.5%	7.4%	7.7%	7.8%	7.7%
Real GDP per Capita (thousand MT)	8.1	8.4	8.9	9.3	9.8	10.3
Nominal GDP (million MT)	269,346	323,226	375,170	426,719	485,662	552,264
Annual Growth Rate (%)	12.1%	20%	16.1%	13.7%	13.8%	13.7%
Nominal GDP per Capita (thousand MT)	34.8	40.8	46.2	51.3	57.1	63.4
Inflation Rate (% Annual Average)	3.3%	12.7%	8.0%	5.6%	5.6%	5.6%
Exchange Rate (Annual Average)	26.7	32.6	32.9	33.6	35.7	38.3

Source: PARP (Action Plan for Reducing Poverty), 2011-2014

(2) National Development Strategies (ENDE): 2015-35

According to the ENDE, the current structure of the economy shows that Mozambique has considerable potential to accelerate economic growth. In this perspective, the ongoing effort to achieve the goals of development and poverty eradication must be taken into account. For this the government must mobilize financial resources to promote public investment in strategic sectors without losing sight of issues crowding out private investment and debt sustainability and pursue a monetary and exchange policy geared to maintaining low and stable inflation over the medium and long term, avoiding instability in economic growth, interest rates and the exchange rate.

As socioeconomic indicators and targets, the ENDE is forecasting an average annual growth of about 7.4% during the period 2011-2035 due to the contributions of the sectors of agriculture, manufacturing, mining, transport and communication, construction and electricity and water. The growth rate in the final draft is very conservative since the contribution of natural gas production is not included.

² The National Development Strategy 2015-2035 was approved in June 2014 by the Government of Mozambique.

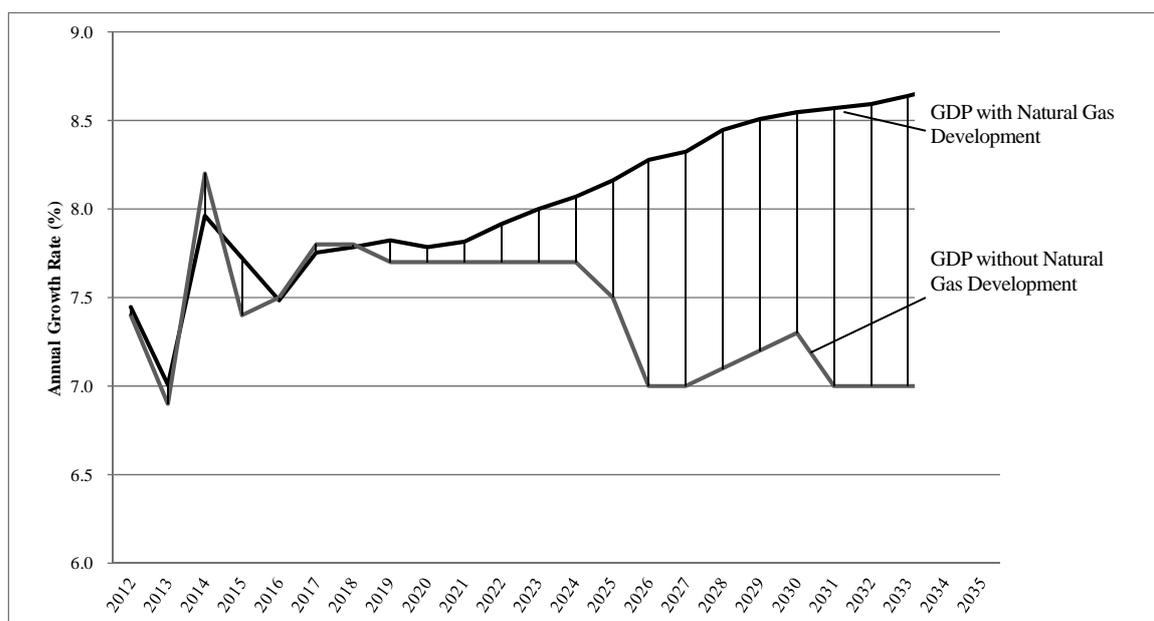
The ENDE stresses that the expansion of the production of the Moatize coal, natural gas and other mineral resources will lead to the growth of exports and that the dynamic growth of the transportation and communications sector is expected through the implementation of the integrated infrastructure and transport system which will serve primarily to connect the inland areas of South Africa, Zimbabwe and Malawi to the sea. Also, the ENDE emphasizes the importance of the industrial sector as a means to realize social equity.

Table 11.3.2 shows (i) GDP projection at the stage of the April 2013 draft of ENDE, which includes the natural gas production, and (ii) the GDP projection in the final draft of ENDE, which does not include the natural gas development. Therefore, the major part of the difference between the two line-graphs (slightly less than 2% points at most) shows the effects of the natural gas production.

Table 11.3.2 Selected Socioeconomic Indicators of ENDE: 2011-2035

Item	Unit	Year			
		2011	2017	2025	2035
With Natural Gas Development					
GDP (in 2003 prices)	million MT	177,772	275,304	506,526	1,149,171
Annual Growth Rate (%)		7.3	7.8	8.2	8.8
Without Natural Gas Development					
GDP (in 2003 prices)	million MT	177,772	274,855	497,079	984,241
Annual Growth Rate (%)		7.3	7.8	7.5	7.1

Source: ENDE (National Development Strategies) , 2013, Draft, MPD



Source: JICA Study Team based on the data from MPD

Notes: (1) GDP projection at the stage of the April 2003 draft of ENDE includes natural gas production. On the other hand, GDP projection in the final draft of ENDE does not include natural gas development.

(2) The projected annual growth rate is based on 2003 constant prices

Figure 11.3.1 Projected Annual GDP Growth Rates between 2012 and 2035

(3) Province-Wise Projections

Table 11.3.3 shows the targeted or projected growth rate by 5-year provincial plans or strategic plans in the Nacala Corridor Region. Most of the provinces are expected to be at 8-10 % annual growth for the coming 10 years.

Table 11.3.3 Targeted or Projected Growth Rate of GRDP by Provincial Plans

Provinces	Planned Period	Options		
		Conservative	Moderate	Optimistic
Niassa	2008-2017	8.0%	10.0%	12.0%
Cabo Delgado	2010-2014	N.A.		
Nampula	2010-2015		8.5%	
	2015-2020		8.3%	
Zambezia	2011-2020	N.A.		
Tete (based on interview)	2012-2021	2.0%	-	9.0%

Sources: Provincial 5 Year Plans or Strategic Plans

(4) Other Projections

The 2011 Country Report of Mozambique by the International Monetary Fund (IMF)³ projects GDP growth rates of 7.5% in 2012, 7.9% in 2013 and an average growth rate of 7.8% from 2014 to 2016. On the other hand, the World Bank estimated an average GDP growth rate of 7.5% from 2010 to 2014.

11.3.2 Economic Framework for the Nacala Corridor Region⁴**(1) Basic Concept of Growth Patterns**

Two economic growth patterns for the Nacala Corridor Region are taken into account as an economic framework. The first pattern may be affected by an over-heated or bubble economy characterised by a very large amount of investment for exploitation of natural resources and a very large-scale and very high speed development. This pattern is referred to as “the unmanaged economic growth pattern.” This pattern of development is not well managed in respect of investment, development scale and development speed. This type of development tends to result in a large number of resettlements and large environmental impact both in mining areas and transport corridors.

As already discussed, large scale projects in mining (coal and natural gas) are expected in the Nacala Corridor Region. However, without appropriate management of the economy, the development of the Nacala Corridor Region may not be sustainable and the poverty reduction and the balanced distribution of income may not be accomplished in the long term period, even though the growth of the Nacala Corridor Region will be very rapid in the initial stage. This is the case of the unmanaged economic growth pattern.

The second growth pattern may lead the way to sustainable economy. The second pattern is referred to as “the managed economic growth pattern,” which will be economically, environmentally and institutionally managed. This growth pattern can be achieved by managing and mitigating environmental and social impacts due to rapid and massive development, especially in the mining sector. In the managed economic growth pattern, large scale projects/corporations are encouraged to create linkage with small-scale local companies and local personnel. As a result of these efforts, the economic growth rates would be lower in the beginning phases, but they would be more sustainable than the first growth pattern (the unmanaged case).

³ IMF 2011 Country Report No. 11/149, June 2011

⁴ For considering options for economic framework, GRDP for Nacala Corridor Region in this section 11.3.2 includes whole area in Zambezia Province.

The IMF report⁵ also states that Mozambique's acceleration in the population growth rate has not been accompanied by economic diversification or by commensurate employment creation. The productive and export base has become increasingly concentrated - a reflection of the emergence of large-scale projects and weaknesses in the business environment that have prevented diversification of the economy, in contrast with Sub-Saharan African peer countries.

On the other hand, the managed economic growth pattern will promote sustainable growth and balanced development in the Nacala Corridor Region, which is composed of increased production and productivity of agricultural sector, expansion of manufacturers in the growth poles as well as development of SEZ, IFZ and industrial estates, strengthening of the linkages among manufactures, the services sector and large-scale mining projects, promotion of tourism, creation of employment opportunities and development of human resources. The investment by large-scale projects will be distributed to the whole economy in the Nacala Corridor Region.

(2) Methodology

The indicators of two economic growth patterns are shown in Table 11.3.4. Each growth pattern is composed of Cases A and B. Case A does not include the large-scale projects.⁶ On the other hand, Case B includes them.

It should be noted that indicators of these growth patterns are the likely key figures rather than projections because the contribution to GRDP by large-scale projects to the Nacala Corridor Region in the future is not foreseen at this moment.

The indicators are mainly based on the growth rates of GDP by PARP and ENDE, the growth rates of GRDP by the provincial plans, the information of the development volume and timing of the large-scale projects, the past study on the impact of large-scale projects on GDP⁷, and trend analysis on the incremental capital-output ratio (ICOR) in the recent years.

⁵ Ibid, p.16

⁶ The large-scale projects include coal extraction and hydro power plant development in Tete and natural gas development and construction of derived plant facilities in Cabo Delgado.

⁷ According to a study titled "Contribution of Large-Scale Projects to GDP in Mozambique" by Christoffer Sonne-Schmidt, et al, April 2009, the direct contribution by three large-scale projects, namely (i) the aluminum smelter (Mozal in Maputo Province), (ii) the gas extraction and pipeline project (Sasol Gas Project in Inhambane) and (iii) the titanium ore or heavy sand project (Moma in Nampula), to growth in GDP at factor cost was estimated to be between 0.8 and 1.1 % points in 2006. The study concluded that rapid economic growth in Mozambique holds with or without the direct contribution of these large-scale projects or in other words that the contribution of large-scale projects to economic growth in the country is rather small. However, scale and impact by the large-scale projects defined in the study of PEDEC-Nacala seems to be much larger than the above-mentioned ones. In PEDEC-Nacala, contribution of the large-scale projects to the economy of the Nacala Corridor Region is assumed to be a 1–2% point growth in GRDP for both of growth scenarios, considering the analysis of the Incremental Capital-Output Ratio (ICOR) in the recent years.

Table 11.3.4 Alternative GRDP Growth Rates: Economic Growth Patterns until 2035

	Unit: % per annum			
	2012-2015	2016-2020	2021-2025	2026-2035
(1) Unmanaged economic growth pattern without coal & natural gas development (Case A1)	7.5	8.0	8.5	6.0
(2) Unmanaged economic growth pattern with coal & natural gas development (Case B1)	7.5	9.0	10.5	6.5
(3) Managed economic growth pattern without coal & natural gas development (Case A2)	7.5	7.5	7.5	7.5
(4) Managed economic growth pattern with coal & natural gas development (Case B2)	7.5	8.5	9.5	9.5

Source: JICA Study Team

Note: The annual growth rate between 2012 & 17 is 7.7% in (1), 8.1 % in (2), 7.5% in (3) and 7.9% in (4)

(3) Unmanaged Economic Growth Pattern

As shown in the table below, the initial growth is high in the unmanaged economic growth pattern (Case A), but in the latter period the speed of growth will be slowing down due to a downturn in the investment efficiency to output and the low-linkages among economic stakeholders.

In this growth pattern, it is assumed that investment of large-scale mining projects will contribute to an increase of 1% of GRDP during 2016-20, 2% during 2021-25 and 0.5% during 2026-35. The results are shown as Case B.

(4) The Managed Economic Growth Pattern

The managed economic growth patterns with Case A and B are also shown in Table 11.1.5. Case B shows the increase due to large-scale mining projects, assuming that large-scale projects will contribute to an increase of 1% of GRDP during 2016-20, 2% during 2021-25 and 2% during 2026-35. Even in the latter part of the targeted period, the contribution to GRDP by the large-scale mining projects is not changed through the combination of coal and gas field development activities with downstream processing, transportation and other services including support for SMEs.⁸

Table 11.3.5 GRDP of the Nacala Corridor Region* by Economic Growth Pattern until 2035

Unit: million MT, 2003 constant prices

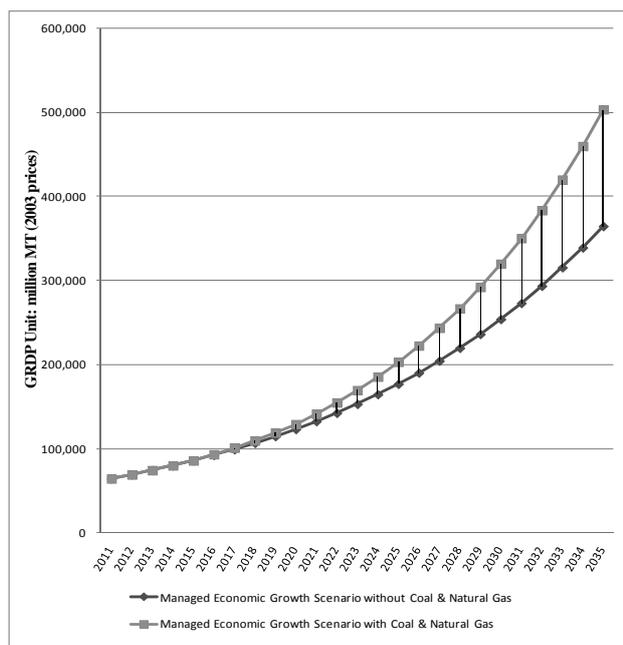
Growth Pattern	2011	2017	2025	2035
(1) Unmanaged economic growth pattern without coal & natural gas development (Case A1)	64,254 (119,414)	100,000 (186,000)	190,000 (352,000)	340,000 (631,000)
(2) Unmanaged economic growth pattern with coal & natural gas development (Case B1)	64,254 (119,414)	102,000 (189,000)	218,000 (404,000)	408,000 (759,000)
(3) Managed economic growth pattern without coal & natural gas development (Case A2)	64,254 (119,414)	99,000 (184,000)	177,000 (329,000)	365,000 (677,000)
(4) Managed economic growth pattern with coal & natural gas development (Case B2)	64,254 (119,414)	101,000 (188,000)	203,000 (377,000)	503,000 (936,000)

Source: JICA Study Team

Note: Numbers in the brackets are figures based on 2011 constant prices.

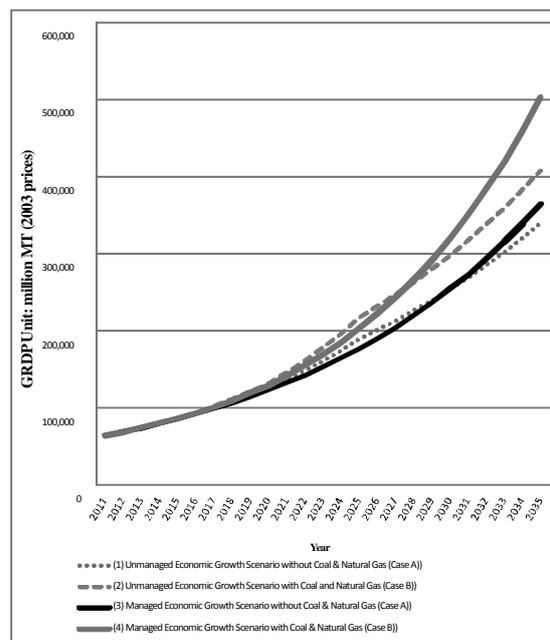
Note*: The figures in this table includes districts in Zambezia Province which are not part of Nacala Corridor Region

⁸ The Executive Summary of "The Future of Natural Gas in Mozambique: Towards a Gas Master Plan," August 2012 by ICF International stresses that the contribution of natural gas development to the regional economy through various activities and support is a key element for growth pattern selection in the Master Plan.



Source: JICA Study Team

Figure 11.3.2 Two GRDP Growth Patterns



Source: JICA Study Team

Figure 11.3.3 Managed Growth Pattern with and without Coal & Natural Gas Development

The managed economic growth pattern is also consistent with the concept of the ENDE, which is aiming at inclusive and sustainable growth through balanced vitalization of agriculture, mining, the processing industry, logistics and tourism sectors, past performance of the economy, donors' GDP growth projections, and the trend of investment.

As a result, the managed economic growth pattern will be selected as targeted indicators for development of the Nacala Corridor Region. According to the preliminary calculation based on the projection by MPD for the draft of ENDE on GDP deflator and the exchange rate to US dollar, per capita GRDP in the Nacala Corridor Region by this pattern (Case B2) will amount to US\$ 2,753 in 2035.

Table 11.3.6 Selected Economic Framework for the Nacala Corridor Region*

	2011	2017	2025	2035
GRDP of the Five Provinces in Nacala Corridor Region (million MT at 2003 prices)	64,254	101,000	203,000	503,000
Annual Growth Rate (%)	-	7.8%	9.1%	9.5%
GRDP per Capita (thousand MT at 2003 prices)	4,597	6,080	9,900	19,449
Annual Growth Rate (%)	-	4.8%	6.3%	7.0%

Sources: JICA Study Team based on INE's statistics

Note*: The figures in this table includes districts in Zambezia Province which are not part of Nacala Corridor Region

11.3.3 Economic Structure in the Nacala Corridor Region: 2025 and 2035

In 2011, the percentage shares of GRDP by each broad economic sector in the Nacala Corridor Region were: 40% for agriculture, 0.2% for mining, 19% for industry (manufacturing, construction, electricity & water supply) and 40% for services.

Considering the targeted indicators by economic sector in the ENDE (2015-2035), the Strategic Plan for Agricultural Development (PEDSA) 2010-2019 and other materials/information, the shares

of the economic sectors in 2025 and 2035 and their growth rates are set as shown in Table 11.3.7 and Table 11.3.8 within the framework of the managed economic growth pattern.

Table 11.3.7 Change of Economic Structure in the Nacala Corridor Region

Unit: per cent

	GRDP at Factor Cost (million MT, 2003 prices)	Agriculture	Mining/Large-scale Projects	Manufacturing, Construction & Utilities	Services
2011	64,254	40.3	0.2	19.3	40.2
2025	181,700	33	13	19	35
2035	450,300	24	28	20	29

Sources: JICA Study Team based on INE's statistics

Table 11.3.8 Growth Rates by Economic Sector in the Nacala Corridor Region

Unit: per cent

	Agriculture	Mining/Large-scale Projects	Manufacturing, Construction and Utilities	Service
2011-25	7.0	49.3	8.5	7.4
2025-35	6.0	18.3	9.7	7.4

Source: JICA Study Team

The percentage shares of the agriculture, mining, industry and service sectors will be changed from 40.3% in 2011, to 33.1% in 2025 and to 23.9% in 2035, from 0.2%, 12.8% and 27.7%, from 19.3%, 19.2% and 19.6%, from 40.2%, 34.8% and 28.8%, respectively.

In terms of growth rates, agriculture, manufacturing and the service sector will rise steadily and robustly, although the agriculture sector will gradually lose its share since the share of the mining sector, which is derived from large-scale mining projects, will be outstandingly high.

11.3.4 Provincial GRDP in the Nacala Corridor Region: 2017, 2025 and 2035

Based on the INE's data of the provincial GRDP by economic sector in 2011 as shown in Table 11.3.9, the provincial GRDP at factor cost in the Nacala Corridor Region by economic sector for each province is estimated as shown in Table 11.3.10 applying the growth rates by economic sector discussed in the preceding section. The initial figures by economic sector and by province that were calculated using the growth rates are adjusted to coincide with GRDP at factor cost by sector in the Nacala Corridor Region as a whole. The GRDP contribution of large-scale projects are separately calculated and distributed to Cabo Delgado and Tete Provinces. The value-added amount of the mining sector in Niassa, Nampula, and Zambezia Provinces is simply distributed to 10 MT million and MT 30 million each in 2025 and 2035, respectively since its production could not be projected.

The shares of the manufacturing, construction and utility sector in GRDP in Nampula and Tete have increased, while the provinces of Niassa, Zambezia and Nampula will maintain their higher share of agriculture. Nampula holds the largest share of GRDP in the Nacala Corridor Region.

Table 11.3.9 Provincial GRDP at Factor Cost by Economic Sector: 2011

	Agriculture, Fishery & Forestry		Mining/Large-scale Projects		Manufacturing, Construction and Utilities		Services		GRDP at Factor Cost
	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)
Niassa	2,608	49.5	1	0.0	376	7.1	2,287	43.4	5,272
Cabo Delgado	4,175	51.2	2	0.0	1,021	12.5	2,955	36.3	8,152
Nampula	10,583	39.9	7	0.0	4,505	17.0	11,455	43.1	26,551
Zambezia*	3,869	50.8	2	0.0	937	12.3	2807	36.9	7,615
Tete	2,006	20.0	74	0.7	4,270	42.6	3,688	36.7	10,038
Nacala Corridor Region	23,242	40.3	85	0.2	11109	19.3	23,192	40.2	57,628
Other Area	25,986	21.7	2413	2.0	28480	23.8	62,972	52.5	119,851
Mozambique	49,228	27.7	2498	1.4	39589	22.3	86,164	48.6	177479

Sources: JICA Study Team based on INE's statistics

Note: *Only GRDP from the northern 7 districts in Zambezia

Table 11.3.10 Provincial GRDP at Factor Cost by Economic Sector: 2017, 2025 & 2035

(1) Projected Provincial GRDP in 2017 by Economic Sector

	Agriculture, Fishery & Forestry		Mining/Large-scale Projects		Manufacturing, Construction and Utilities		Services		GRDP at Factor Cost
	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)
Niassa	3,900	48.7	0	0.0	600	7.5	3,500	43.8	8,000
Cabo Delgado	6,200	49.2	200	1.6	1,700	13.5	4,500	35.7	12,600
Nampula	15,900	39.1	10	0.0	7,300	17.9	17,500	43.0	40,700
Zambezia*	5,800	50.0	0	0.0	1,500	12.9	4,300	37.1	11,600
Tete	3,000	17.2	1,800	10.3	6,900	39.7	5,700	32.8	17,400
Nacala Corridor Region	34,800	38.6	2,000	2.2	18,000	19.9	35,500	39.3	90,300
Other Area	39,100	21.1	24,300	13.1	34,400	18.6	87,200	47.2	185,000
Mozambique	73,900	26.8	26,300	9.6	52,400	19.0	122,700	44.6	275,300

(2) Projected Provincial GRDP in 2025 by Economic Sector

	Agriculture, Fishery & Forestry		Mining/Large-scale Projects		Manufacturing, Construction and Utilities		Services		GRDP at Factor Cost
	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)
Niassa	6,800	47.9	10	0.1	1,200	8.4	6,200	43.6	14,200
Cabo Delgado	10,800	34.5	9,300	29.7	3,200	10.2	8,000	25.6	31,300
Nampula	27,400	37.8	10	0.0	14,200	19.4	31,100	42.8	72,700
Zambezia*	10,000	48.8	10	0.0	2,900	14.1	7,600	37.1	20,500
Tete	5,200	12.1	14,000	32.6	13,400	31.1	10,400	24.2	43,000
Nacala Corridor Region	60,200	33.1	23,300	12.8	34,900	19.2	63,300	34.9	181,700
Other Area	66,700	20.5	53,800	16.6	72,000	22.2	132,300	40.7	324,800
Mozambique	126,900	25.1	77,100	15.2	106,900	21.1	195,600	38.6	506,500

(3) Projected Provincial GRDP in 2035 by Economic Sector

	Agriculture, Fishery & Forestry		Mining/Large-scale Projects		Manufacturing, Construction and Utilities		Services		GRDP at Factor Cost
	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)	Share (%)	(million MT, 2003 constant prices)
Niassa	12,100	43.5	30	0.1	3,000	10.8	12,700	45.6	27,800
Cabo Delgado	19,400	13.5	99,700	69.5	8,100	5.6	16,400	11.4	143,600
Nampula	49,100	33.1	30	0.0	35,800	24.1	63,600	42.8	148,500
Zambezia*	18,000	43.9	30	0.1	7,400	18.0	15,600	38.0	41,000
Tete	9,300	10.4	24,900	27.9	33,900	37.9	21,300	23.8	89,400
Nacala Corridor Region	107,900	23.9	124,600	27.7	88,200	19.6	129,600	28.8	450,300
Other Area	141,900	20.3	169,200	24.2	167,200	23.9	220,600	31.6	698,900
Mozambique	249,700	21.7	293,900	25.6	255,400	22.2	350,200	30.5	1,149,200

Sources: JICA Study Team based on INE's statistics and ENDE (MPD)

Note*: Only GRDP from the northern 7 districts in Zambezia

As a result, PEDEC-Nacala's future economic frameworks can be summarized as in the following tables.

Table 11.3.11 GRDP and GRDP by Sector, Years 2007, 2011, 2017, 2025 and 2035

	2007	2011	2017	2025	2035
GRDP of the Nacala Corridor Region (million MT in 2003 prices)	44,876	57,628	90,300	181,700	450,300
Agriculture, Livestock, Fishery and Forestry Sector	17,287	23,242	34,800	60,200	107,900
Mining Sector	47	85	2,000	23,300	124,600
Manufacturing, Construction and Utilities Sector	9,076	11,109	18,000	34,900	88,200
Service Sector	18,466	23,192	35,500	63,300	129,600

Source: JICA Study Team

Table 11.3.12 GRDP by Province, Years 2011, 2017, 2025 and 2035

	GRDP (million MT, 2003 constant price)				Annual Growth Rate (%)	
	2011	2017	2025	2035	2011-2025	2011-2035
Niassa Province	5,272	8,000	14,200	27,800		
Annual Growth Rate (%)	-	7.2%	7.4%	6.9%	7.3%	7.2%
Cabo Delgado Province	8,152	12,600	31,300	143,600		
Annual Growth Rate (%)	-	7.5%	12.0%	16.5%	10.1%	12.7%
Nampula Province	26,551	40,700	72,700	148,500		
Annual Growth Rate (%)	-	7.4%	7.5%	7.4%	7.5%	7.4%
Zambezia Province*	7,615	11,600	20,500	41,000		
Annual Growth Rate (%)	-	7.3%	7.4%	7.2%	7.3%	7.3%
Tete Province	10,038	17,400	43,000	89,400		
Annual Growth Rate (%)	-	9.6%	12.0%	7.6%	11.0%	9.5%
Nacala Corridor Region	57,629	90,300	181,700	450,300		
Annual Growth Rate (%)	-	7.8%	9.1%	9.5%	8.5%	8.9%
Other Area	119,851	185,000	324,800	698,900		
Annual Growth Rate (%)	-	7.5%	7.3%	8.0%	7.4%	7.6%
Mozambique	177,479	275,300	506,500	1,149,200		
Annual Growth Rate (%)	-	7.6%	7.9%	8.5%	7.8%	8.1%

Source: JICA Study Team

Table 11.3.13 GRDP per Capita by Province, Years 2011, 2017, 2025 and 2035

	GRDP per Capita (thousand MT, 2003 constant price)				Annual Growth Rate (%)	
	2011	2017	2025	2035	2011-2025	2011-2035
Niassa Province	3.78	4.75	6.82	10.97		
Annual Growth Rate (%)	-	3.8%	4.6%	4.9%	4.3%	4.5%
Cabo Delgado Province	4.57	6.16	12.81	47.33		
Annual Growth Rate (%)	-	5.1%	9.6%	14.0%	7.6%	10.2%
Nampula Province	5.76	7.43	10.84	18.00		
Annual Growth Rate (%)	-	4.3%	4.8%	5.2%	4.6%	4.9%
Zambezia Province*	3.73	4.78	6.96	11.51		
Annual Growth Rate (%)	-	4.2%	4.8%	5.2%	4.6%	4.8%
Tete Province	4.73	6.51	12.19	18.83		
Annual Growth Rate (%)	-	5.5%	8.2%	4.4%	7.0%	5.9%
Nacala Corridor Region	4.91	6.31	10.29	20.35		
Annual Growth Rate (%)	-	4.6%	6.3%	7.1%	5.5%	6.2%
Other Area	10.80	14.39	20.88	35.69		
Annual Growth Rate (%)	-	4.9%	4.8%	5.5%	4.8%	5.1%
Mozambique	7.70	10.214	15.25	27.66		
Annual Growth Rate (%)	-	4.7%	5.2%	6.1%	5.0%	5.5%

Source: JICA Study Team

Table 11.3.14 Percentage of GRDP per Capita by Province to National Average, Years 2011, 2017, 2025 and 2035

	2011	2017	2025	2035
Niassa Province	0.49	0.47	0.45	0.40
Cabo Delgado Province	0.59	0.61	0.84	1.71
Nampula Province	0.75	0.73	0.71	0.65
Zambezia Province*	0.48	0.47	0.46	0.42
Tete Province	0.61	0.64	0.80	0.68
Nacala Corridor Region	0.63	0.62	0.67	0.74
Other Area	1.40	1.42	1.37	1.29
Mozambique	1.00	1.00	1.00	1.00

Source: JICA Study Team

Chapter 12 Spatial Structure of the Nacala Corridor Region

12.1 Spatial Structure of the Nacala Corridor Region

The Spatial Structure of the Nacala Corridor Region is expressed in the following two ways:

- 1) Transport corridor network, and
- 2) Hierarchical system of urban centres.

12.2 Transport Corridor Network for the Nacala Corridor Region

PEDEC-Nacala recommends the spatial structure of Nacala Corridor Region in 2035 as shown in Figure 12.2.1. The blue arrows indicate the proposed corridor routes, while the brown arrows are the existing transportation routes. The transport network is composed of major corridors, sub-corridors and feeder lines. The main corridors are the backbones of the region, which go through primary urban centres and secondary urban centres. The sub-corridors are extended from the main corridors to tertiary urban centres. Feeder lines are to connect main corridors and sub-corridors to wide areas and quaternary urban centres and other minor urban centres.

The corridor structure is designed in such a way that Nacala Port will be connected with Lilongwe of Malawi and Lusaka (Mpika) of Zambia for approximately 2,000 km as an international corridor and the effect of improved access will disseminate to as many areas in the Mozambican part as possible to enhance people's mobility and promote development along the routes.

(1) Main Corridors

- [M-1] Nacala-Nampula-Cuamba-Lilongwe (Malawi)-Lusaka (Zambia)
- [M-2] Cuamba-Tete
- [M-3] Cuamba-Lichinga

The main corridor shown in solid blue arrows starts at Nacala at the eastern end, runs westward through Nampula and reaches Cuamba in Niassa Province, about 530 km west of Nacala. The main corridor splits at Cuamba into three directions: in the northwest direction to Lichinga, in the western direction to Lilongwe of Malawi and further to Lusaka (or Mpika) of Zambia and in the south western direction to Moatize of Tete Province through Malawi.

The main corridors will be served both by railways and trunk roads. This main part of the Nacala Corridor will ensure faster and lower cost transportation of cargoes, especially for long haul transportation, thus accelerating exports and imports for Malawi, Zambia and Mozambique. The Cuamba-Lilongwe-Lusaka Main Corridor [M-1] will ensure imports of goods at lower prices and increase the possibility of exporting goods produced in Malawi and Zambia through Nacala Port. The Cuamba-Lichinga Main Corridor [M-3] would dramatically change the status of Niassa

Province, from a dead-end province with weak linkages with other areas to a province exporting abundant agro-related and wood-related products to other areas and overseas through the new corridor. Niassa Province could become a new international gateway to Malawi and southern Tanzania through water transport on Niassa Lake (Malawi Lake). The Cuamba-Tete Main Corridor [M-2] would add a new outlet for Tete Province, which has been an important node of the transportation network connected with Malawi, southern Zambia, Zimbabwe and Beira.

(2) Sub-Corridors

- [S-1] Lichinga-Pemba
- [S-2] Nacala-Pemba-Palma
- [S-3] Chipoka-Metangula-Mbamba Bay-Itsungi Port

Three sub-corridors are shown in big blue dashed lines in Figure 12.1.1. One runs east to west from Pemba of Cabo Delgado Province to Lichinga of Niassa Province for about 700 km, while the other runs south to north from Nacala all the way up to Palma in Cabo Delgado Province through Pemba for about 660 km. While both of these sub-corridors are served by roads, there may be a possibility of a natural gas pipeline connection for the Palma-Nacala section. The Lichinga-Pemba sub-corridor accommodates road traffic between Pemba and Niassa Province and provides an alternative route to the Nacala-Nampula-Cuamba-Lichinga Main Corridor in the event of hindrances such as emergencies and traffic congestion. The Nacala-Palma Sub-Corridor serves the traffic delivering goods to Palma for the natural gas project and tourist destinations along the coastal area and islands of Cabo Delgado Province and Nampula Province. The third sub-corridor is water transport corridor connecting Malawi's Chipoka, Mozambique's Metangula and Tanzania's Mbamba Bay and Itungi Port.

(3) Feeder Lines

PEDEC-Nacala proposes the following seven feeder lines shown in small blue dashed arrows in Figure 12.2.1. They would play a crucial role in expanding the impact of the corridor development spatially to every corner of rural areas.

- [F-1] Nacaroa-Nacala Feeder Line: to ensure easier access to Nacala Port to/from the north
- [F-2] Nampula-Angoche Feeder Line: to support development of the southern part of Nampula Province through promoting fishery and agriculture
- [F-3] Cuamba-Marrupa Feeder Line: to support development of agriculture along the route and strengthen the mutually supportive function of the Lichinga-Pemba Sub-Corridor and Nacala-Nampula-Cuamba Main Corridor
- [F-4] Cuamba-Gurue-Alto Molocue Feeder Line: to stimulate agriculture production along the route in northern Zambezia Province
- [F-5] Lichinga-Metangula Feeder Line: to promote development of agriculture and tourism along the route and create a new international gateway to Malawi and Tanzania by water transport
- [F-6] Nampula-Montepuez Feeder Line: to promote development of agriculture and tourism along the route and strengthen the mutually supportive function of the Lichinga-Pemba Sub-Corridor and Nacala-Nampula-Cuamba Main Corridor
- [F-7] Tete-Fingoe-Zumbu Feeder Line: to promote agriculture production in the fertile land along the route and open a new outlet to the southern part of Zambia

12.3 Hierarchical System of Urban Centres

12.3.1 Urban Centres

Urban areas/urban centres are important areas where urban functions and economies are accumulated and interacted with. Urban centres will provide various urban services including public administration services, commercial-business services and urban infrastructure services (roads, electricity and water).

When international/regional transport corridors are developed, urban centres will develop more in respect of accumulation of public administrative functions and commercial-business functions, because transport corridors can help expand catchment areas of urban centres. That is, commercial-business services sectors and manufacturing sectors will be attracted to be located in urban centres/ urban areas, in response to the increased degree of interconnection/integration through international/regional transport corridors.

To effectively cover the wide region like the Nacala Corridor Region, it is important to establish a hierarchical system of urban centres. Table 12.3.1 shows the present situation and the recommended hierarchy of urban centres in the future (2025-2035).

Table 12.3.1 Classification of Urban Centres at Present and in 2025-2035

Level	Present	2025-2035
Primary Urban Centre (1 st Level: International)	None	Nacala Bay Area (Nacala and Nacala-a-Velha)
Secondary Urban Centre (2 nd Level: National & Regional)	Nampula, Nacala	Greater Nampula, Cuamba, Tete-Moatize
Tertiary Urban Centre (3 rd Level: Provincial)	Pemba, Lichinga, Tete	Pemba, Lichinga
Quaternary Urban Centre (4 th Level: Sub-Provincial)	Nacala-a-Velha, Angoche, Cuamba, Moatize, Gurue, Mocuba	Angoche, Gurue, Mocuba, Palma
Quinary Urban Centre (5 th Level: District)	Other Municipality Centres/ District Centres	Other Municipality Centres / District Centres

Source: JICA Study Team

12.3.2 Designated Functions for Major Urban Centres

In consideration of the Overall Development Strategies and future Spatial Structure of the Nacala Corridor Region, the following functions for major urban centres are designated for the future:

1) Nacala Bay Area: Primary Urban Centre (International)

The First-class International City for Business, Industry and Tourism: a New Gateway for Africa

2) Greater Nampula: Secondary Urban Centre (National & Regional)

Regional Growth Pole for the Northern Region

3) Cuamba City: Secondary Urban Centre (National & Regional)

Inland Regional Logistics and Industrial Centre

4) Tete City with Moatize: Secondary Urban Centre (National & Regional)

Inland Regional Administrative and Business Centre with Support Base for Coal Mining

5) Lichinga City: Tertiary Urban Centre (Provincial)

Provincial Growth Pole and Service Centre with Academic-Scientific Centre and Wood Processing Base

6) Pemba City: Tertiary Urban Centre (Provincial)

Provincial Growth Pole and Service Centre with Support Base for Natural Gas Exploitation, as well as with Tourism Base

7) Angoche: Sub-Provincial Urban Centre

Commercial and Service Centre

8) Gurue: Sub-Provincial Urban Centre

Commercial and Service Centre

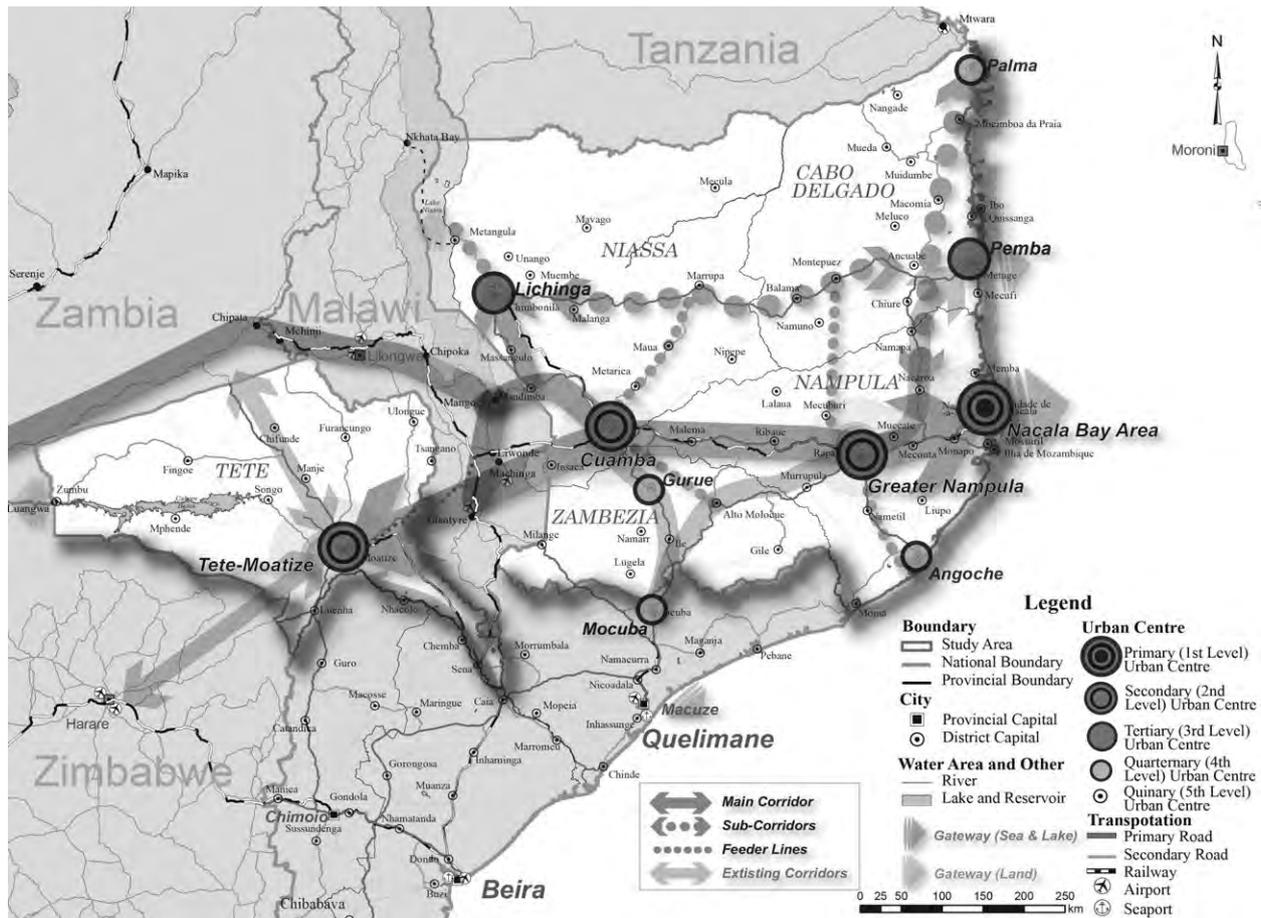
9) Mocuba: Sub-Provincial Urban Centre

Commercial, Service and Industrial Centre with Industrial Production Base

10) Palma: Sub-Provincial Urban Centre

Commercial, Service and Industrial Centre for Natural Gas Exploitation and Chemical Industrial Base

Figure 12.3.1 shows the hierarchical pattern of urban centres in the Nacala Corridor Region. Table 12.3.2 and Figure 12.3.2 show the future urban populations of major urban centres.



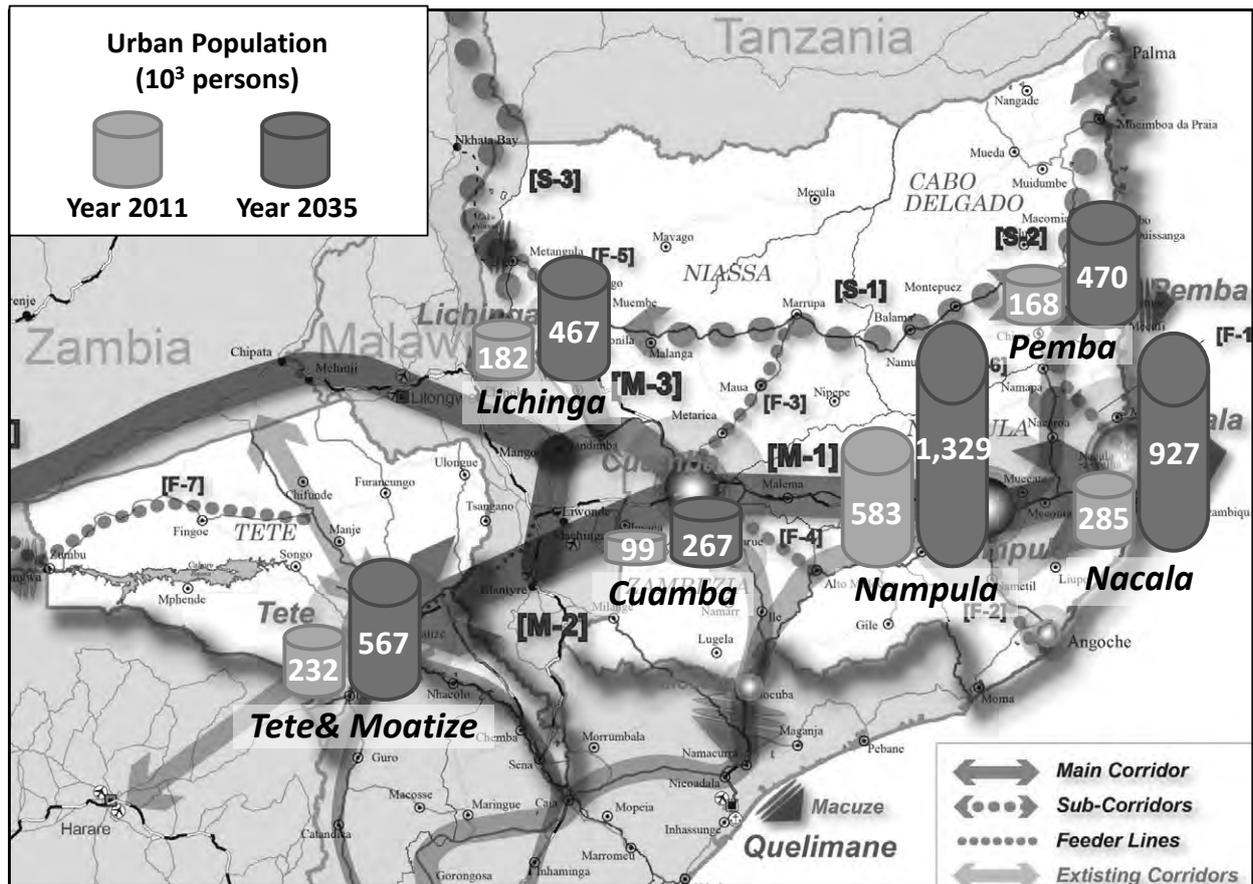
Source: JICA Study Team

Figure 12.3.1 Hierarchical Pattern of Urban Centres in the Nacala Corridor Region, Year 2025-2035

Table 12.3.2 Urban Population of Major Urban Centres in 2011 and 2035

	Year 2011	Year 2035
Nacala Bay Area	285,000	927,000
Greater Nampula	583,000	1,329,000
Cuamba City	99,000	267,000
Tete & Moatize	232,000	567,000
Lichinga City	173,000	467,000
Pemba City	168,000	470,000

Source: JICA Study Team

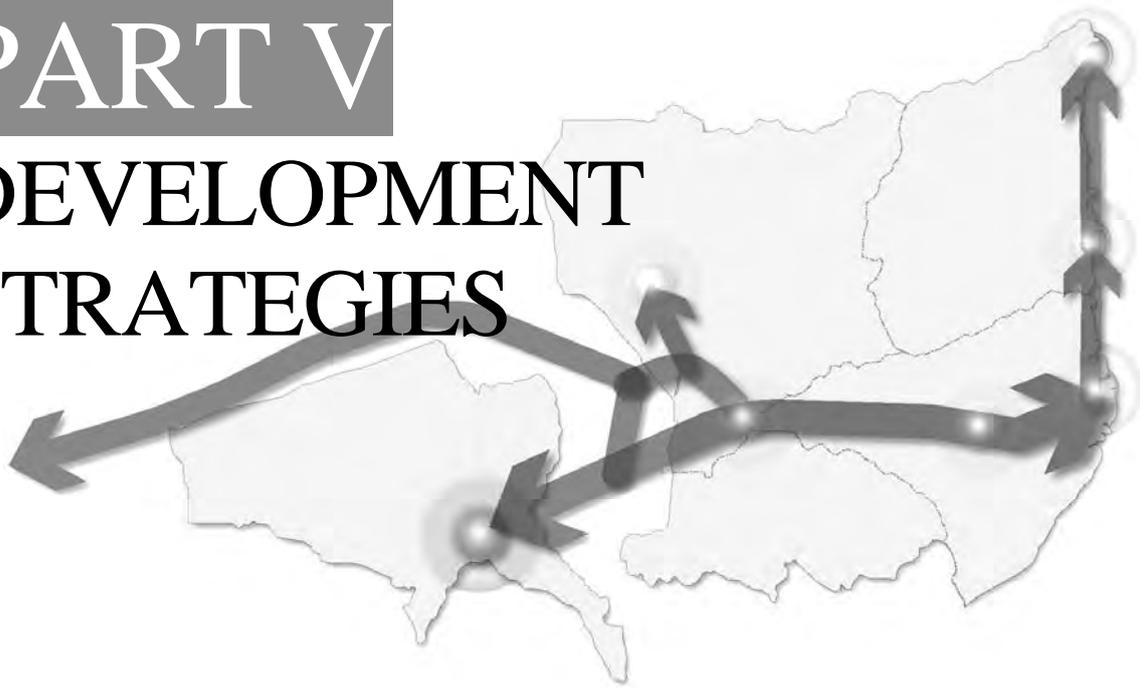


Source: JICA Study Team

Figure 12.3.2 Urban Populations of Major Urban Centres, Years 2011 and 2035

PART V

DEVELOPMENT STRATEGIES



Chapter 13 Development Scenarios and Overall Development Strategies

13.1 Introduction

In this chapter, at first, development scenarios are considered and analysed. After the evaluation from four perspectives (economy, space, social and environment), a development scenario is selected. Based on the selected development scenario, overall development strategies are formulated in order to achieve the future vision and development goals for the Nacala Corridor Region. Furthermore, considering how to initiate regional development, essential development strategies (short and medium-term) are identified in relation to the overall development strategies.

13.2 Development Scenario

A “Development Scenario” is a set of narrative description (but not full-scale explanation) of ways of development including emphasis on economic sectors, spatial patterns of development and sequences of development. It is useful to draw overall images of different patterns of regional development.

In this chapter, alternative development scenarios are prepared and their characteristics are analysed and evaluated from viewpoints provided by the vision, development goals and overall issues.

13.2.1 Selected Development Scenario

Based on the evaluation of alternative development scenarios, the following development scenario “**B-3: Diversified Economic Sectors Development based on a Region-Wide Corridor Network**” has been selected for the long-term future of the Nacala Corridor Region:

(1) **Development of Diversified Economic Sectors**

The Nacala Corridor Region will promote not only mineral resource development (coal, natural gas and other resources), but also the development of diversified economic sectors including commerce, logistics, manufacturing, tourism, agriculture and forestry by utilising a wide range of development potential available in a wide region.

(2) **Coal Development and Transport as an Initial Driving Force**

In this development scenario, coal exploitation in Tete Province and the necessity for upgraded transport of coal from Tete to Nacala Port is a very important initial driving force (trigger) of regional development in the Nacala Corridor Region. To take advantage of this very precious development opportunity for enhancing the long-distance transport function and development potential of economic sectors is a very significant key for PEDEC-Nacala. The coal development for export would assure a high transport demand in the beginning phase of railway upgrading.

Moreover, the upgraded railway will be able to transport non-coal cargoes (general cargoes and containers), as well as passengers, if adequate development intervention is done for accommodating non-coal cargoes in accordance with the concessional agreements.

(3) Main Transport Corridor: Paralleled Railway and Trunk Road

In parallel with the upgraded railway, trunk roads connecting Lichinga, Mandimba, Cuamba and Nampula to Nacala Port will be constructed using foreign assistance to the Mozambican government. The upgraded railway and upgraded trunk roads will be able to complement each other. Long-distance (over 500-700 km) heavy-loaded cargoes will use the corridor railway. On the other hand, trunk roads and feeder roads will transport goods and people for the medium-distance (300-500 km).

The trunk roads from Lichinga, Mandimba, Cuamba and Nampula up to Nacala Port would be an axis of the Nacala Corridor Region from which secondary corridors and feeder lines could be extended widely and deeply into the region. Secondary roads and feeder roads would collect goods and people from wide areas to the trunk road and corridor railway.

(4) Extensive Corridor Network and Hierarchical Urban Centres

The extending corridor network will be developed gradually after completion of the main corridor (consisting of upgraded railway and trunk roads). This extensive corridor network will also help to develop urban centres at nodal points of transport. These nodal urban centres will become commercial and service centres and bases for industrial production.

The extensive corridor network and hierarchical system of urban centres will provide transport services and commercial centre services, resulting in improvement of the business environment for creating a value chain for the agricultural and forestry sectors. Transport costs will be substantially reduced in wide areas, in which prices of daily goods and construction material will be reduced and small-scale farmers will be able to buy chemical inputs at more reasonable prices and sell their agricultural produce at higher prices to middle traders.

(5) Positive Impact on Education and Health Services

With this improved extensive corridor network and urban centres, administrative officers, school teachers and health officers will be able to live and work in better conditions even in inland areas of the Nacala Corridor Region. As a result, with additional proper intervention, schools and health centres will be able to function in better ways for local people even in less accessible areas.

(6) Development Possibility for Other Mineral Resources and Tourism Resources in Less Accessible Areas

The Nacala Corridor Region is rich in a variety of mineral resources and nature tourism resources. Using the extensive corridor network and urban centres, such mineral resources and tourism resources (products and destinations) will be more accessible and easily utilised for development.

(7) Priority in Development

As for the priority in development, this development scenario gives Nacala Bay Area an especially high priority in preparing the foundation (hard and soft infrastructures) of manufacturing sector development. Since Nacala Bay Area will have an upgraded seaport function, and an upgraded

railway connection to inland areas of Mozambique, Malawi and Eastern Province of Zambia, Nacala Bay Area's locational advantage will be enhanced to a substantially high level so that manufacturing sectors could be located and developed for serving inland countries and areas, as well as overseas countries. However, in order to achieve this situation, it is necessary to provide economic infrastructure to support manufacturing industries, including those for stable and ample electricity and water supply.

When Nacala Bay Area is successful in attracting and operationalising manufacturing industries, then Greater Nampula will be able to do so by getting adequate economic infrastructure.

13.2.2 Alternative Development Scenarios

In order to consider future development patterns, alternative development scenarios have been developed. Two major factors are used for creating different development scenarios. The first factor is major economic sectors. The second factor is spatial patterns of development.

(1) Mining-Oriented Economy vs. Diversified Economic Sectors

By considering which economic sector should become a major driving force for promoting development of the Nacala Corridor Region, the following two types of development scenarios have been prepared:

- Scenario A: Mining-Oriented Regional Development
- Scenario B: Regional Development based on Diversified Economic Sectors

Major features of these scenarios are briefly described below.

1) Scenario A: Mining Sector-Oriented Regional Development

In this scenario, the major economic sectors are limited to mining sectors. In the Nacala Corridor, there are two dominant mining sectors: 1) coal exploitation and coal transport for export and 2) natural gas export and LNG production for export.

In addition to the mining activities, there are some possibilities to develop other economic sectors to support to mining activities, including first processing of minerals (such as LNG for natural gas) and providing maintenance services to construction machinery, as well as food and other supply services. In addition to the supporting industries, it will be necessary to develop infrastructure and urban functions in order to support the mining activities. The return on invested capital would be higher even after including the costs not only for mining activities but also for supporting industries, infrastructure provision and urban functions.

In mining areas and their surrounding areas, it will be not so easy to develop other economic sectors even though they can utilise the infrastructure and urban functions to be provided for mining activities and their supporting sectors.

Mining activities together with supporting sectors will not be sustainable in the very long run. Therefore, the regional economy based on dominant mining sectors is not very sustainable.

2) Scenario B: Regional Development based on Diversified Economic Sectors

In this scenario, in addition to mineral resource development, diversified economic sectors will be developed including manufacturing, tourism, agriculture and forestry, as well as commercial and

services. There are the following development possibilities in the Nacala Corridor Region:

- Development of manufacturing sectors in Nacala Bay Area and Greater Nampula
- Development of Agro-processing industries in Cuamba
- Tourism bases are developed in Nacala Bay Area, Pemba and Lichinga for getting access to beaches and cultural and nature tourist destinations
- Agricultural development along the main corridor by supporting small-scale farmers and by establishing a value chain for agriculture
- Agricultural development in the areas near coal exploitation in Tete Province
- Agricultural development in the areas near natural gas exploitation in northern Cabo Delgado

The regional economy composed of diversified economic sectors will have the following various benefits:

- Different economic sectors could support each other so as to achieve synergetic economic growth
- Diversified economic sectors will be located in wide and various areas, resulting in contribution to region-wide development
- Diversified economic sectors will be able to enable people of various occupations to find their own jobs
- In the regional economy based on such diversified economic sectors, a wide range of occupations can participate in economic activities
- The regional economy with diversified economic sectors will have resilience to external shocks
- The regional economy supported by diversified economic sectors will be more sustainable than other cases

(2) Three Different Spatial Patterns of Development

In addition to the first factor of major economic sectors, spatial patterns of development are used as the second factor to differentiate development scenarios. Considering different possibilities in the Nacala Corridor Region, the following three patterns are formulated:

- Spatial Pattern 1: Three Enclaves of Tete, Palma and Nacala
- Spatial Pattern 2: Tete-Nacala Single Corridor Development
- Spatial Pattern 3: Development based on a Region-Wide Corridor Network

These three spatial patterns are closely related to different major economic sectors. Spatial Pattern 1 is strongly oriented toward the mining sector oriented (Scenario A). Both Spatial Pattern 2 and Spatial Pattern 3 support the case of diversified economic sectors (Scenario B). Therefore, by combining the two factors (major economic sectors and spatial patterns), the following three development scenarios are naturally identified:

- **Scenario A-1:** Strong Mining Sector Orientation and Three Enclaves of Tete, Palma and Nacala (Zero Option)
- **Scenario B-2:** Diversified Economic Sectors Development based on Tete-Nacala Single Corridor
- **Scenario B-3:** Diversified Economic Sectors Development based on a Region-Wide Corridor Network

Major characteristics of these development scenarios are described below.

1) Scenario A-1: Strong Mining Sector Orientation and Three Enclaves of Tete, Palma and Nacala (Zero Option)

Major development will take place mostly in the three enclaves at Tete, Palma and Nacala. Tete's enclave will be limited to coal exploitation and its supporting function. Palma's enclave will be limited to natural gas exploitation and LNG production with their supporting sectors. Palma will develop chemical industries, such as those of ammonia and methanol. Nacala's enclave will be based on Nacala Port's logistics sectors and manufacturing sectors oriented toward domestic markets.

In this scenario, the function of the railway from Tete to Nacala Port will not be well developed and mostly limited to coal transport, but neither general cargoes nor containers will be substantially transported.

Other economic sectors will not be able to grow well, except for the supporting sectors of mining activities, even though they can depend on infrastructures and urban functions to support mining sectors. Since it is subject to the world price fluctuation of mineral resources, Nacala Corridor Region's economy will be not very resilient to external shocks, resulting in unsustainability in the long run. The regional economies based on such enclaves will not be sustainable in the very long run.

Since the railway from Tete to Nacala Port will be limited to coal transport in this scenario, heavy-loaded large trailers will run on the trunk roads (currently under construction) from Lichinga or Mandimba through Cuamba to Nampula and Nacala. In such a rail and road transport situation, the trunk roads would be in damaged conditions, even though the road upgrade projects are completed. As a result, in the medium and long terms, well-maintained trunk roads would not be available in the Nacala Corridor, and the creation of a value chain for the agricultural sector would be very difficult.

This scenario (Scenario A-1) can be regarded as "Zero Option" because the expected development situation following this scenario is like the case without substantial intervention.

2) Scenario B-2: Diversified Economic Sectors Development based on Tete-Nacala Single Corridor

In this scenario, only a single transport corridor (composed of railway and trunk road) from Tete to Nacala Port will be upgraded and functional. The areas along this transport corridor will be developed including the areas surrounding Nacala Port.

In addition to coal, the railway from Tete to Nacala Port will transport general cargoes and containers, as well as passengers. As a result, the commercial and logistics catchment areas for major urban centres, such as Nacala and Nampula, will be significantly expanded. Then, not only commerce and logistics sectors but also manufacturing and other sectors will be able to grow, largely by taking advantage of development opportunities to arise due to the upgraded railway.

On the other hand, in the areas along the transport corridor, the creation of value chain for the agricultural sector will be relatively easy and possible so as to contribute to modernisation and intensification of small-scale farmers' agriculture.

In this scenario, the connection between Nacala Port and Tete will be strongly established both by

railway and trunk road, while the connection between Nacala Port and Pemba/Palma is relatively weak.

3) Scenario B-3: Diversified Economic Sectors Development based on a Region-Wide Corridor Network

In this scenario, a region-wide corridor network is developed by extending sub-corridors and feeder lines from the main corridor. Wide development will take place along the extensive corridor network.

With such an extensive corridor network, wide areas not only in inland Mozambique but also in Malawi and the eastern part of Zambia will be connected strongly to each other so as to form a larger and integrated regional economy. In this extensive and integrated regional economy, major urban centres, such as Nacala Bay Area and Greater Nampula, will increase their roles in providing commercial and logistics services, as well as in industrial production. Other urban centres at nodal points of the corridor network will also be able to grow their urban and economic functions.

Since a region-wide corridor network and hierarchical system of urban centres are extensively established for serving wide areas of the Region, it will be possible to create a value chain for agricultural and other economic sectors.

When the regional economy becomes diversified, it could reduce risks due to external shocks to mining sectors, including price fluctuation, unlike Scenario A-1.

In this scenario, when diversified economic sectors grow by utilising a variety of resources and development potentials, not only large enterprises but also SMEs will be able to participate in economic development in the Region. As a result, the achievement of this scenario would contribute to sustainable growth of the national economy of Mozambique.

On the other hand, development and maintenance of the extensive region-wide transport corridor network is relatively costly; therefore, it is necessary to substantially develop diversified economic sectors in order to generate cargo demands for the transport corridor.

13.2.3 Evaluation of Alternative Development Scenarios

The three alternative development scenarios (A-1, B-2 and B-3) were comparatively evaluated by considering economic and spatial impacts/benefits, social impacts and environmental impacts, as shown in Table 13.2.1.

In the medium and long terms, Scenario B-3 is better than the other scenarios from the viewpoints of economic and social impacts. The intensity of the environmental impacts in Scenario B-3 would be lower than those of Scenarios A-1 and B-2. In this respect, environmental impacts in Scenario B-3 are easier to control or manage than those of Scenarios A-1 and B-2.

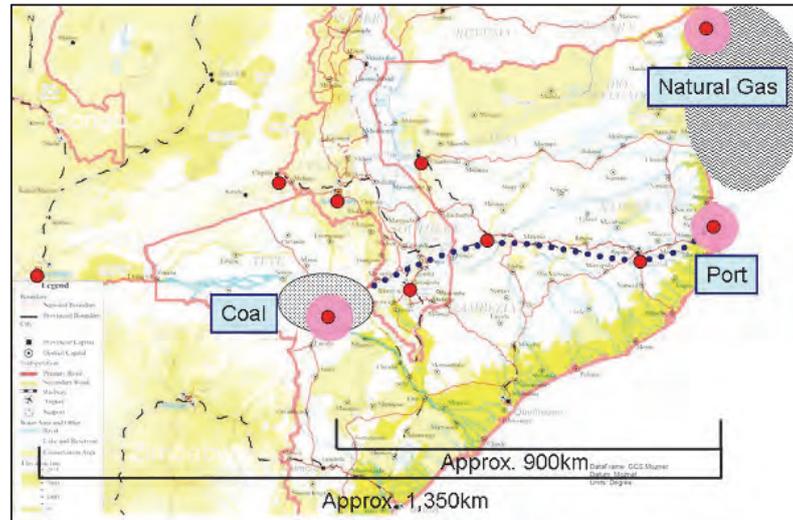
In broader terms, Scenario B-3 could bring about development benefits to wider areas, enabling more and various groups of people to participate in regional development by utilising various potentials available in a wide region.

Not by limiting development effort at certain sectors, but by promoting development of diversified economic sectors, Scenario B-3 will be able to seek sustainable development than the other scenarios.

With Scenario B-3, there would be more possibilities to generate more cargo demands to sustain the region-wide transport corridor network than the other scenarios.

Scenario A-1:
Strong Mining
Sector
Orientation
and Three
Enclaves of
Tete, Palma
and Nacala

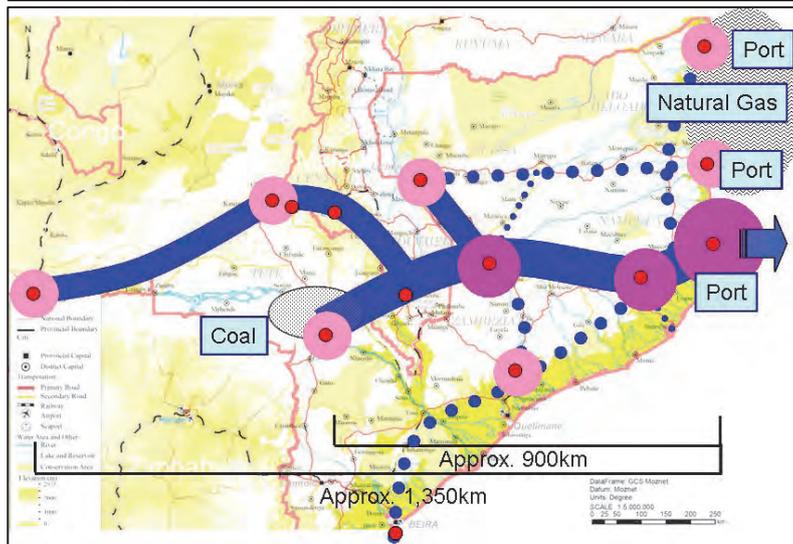
(Zero Option)



Scenario B-2:
Diversified
Economic
Sectors
Development
based on
Tete-Nacala
Single
Corridor



Scenario B-3:
Diversified
Economic
Sectors
Development
based on a
Region-Wide
Corridor
Network



Source: JICA Study Team

Figure 13.2.1 Alternative Development Scenarios for the Nacala Corridor Region

Table 13.2.1 Evaluation of Alternative Development Scenarios

Scenario Code	Scenario Name	Factors to Differentiate Scenarios		Characteristics of Benefits/Impacts		
		Major Industries	Spatial Pattern	Economic and Spatial Benefits/Impacts	Social Impacts	Environmental Impacts
A-1	Strong Mining Sector Orientation and Three Enclaves of Tete, Palma and Nacala (Zero Option)	Mining-Sector-Oriented Regional Development	1: Three Enclaves of Tete, Palma and Nacala	<ul style="list-style-type: none"> • Significant Positive Effect: Concentrated investments to mining sectors, including supporting sectors, infrastructure and urban facilities, will take place in Tete and Palma. The efficiency of invested capital for such mining-related development will be relatively high. • Negative Effect: However, since those supporting sectors, infrastructure and urban functions will be developed closely related to mining sectors, it will be difficult for other economic sectors to utilize them for their further development. As a result, not so wide a range of economic sectors will be able to develop based on the infrastructure and urban functions to be developed in relation to mining sectors in Tete and Palma. • Negative Effect: Since mineral resource development is influenced by world price fluctuation and other external shocks, Nacala Corridor Region's economy will not be very sustainable in the long run. • Negative Effect: The possibility of the improvement of value-chains for agriculture in the Nacala Corridor Region is very limited to the enclave areas. Difficulties for small-scale farmers to get access to chemical inputs and transport services will continue. 	<ul style="list-style-type: none"> • Negative Effect: A large influx of migrant managers, engineers and other workers from outside the enclaves may occur, causing various social problems. • Negative Effect: On the other hand, the employment of local human resources for mineral resources development will be limited. The supporting sectors for mining development include machine spare parts supply and maintenance services for excavation, and transport will also be operated by foreign-related enterprises. Therefore, benefits from this development scenario will not reach a wide area, but concentrate to the three enclave areas. • Slight Positive Effect: The social impacts caused by the development will also be limited to the three enclaves. 	<ul style="list-style-type: none"> • Negative Effect: Coal mining will change land features, which is likely to affect landscape, vegetation, habitats of wild animals, air quality and water quality. • Significant Positive Effect: Since the development will be limited mainly to three enclave areas, the environmental impact will also be limited geographically. This situation will make it relatively easier to implement environmental mitigation measures, environmental control and monitoring. • Slight Positive Effect: Large mining companies conduct environmental management relatively well. However, if an accident occurs, a large negative environmental impact will be caused in Tete and off-shore of Palma in Cabo Delgado. • Negative Effect: There may be an increase in negative impact on the living environment and inhabitants' health due to dust pollution caused by coal transport, as well as by coal loading & unloading. • Negative Effect: If the above negative impact is extremely large, there is a possibility of decline or suspension of mining operation, as well as closure of mines. In such a case, the impact on the regional economy will be serious.
B-2	Diversified Economic Sectors Development based on Tete-Nacala Single Corridor	B. Regional Development based on Diversified Economic Sectors	2: Tete-Nacala Single Corridor Development	<ul style="list-style-type: none"> • Slight Positive Effect: The risks caused by geographical concentration of economic development will be eased compared to Scenario 1 due to diverse economic sectors in wide areas. • Slight Positive Effect: Tete and Nacala Port will be connected strongly by railway and trunk road, which can transport non-coal cargoes in a long distance. With this upgraded corridor, development potentials will emerge. It will become possible to promote development of not only commercial and logistics sectors, but also manufacturing sectors, especially in major urban centres, such as Nacala and Nampula. Since the upgraded transport corridor is only one from Tete to Nacala Port, major economic development will tend to concentrate in the major urban centres and the areas along the main corridor. • Slight Positive Effect: With this upgraded transport corridor, transport costs will be reduced greatly along the corridor. Moreover, with the upgraded urban centres on the corridor, private sectors will be able to create a value chain for agricultural sectors. • Negative Effect: However, Palma and Pemba will not be strongly connected with the main corridor of Tete-Nacala Port. As a result, manufacturing sectors around Nacala Port will not have synergetic effect with natural gas exploitation and chemical industries in Palma. • Negative Effect: Improvement of value-chains for agriculture will be limited to the areas along the corridor of Nacala-Nampula-Cuamba-Mandimba-Lichinga. A majority of small-scale farmers will continue to feel it difficulty in getting access to chemical inputs and transport services. 	<ul style="list-style-type: none"> • Negative Effect: Since the transport corridor will be upgraded mainly from Tete to Nacala Port, the scale and extent of development benefits will be limited to the areas along the main corridor (Tete-Nacala Port). • Slight Positive Effect: As a result, the price decline of consumer goods and construction material due to the decrease in transport costs will not be enjoyed very widely in the region. The improvement of market access will also be limited to the corridor areas. • Slight Positive Effect: Increase of selling prices of small-farmers' agricultural products will take place only along the upgraded corridors. • Negative Effect: With a less extensive transport corridor network, a huge size of less accessible areas will remain in the region. 	<ul style="list-style-type: none"> • Slight Positive Effect: The environmental impact including reduction of forest areas will be limited to the areas along Tete-Nacala Corridor. • Negative Effect: In major urban centres at important nodal points, such as Nacala and Nampula, the environmental impact will increase due to the concentration in population increase and economic development.

B-3	Diversified Economic Sectors Development based on a Region-Wide Corridor Network	B. Regional Development based on Diversified Economic Sectors	3: Development based on a Region-Wide Corridor Network	<ul style="list-style-type: none"> • Significant Positive Effect: Economic sectors will become more diverse and the risk caused by market demand fluctuation of mineral resources will be much eased compared with Scenarios 1 and 2. • Significant Positive Effect: Under the extensive upgraded transport corridor network, not only large enterprises but also small & medium enterprises (SMEs) will be able to participate in development opportunities to arise due to the upgrading of transport corridors. At the same time, a variety of economic sectors will be able to grow by utilizing various potentials scattering over a wide region. This will also benefit the national economy as a whole. • Negative Effect: On the other hand, the improvement of such a region-wide corridor network will be costly. It will be necessary for economic sectors of the region to make continuous effort at promoting diversified and geographically wide economic development in order to generate a large enough volume of cargo to sustain the extensive corridor network. • Significant Positive Effect: Improved value-chains for agriculture will be available in wide areas of the Nacala Corridor Region. As a result, small-scale farmers will be able to get access to chemical inputs and transport services. 	<ul style="list-style-type: none"> • Significant Positive Effect: With the upgraded extensive corridor network, accessibility to infrastructure and services will be largely improved and time costs borne by people and businesses will be reduced in wide areas in the region. • Significant Positive Effect: This type of extensive corridor network has a positive effect on reducing the prices of daily commodities and construction materials. • Significant Positive Effect: Small-scale farmers will have opportunities to expand their markets due to better access. Selling prices of small-scale farmers' agricultural products will be increased in relatively wide areas, due to the decrease of transport costs. • Negative Effect: While the extended corridor network will bring commercial agricultural investments and public construction projects, and expand business opportunities in the region, land acquisition and unspontaneous resettlement would increase. Consequently, risks of loss of income sources or means of livelihood, which affects the inhabitants, especially small-scale farmers, of the region might increase even with recommended land management effort. • Slight Positive Effect: Business opportunities will expand due to the geographical expansion of development areas. On the other hand, there is a risk of widening the gap between the rich and the poor. • Negative Effect: The risks of crime and prevalence of infectious diseases may increase in wide areas due to a large volume of migration. 	<ul style="list-style-type: none"> • Negative Effect: The environmental impact including reduction of forest areas will be larger than the other development scenarios. • Negative Effect: If the provision of infrastructure is delayed, the negative impact on the living environment may become larger in Nacala Bay Area, because of its rapid population increase, causing rapid expansion of urban sprawl, heavy traffic congestion, increase of solid waste and sewage. • Negative Effect: In the case of Nacala Bay Area, development of manufacturing sectors and increase of commercial and logistics activities will take place along Nacala Bay. It is likely to bring about environmental impacts in a compounding manner. • Negative Effect: Nampula will also continue to increase its population and expand economic development. As a result, the environmental impact will become larger. The rail transport for massive coal through the central part of Nampula City might cause serious negative impacts. Moreover, the road traffic on National Road No. 13 on the main corridor will also go through the central area of Nampula City. These compounding impacts might cause serious negative impacts. Furthermore, such serious impacts might hinder economic development for Greater Nampula.
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Source: JICA Study Team

13.3 Overall Development Strategies

13.3.1 Overall Development Strategies and Essential Development Strategies

PEDEC-Nacala formulates “Overall Development Strategies” to provide solutions covering a wide range of overall issues. The Overall Development Strategies are formulated to cover all of the short, medium and long terms. For implementing the Overall Development Strategies, priority programmes/projects are considered. In PEDEC-Nacala, ideas on priority programmes/projects were prepared.

On the other hand, in order to start up regional development so as to lead to region-wide dynamic and inclusive development, Essential Development Strategies are formulated and recommended for short and medium-term implementation in line with the Overall Development Strategies. For implementing the Essential Development Strategies, especially important priority programmes/projects are selected out of the priority programmes/projects.

13.3.2 Overall Development Strategies for the Nacala Corridor Region

For achieving the selected development scenario for the Nacala Corridor Region, PEDEC-Nacala formulated the following seven overall strategies for the development of the Nacala Corridor Region.

- (1) **Effective Region-Wide Transport and Logistics System**
 - Creation of an effective region-wide transport and logistics system by ensuring that key transport projects could come into operation, the railway could be used for general cargoes, containers and passengers, not limited to coal transport, and inter-modal cargo transshipment could be secured among sea transport, rail transport and road transport.
- (2) **Foundation for Manufacturing Sectors in Major Urban Centres**
 - Strengthening of the foundation for manufacturing sectors at major urban centres in addition to commercial and logistics functions.
- (3) **Agriculture and Other Economic Sector Development oriented to Non-Mineral Resources**
 - Promotion of agricultural development and other economic sectors development that are oriented toward non-mineral resources by implementing support measures in addition to upgrading of the transport corridors.
- (4) **Environmental Management and Land Management**
 - Strengthening of environmental management by capacity development for enforcement of environmental regulations and monitoring of environmental management and by assuring “Principles for Responsible Investment in Agriculture and Food System (rai Principles)” and Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security.
- (5) **Human Resources Development**
 - Strengthening of human resources development by improving both basic education and technical and vocational education and training (TVET).

- (6) **Coordination and Promotion of Integrated Regional Development**
 - Establishment of an institutional framework and implementation of capacity development for coordinating and promoting integrated development.
- (7) **Region-Wide Inclusive Development**
 - Coping with emerging social problems, socially vulnerable people and geographically less accessible areas for promoting inclusive development widely in the region.

13.3.3 Essential Development Strategies

In line with the directions and emphases of the Overall Development Strategies, Essential Development Strategies are formulated and the following necessary actions are recommended:

(1) **Securing of the Multi-Modal Transport Function of the Nacala Corridor**

For long-term effort at establishment of a region-wide corridor network, it is necessary to start with the securing of the multi-modal transport function of the Main Corridors by the following actions:

- Assuring Coal Railway Transport from Moatize to Nacala Port
- Assuring Non-Coal Railway Transport for the Nacala Corridor
- Port-Railway Integration at Nacala Port
- Port-Road Integration in Nacala Bay Area
- Securing the Upgraded Road Function of the Nacala Corridor
- Capacity Development of Railway Regulatory Body (INATTER)

(2) **Development of the Foundation for Economic Development in Nacala Bay Area, Greater Nampula and Palma**

For developing diversified economic sectors, it is essential to take advantage of emerging development potential due to the upgrading transport corridor. Such development potential will arise significantly in Nacala Bay Area and Greater Nampula. Moreover, by taking advantage of prospective natural gas exploitation in northern Cabo Delgado, it is possible to develop chemical industries using natural gas (including methanol and ammonia) in Palma.

However, it is not an easy task to start up economic sector development considering the present poor infrastructure situation. Therefore, it is necessary to start with the development of the foundation for economic sector development in Nacala Bay Area, Greater Nampula and Palma by taking the following actions:

- Development of the Foundation (Investment Promotion, Roads, Electricity Distribution and Water Supply, Other Urban Infrastructure and Services) for Manufacturing Sectors in Nacala Bay Area, Greater Nampula and Palma
- Water Resource Development and Urban Water Supply for Nacala Bay Area, Greater Nampula and Palma
- Securing of Electricity Supply in Nacala Bay Area, Greater Nampula and Palma

(3) Promotion of Sustainable Agricultural Development by 1) Promoting Development of Small-Scale Farmers and 2) Promoting Effective Utilisation of the Private Sector's Viability and Funds for Assisting Small-Scale Farmers

Agricultural strategies are prepared for achieving the following objectives:

1) For development of small-scale farmers

- To protect the rights of small-scale farmers and communities on land and other natural resources and their sustainable use, and the prevention of conflicts
- To increase agricultural production and its diversification, and improvement of the productivity of small-scale farmers
- To establish supply chains for agricultural products and to generate added values
- To enhance governance of the agricultural sector
- To develop a social infrastructure to assist community improvement

2) For effective use of the private sectors viability and funds for assisting small-scale farmers

- To increase agricultural production and its diversification, and improvement of productivity
- To establish supply chains for agricultural products and to generate added values
- To realise appropriate private investment applying “Principles for Responsible Investment in Agriculture and Food System (rai Principles)” and Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security

In line with the above directions, PEDEC-Nacala recommends the promotion of agricultural development by taking advantage of upgraded transport corridors, as well as emerging mining sectors (coal and natural gas).

The priority areas for applying the above strategies should be the areas along the main corridors and sub-corridors shown in the Spatial Structure for Nacala Corridor Region (See Figure 12.2.1). In addition, the areas near Palma and Pemba for supporting natural gas development and the areas near Tete coal mines are important targets for applying these agricultural development strategies.

(4) Strengthening of Implementation System and Capacity for Environmental Management and Land Management

In order to cope with increasing environmental problems and land disputes due to increasing economic activities, development activities and investments in the course of regional development, it is essential to start with the strengthening of implementation systems and capacity development for environmental management and land/forest management as follows:

- Strengthening of Implementation System for Environmental Management including Environment Monitoring
- Establishment of Environmental Laboratories (Maputo, Tete and Nacala)
- Capacity Development of Technical Personnel for Environmental Laboratories
- Capacity Development for Monitoring of Conformity with rai Principles
- Capacity Development for Appropriate Operation of DUAT System in accordance with Land/Forest Management Policies

(5) Strengthening of Basic Education and Industrial Human Resources Development

Considering the present situation of primary and secondary education in the Nacala Corridor Region, it is essential to start with the strengthening of basic education (primary and secondary education) for enriching people's lives and preparing for employment. At the same time, it is also essential to establish and improve technical and vocational education and training institutions.

- Increase of Government Budgets for Improving the Quality of Basic Education
- Encouragement of Community Participation in Improvement of Quality of Primary Schools in Communities
- Strengthening of Secondary Education through Focus on Science and Mathematics Education
- Establishment of Technical and Vocational Education and Training (TVET) Institutions

(6) Establishment and Capacity Development of an Institutional Framework for Coordinating and Promoting Integrated Regional Development

In order to effectively start up and efficiently promote multi-sectoral development covering huge areas, it is essential to establish an effective coordinating mechanism by implementing the following actions:

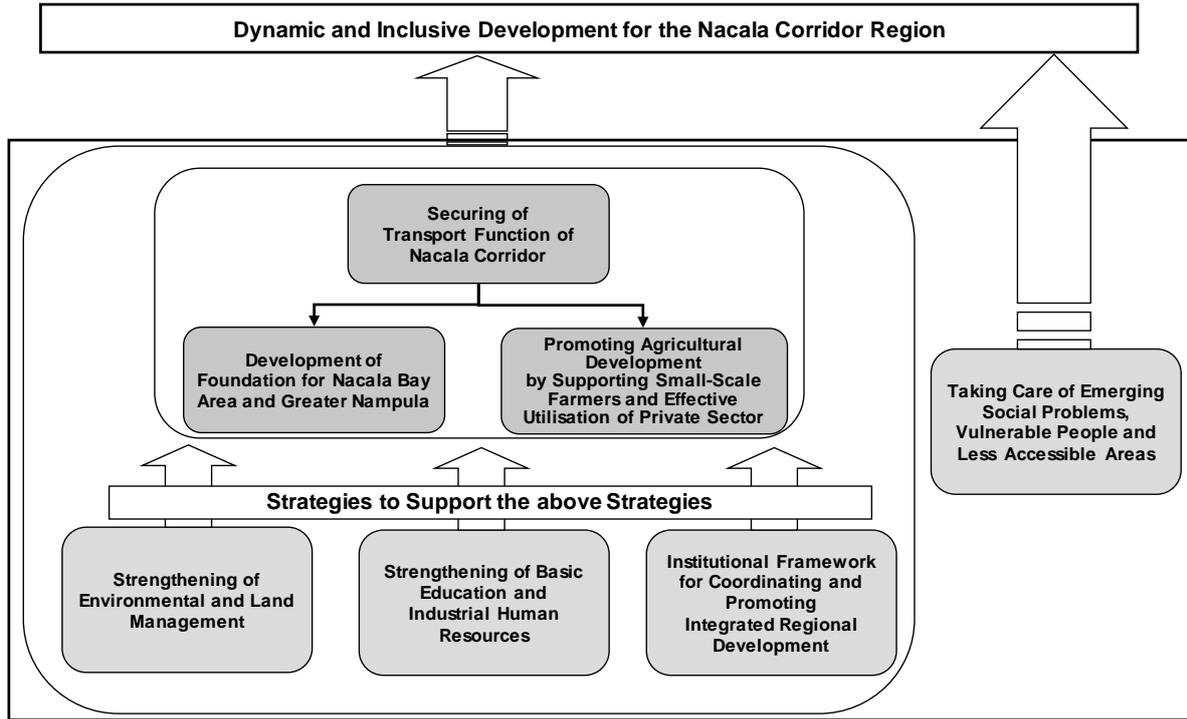
- Establishment of an Institutional Framework for Promoting and Coordinating Integrated Development in the Nacala Corridor Region
- Capacity Development of the Special Organisation for Promoting and Coordinating Integrated Development in the Nacala Corridor Region

(7) Taking Care of Emerging Social Problems, Vulnerable People and Less Accessible Areas

For achieving "Inclusive Development", it is essential to cope with a variety of social and environmental problems that could emerge in the course of promoting dynamic development in the Region. Special attention should also be paid to socially vulnerable people, who might not be able to participate in prospective development opportunities, and to geographically less accessible areas¹, which might not be able to be well covered by a region-wide corridor network and by a hierarchical urban centre system. For this kind of effort, the following actions are among the starting points required by allocating more government budgets:

- Paying Attention to and Preparation for Emerging Social and Environmental Problems
- Conducting Dialogues with Groups of Vulnerable People and People Living in Less Accessible Area
- Upgrading of Health Services Capacity in Major Urban Centres
- Strengthening of Primary Health Care System in Rural Areas

¹ Less accessible areas are defined by PEDEC-Nacala as those areas which are 30km away or farther from the main corridors, sub-corridors and feeder lines of the proposed long-term spatial structure of the Nacala Corridor Region.



Source: JICA Study Team

Figure 13.3.1 Composition of Essential Development Strategies

13.3.4 Medium and Long-Term Actions to be Taken in Line with Overall Development Strategies

After taking necessary actions to implement the Essential Development Strategies for starting up regional development and promoting inclusive development in the short and medium terms, further actions (medium and long-term actions) should be taken. These actions are summarised in Tables 13.3.1 through 13.3.3.

Table 13.3.1 Medium and Long-Term Actions to be Taken for Implementing Overall Development Strategies

Overall Development Strategies		
	Essential Development Strategies Short- and Medium-Term Actions to be Implemented	Medium- and Long-Term Actions to be Implemented
(1) Effective Region-Wide Transport and Logistics System	<p><u>Start with Securing of Transport Function of the Main Corridor (Nacala-Nampula-Nayuchi-Nkaya-Moatize) (by Capitalizing on Ongoing and Planned Transportation Projects)</u></p> <ul style="list-style-type: none"> - Assuring of Coal Railway Transport from Moatize to Nacala Port - Assuring of Non-Coal Railway Transport for the Nacala Corridor - Port-Railway Integration at Nacala Port - Port-Road Integration in Nacala Bay Area - Securing of the Upgraded Road Function of the Nacala Corridor - Capacity Development of Railway Regulatory Body (INATTER) 	<p><u>In the Medium and Long Terms, Develop a Region-Wide Corridor Network by Extending Sub-Corridors and Feeder Lines</u></p> <ul style="list-style-type: none"> - Strengthening of Cuamba-Lichinga Route of Northern Railway - Upgrading of Nkaya-Lilongwe-Mchinji Route of Malawi Railway System - Upgrading of Train Operation at Mchinji-Chipata - Extending of Mchinji-Chipata up to Mpika to connect with Tazara Railway - Strengthening of Capacity of Road Maintenance
(2) Foundation for Manufacturing Sectors in Major Urban Centres	<p><u>Start with Nacala Bay Area and Greater Nampula for Development of the Foundation for and Promotion of Manufacturing Sectors</u></p> <ul style="list-style-type: none"> - Development of Foundation for Manufacturing Sectors in Nacala Bay Area and Greater Nampula - Water Resources Development and Urban Water Supply for Nacala Bay Area and Greater Nampula - Securing of Electricity Supply in Nacala Bay Area and Greater Nampula - Development of Foundation for Natural Gas Exploitation and Natural Gas Related Chemical Industries, including Public Port, Electricity Supply, Water Supply, Urban Functions and Social Services, in Palma 	<p><u>In the Medium and Long Terms, Develop the Foundation for Manufacturing Sectors in Other Major Urban Centres, such as Tete-Moatize, Cuamba City, Lichinga City, Pemba City and Palma</u></p> <ul style="list-style-type: none"> - Tete/Moatize as an Inland Regional Administration and Business Centre on the Main Corridor - Cuamba as an Inland Regional Logistics and Industrial Centre on the Main Corridor - Palma as a Chemical Industrial Centre - Pemba as a Provincial Growth Pole and Service Centre Including the Function of Supporting Base for Natural-Gas Exploitation and Tourism Centre - Lichinga as Provincial Growth Pole and Service Centre Including the Function of Academic and Research Function, as well as Wood Processing Industry
(3) Agriculture and Other Economic Sector Development Oriented to Non-Mineral Resources	<p><u>Start with Areas along the Main Corridor from Nacala through Nampula, Cuamba to Mandimba and Lichinga</u></p> <ul style="list-style-type: none"> - To Protect Rights of Small-Scale Farmers and Communities on Land and Other Natural Resources and their Sustainable Use - To Increase Agricultural Production and its Diversification, and Improvement of Productivity of Small-Scale Farmers - To Establish Supply Chains for Agricultural Products and Generate Added Values - To Develop Social Infrastructure to Assist Community Improvement - To Realize Appropriate Private Investment Applying "Principles for Responsible Investment in Agriculture and Food System (rai Principles)" and Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security 	<p><u>In the Medium and Long Terms, Implement Small-Scale Farmers Supporting Strategies, Extend a Value Chain for Agriculture and Promote Other Economic Sectors in Areas along Sub-Corridors and Feeder Lines</u></p> <ul style="list-style-type: none"> - Areas Along Lichinga-Marrupa Sub-Corridor - Areas Along Cuamba-Marrupa Feeder Line - Areas Along Marrupa-Montepuez Sub-Corridor - Tourism Development

Source: JICA Study Team

Table 13.3.2 Medium and Long-Term Actions to be Taken for Implementing Overall Development Strategies

Overall Development Strategies		
	<u>Essential Development Strategies</u> Short- and Medium-Term Actions to be Implemented	Medium- and Long-Term Actions to be Implemented
(4) Environmental Management and Land Management	<p><u>Start with Strengthening of Implementation System and Capacity Development for Environmental Monitoring and Land/Forestry Management</u></p> <ul style="list-style-type: none"> - Strengthening of Implementation System for Environmental Management including Environment Monitoring - Establishment of Environmental Laboratories (Maputo, Tete and Nacala) - Capacity Development of Technical Personnel for Environmental Laboratories - Capacity Development for Monitoring of Conformity with rai Principles - Capacity Development of Appropriate Operation of DUAT System in Accordance with Land/Forest Management Policies 	<p><u>Furthermore, Continue the Strengthening of Implementation Systems and Capacity Development for Environmental Management and Land/Forest Management</u></p> <ul style="list-style-type: none"> - Increase of Technical Personnel for Environmental Management - Expansion of Variety of Chemical Substances to be Analysed by Environmental Laboratories - Capacity Development of Technical Personnel for Environmental Laboratories
(5) Human Resources Development	<p><u>Start with Strengthening of Basic Education and Industrial Human Resources Development</u></p> <ul style="list-style-type: none"> - Increase of Budgets for Improving the Quality of Basic Education - Encouragement of Community Participation in Improvement of the Quality of Primary Schools in Communities - Strengthening of Secondary Education Through Focus on Science and Mathematics Education - Establishment of Vocational Education and Training Institutions 	<p><u>Furthermore, Continue the Strengthening of Basic Education, Especially in Less Accessible Areas, and Improvement of TVET Institutions by Paying Attention to the Needs of Economic Sectors</u></p> <ul style="list-style-type: none"> - Continuation of Improvement of Basic Education - Paying More Attention to Less Accessible Areas for Improvement of Basic Education - Improvement of Vocational Education and Training Institutions in Accordance with Needs of Industrial and Business Sectors
(6) Coordination and Promotion of Integrated Regional Development	<p><u>Start with Establishment of and Capacity Development for a New Organization Specially Designed for Coordination and Promotion of Integrated Development</u></p> <ul style="list-style-type: none"> - Establishment of Institutional Framework for Promoting and Coordinating Integrated Development in the Nacala Corridor Region - Capacity Development for Promoting and Coordinating Integrated Development in the Nacala Corridor Region 	<p><u>Continue the Coordination and Promotion for Integrated Development by Revising PEDEC Strategies Based on Monitoring and Evaluation</u></p> <ul style="list-style-type: none"> - Revision of PEDEC Strategies Based on Analysis of Results of Monitoring and Evaluation - Improvement and Adjustment of Mechanism and Organization for Promoting and Coordinating Integrated Development in the Nacala Corridor Region - Coordination and Promotion for Implementation of Revised PEDEC Strategies

Source: JICA Study Team

Table 13.3.3 Medium and Long-Term Actions to be Taken for Implementing Overall Development Strategies

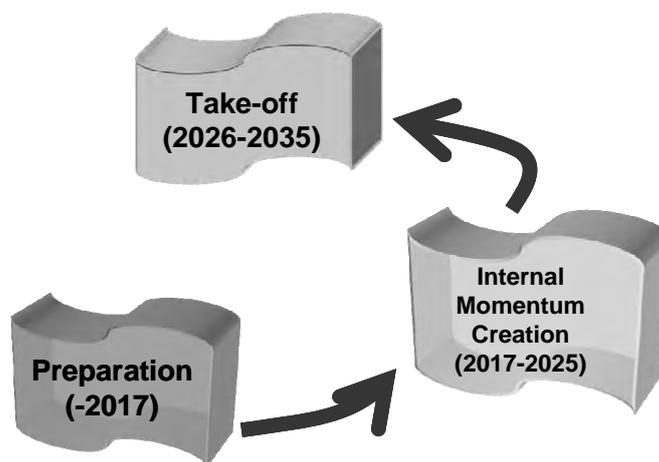
	Overall Development Strategies	
	Essential Development Strategies Short- and Medium-Term Actions to be Implemented	Medium- and Long-Term Actions to be Implemented
(7) Deep Inclusive Development	<p><u>Start with Preparation for Taking Care of Emerging Social and Environmental Problems, Vulnerable People and Less Accessible Areas</u></p> <ul style="list-style-type: none"> - Paying Attention to and Preparation for Emerging Social and Environmental Problems - Conducting Dialogues with Groups of Vulnerable People and People in Less Accessible Areas - Upgrading of Health Services Capacity in Major Urban Centres - Strengthening of Primary Health Care System in Rural Areas 	<p><u>Continue the Implementation of Measures against Social and Environmental Problems and Special Measures for Taking Care of Vulnerable People and Less Accessible Areas</u></p> <ul style="list-style-type: none"> - Strengthening of Capacity for Coping with Social and Environmental Problems due to Increasing Economic and Development Activities - Implementation of Special Measures for Vulnerable Groups of People - Implementation of Special Measures for Less Accessible Areas - Further Expansion of Health Services Capacity in Urban Centres Including Major and Minor Urban Centres - Further Expansion of Primary Health Care System in Rural Areas

Source: JICA Study Team

13.4 Stage-Wise Development Strategies

13.4.1 Stage-Wise Development Prospect

As part of development scenario, a way of development by stage is presented in this section. The development of the Nacala Corridor Region is divided into three stages: preparation stage from 2013 to 2017, internal momentum creation stage from 2018 to 2025 and take-off stage from 2026 to 2035.



Source: JICA Study Team

Figure 13.4.1 Stage-Wise Development for Nacala Corridor Region (3 Stages)

13.4.2 Stage-Wise Development Strategies

(1) Different Strategies by Stage

As described in the previous section, different situations or objectives are expected to be achieved at different stages of the three-stage development. The following strategies for each stage are proposed to achieve the staged development.

1) Strategies for Preparation Stage (Present-2017)

The coal extraction and export started in this period and this is one of the initial driving forces, which is expected to enable the following strategies effective in promoting the development of diversified economic sectors.

- Strategies to make the transport corridor consisting of railways, roads and sea ports, functional and effective
 - Port-road integration (port access road)
 - Port-railway integration (shunting yards)
 - Railway-road integration (multi-modal logistics terminals)
- Strategies to increase the capacity and efficiency of the corridor railways in transporting non-coal cargo (general cargo and containers)
 - Railway-railway integration through international cooperation
 - Coordination between coal transport and non-coal transport on corridor railways

- Strategies to prevent or mitigate negative environmental and social impacts which might be caused by mega projects and other developments so as to smoothly start the Nacala Corridor regional development

2) Strategies for Internal Momentum Creation Stage (2017-2025)

The natural gas extraction and export will start in this period and it is expected to substantially improve the situation of national economy of Mozambique. At the same time, the possibility for developing chemical industries utilizing extracted natural gas would arise.

- Strategies for providing infrastructure and services in order to promote investments and initiate the development of the economic sectors, such as manufacturing, agriculture and tourism, as well as chemical industries
- For supporting the development of urban-based industries, electricity supply, water resources development and water supply are keys
 - Electricity supply to the urban and manufacturing sectors
 - Water supply to the urban and manufacturing sectors
- Strategies for capacity development for investment promotion are also required to support such urban-based industrial development
- On the other hand, area development for agriculture and industrial tree plantation requires not only strategies for infrastructure/services provision, but also strategies for establishing a system for preventing and resolving possible conflicts between investors and small-scale farmers

3) Strategies for Take-off Stage (2026-2035)

- Strategies to provide infrastructure support and institutional support
- Strategies to promote collaboration of different economic sectors, including development of supporting industries for manufacturing and chemical industries
- Strategies to promote integration of economic sectors and infrastructure
- Strategies for capacity development for these purposes above

(2) Different Types of Integration by Stage

The above mentioned different strategies by stage contain different types of integration at each stage. At the Preparation Stage, integration of different transport modes, such as the sea port and roads, sea port and railways, and railways and roads, is important. At the Internal Momentum Creation Stage, support of infrastructure sectors to economic sectors is essential. At the Take-off Stage, more intensive and self-sustained interaction within economic sectors should be promoted. Table 13.4.1 shows different types of integration at these three stages.

Table 13.4.1 Different Types of Integration by Stage

Stages	Types of Integration			
Preparation Stage	Port-Road Integration	Port-Railway Integration	Railway-Road Integration	Railway-Railway Integration
Internal Momentum Creation Stage	Electricity Supply to Urban Sector/ Manufacturing Sector	Water Supply to Urban Sector/ Manufacturing Sector	Road Access to Key Urban Functions/ Manufacturing Bases	Road Access to Tourism Sites
Take-off Stage	Spontaneous Integration between Different Economic Sectors	More Intensive Infrastructure Supporting Various Economic Sectors	-	-

Source: JICA Study Team

Chapter 14 Economic Sectors Development Strategies

14.1 Introduction

This chapter covers a variety of economic sectors including agriculture, forestry, mining, natural gas, processing industry, logistics, tourism and investment promotion.

Within the above, for initiating dynamic development in the Nacala Corridor Region, the mining and natural gas sectors are essential. However, for seeking sustainable development, environmental and social problems are considered in a proactive manner, to formulate development strategies for coal extraction and transport, and natural gas sectors. In addition, the region-wide transport corridor network proposed to cover the Nacala Corridor Region will enhance wide distribution of development benefits from the natural resources. Fortunately, private initiatives for coal extraction in Tete and transport from Tete to Nacala Port are upgrading the railway line of the Nacala Corridor, so as to increase economic development potential in major urban centres along the transport corridor, as well as in Nacala Bay Area. Such upgrade would expand potential development opportunities, by which diversified economic sectors could grow, including commercial, logistics and manufacturing.

By taking advantage of the increases in such potential development opportunities, a priority project for creation of linkage between large companies and SMEs is proposed to promote wide distribution of development benefits to societies and communities in the Nacala Corridor Region.

The upgraded and expanded transport corridors would also contribute to the creation of value chains for agriculture and forestry along the corridors. Moreover, since over 80% of the economically active population are small-scale farmers in the Nacala Corridor Region, agricultural development strategies considering small-scale farmers are very important. The improved transportation would reduce transport costs due to reduction of vehicle operation costs and fuel costs. Such transport cost reduction would reduce agricultural production costs because the prices of seeds and chemical inputs fall down. Moreover, the transport cost reduction would increase the number of traders to come to inland areas for purchasing agricultural products and the small-scale farmers will also have opportunities to expand their markets due to better access. This could increase profits by producing and selling agricultural products in rural areas of the Nacala Corridor Region.

14.2 Agricultural Sector Development Strategies

14.2.1 Future Prospects of the Agricultural Sector

A food supply and demand balance was reviewed for the target years of 2017, 2025 and 2035. The results are summarized as follows.

Table 14.2.1 Food Balance in Nacala Corridor Region

Unit: thousand ton

Crop	2011	2017	2025	2035
Maize	1,199	2,269	3,212	3,326
Millet	28	65	97	171
Sorghum	145	490	701	686
Rice	-390	-532	-606	-1,113
Wheat	-237	-359	-436	-660
Beans	369	678	947	936
Cassava	3,044	7,135	10,637	11,198
Potatoes	71	174	253	241
Sweet potatoes	-96	116	232	265
Groundnuts	67	212	328	314
Cotton	98	152	208	225
Tobacco	70	129	176	191
Tea	4	7	9	10
Sunflower seed	9	14	19	21
Sesame	67	131	181	196
Soybeans	18	76	624	781
Cashew nut	68	98	130	302

Source: JICA Study Team based on PEDSA 2011-2020 in five target provinces

Maize has high potential for export, food processing and feed grain for livestock. Cassava could be a raw material for starch. Soybean will be a prospective export crop. Although rice could be grown in the Nacala Corridor Region, demand should be largely met by import. Wheat also will have to be imported.

14.2.2 Issues on the Agricultural Sector

In agriculture sector, the following issues are defined:

- Small-scale farmers who practice family farming are dominant in the Nacala Corridor Region. Their agricultural productivity is relatively low, and their production volume per family is not substantially large although the soils and rainfall in the region are favourable for agriculture.
- The small-scale farmers' agriculture is extensive in input of land and labour, which requires shifting of cultivated lands and keeping of large fallow areas.
- Prices of existing agricultural products are relatively low partly because the transport conditions are poor and the producers are very far from large markets, such as those of major cities and export markets.
- Prices of existing agricultural products tend to be low partly because the products are of low quality and less diversified. Most farmers produce similar agricultural products (a limited number of agricultural products), easily resulting in over supply in the markets.
- Cash income from selling agricultural products is very limited. Selling of collected fire wood and making charcoal are important cash income sources.
- Off-farm employment opportunities are also limited in rural areas.
- Farm lands and community lands are neither formally registered nor managed. In this situation, population increase has caused an increase in land disputes among villagers. Moreover, increasing

investments coming into rural areas have increased land conflicts between local farmers and agricultural investment companies.

- There is no well-established value chain, which includes a variety of components including input supply, marketing, transport, warehousing, processing industries, and financing. Because of the absence of a well-established value chain for the agricultural sector, it is difficult for small-scale farmers to practice efficient modern agriculture. It is not easy even for private sectors to engage in agribusiness operations in the rural areas.

14.2.3 Objectives for the Agricultural Sector

The objectives of the agricultural sector in the Nacala Corridor Region are in line with the four strategic objectives of PEDSA in Section 4.1.2. The objectives are defined as follows:

(1) For development of small-scale farmers

- To protect rights of small-scale farmers and communities on land and other natural resources and their sustainable use, and the prevention of conflicts
- To increase agricultural production and its diversification, and improvement of productivity of small-scale farmers
- To establish supply chains for agricultural products and generating of added values
- To enhance governance of agriculture sector
- To develop social infrastructure to assist community improvement

(2) For effective use of private sectors vitality and fund for assisting small-scale farmers

- To increase agricultural production and its diversification, and improvement of productivity
- To establish supply chains for agricultural products and generating of added values
- To realize appropriate private investment applying “Principles for Responsible Investment in Agriculture and Food System (rai Principles)” and “Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security”

14.2.4 Strategies for the Agricultural Sector

In order to achieve the abovementioned objectives, the strategies for agriculture sector are formulated as follows:

(1) Strategies for Development of Small-Scale Farmers

1) Protection of Rights of Small-Scale Farmers and Communities on Land and Other Natural Resources and their Sustainable Use, and the Prevention of Conflicts

- By Incorporation of “Principles for Responsible Investment in Agriculture and Food System (rai Principles)” and “Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security” in Legal Structure and Administrative System of Government Institutions
- By Promotion of Land Registration for Communities and Small-Scale Farmers
- By Strengthening of Supervision Mechanism on Land and Environment Law Enforcement
- By Implementation of a Basic Study for Water Resource Management
- By Implementation of a Forest Initiative Programme

- 2) **Promotion of Increase in Agricultural Production and its Diversification, and Improvement of Productivity of Small-Scale Farmers**
 - By Strengthening of Agricultural Research
 - By Strengthening of Agricultural Extension Service
 - By Establishment of Agricultural Development Centre
 - By Model Development of Leading Farmers in the Community
 - By Support of Female Farmers
 - By Training of Distributors of Agricultural Inputs
 - By Improvement of Accessibility to Fertilizers
 - By Promotion of Tractor Hire Services
 - By Establishment of Financial Support System for Small and Medium Sized Agribusiness Enterprises, Farmers Organizations and Individual Farmers
 - By Irrigation System Rehabilitation
 - By Improvement of Irrigation Technology and Construction Quality
 - By Establishment of Vegetable Production Model
 - By Promotion of Cashew Production Development
 - 3) **Establishment of Supply Chains for Agricultural Products and Generating of Added Values**
 - By Formulation and Development of Modern Agricultural Cooperatives
 - By Market Information Access Improvement
 - By Standardization of Agriculture Products
 - By Improvement of Access Roads for Agricultural Activities
 - By Establishment of Rural Agro-industry Development Models
 - By Establishment of Quality Seed Multiplication Model
 - 4) **Enhancement of Governance of Agriculture Sector**
 - By Improvement of Regional Agricultural Statistic System
 - 5) **Assistant for Community Development**
 - By Support of Community Development Activities
- (2) **Strategies for Effective Use of Private Sectors for Assistant of Small-Scale Farmers**
- 1) **Increase in Agricultural Production and its Diversification, and Improvement of Productivity**
 - By Establishment of Proper Operational Management Framework for the Out-grower Scheme
 - By Implementation of Tea Industry Revitalization
 - 2) **Establishment of Supply Chains for Agricultural Products and Generating of Added Values**
 - By Promotion of Quality Seed Production at the Regional Level
 - By Establishment of a Support Organization for Agricultural Investment and Value Chain Development
 - By Capacity Development of Business Development Services
 - By Establishment of Agricultural Special Economic Zone
 - By Rehabilitation of Agricultural Storage Facilities

- 3) Realization of Appropriate Private Investment by Applying “Principles for Responsible Investment in Agriculture and Food System (rai Principles)”¹ and “Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forest in the Context of National Food Security”²**
- By Incorporation of “rai Principles” in Legal Structure and Administrative System of Government Institutions
 - By Strengthening of Supervision Mechanism on Land and Environment Law Enforcement
- 4) Creation of Linkages between Small-Scale Farmers and Large-Scale Mining Activities**
- The potential areas for this strategy are as follows:
 - Angonia-Tsusangano in Tete Province for local communities to supply food crops and fruits to coal mining companies in Tete Province
 - Areas near N'guri Irrigation Dam (existing but needs rehabilitation) for local communities to supply food crops and fruits to natural gas exploitation companies in Cabo Delgado Province
 - Areas near Chipembe Irrigation Dam (existing but needs rehabilitation) for local communities and to supply food crops and fruits by local communities to natural gas exploitation companies in Cabo Delgado Province

The priority areas for applying these strategies should be the areas along the main corridors and sub-corridors shown in the Spatial Structure for Nacala Corridor Region (See Figure 12.2.1). In addition, the areas near Palma and Pemba for supporting natural gas development and the areas near Tete coal mines are important targets for applying these agricultural development strategies.

14.2.5 Programmes and Projects for the Agricultural Sector

Within the Nacala Corridor Region, various projects will be formulated based on the strategies described in the previous section.

¹ The Committee on World Food Security (CFS) endorsed “the Principles for Responsible Investment in Agriculture and Food System” on 15th October, 2014.

² “Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests in the Context of National Food Security, 2012”, FAO and CFS

14.3 Forestry Sector Development Strategies

14.3.1 Future Prospects of the Forestry Sector

The transportation volumes in the target years were estimated based on the planned area for tree planting as follows. The transportation volume is estimated to be 28 thousand tons per day in 2035.

Table 14.3.1 Estimated Transportation Volume

Item	Unit	2025	2035
Total production of wood & wood products	1,000 m ³ /year	4,223	7,170
Transportation	ton/day	16,621	28,201

Source: JICA Study Team based on the Seminar Document of AFN (Forestry Association of Niassa), August 2012, and the interview data from the industrial tree planting companies (ITP)

14.3.2 Issues on the Forestry Sector

In the forestry sector, the following issues are identified:

- Railway from Lichinga- Cuamba-Nacala Port is essential for transporting fuel and machines to Lichinga and for transporting harvested timber and processed wood. The rehabilitation work for Lichinga-Cuamba Railway was started, in addition to the mail railway line between Cuamba and Nacala Port. However, its sustainable operation for transporting non-coal cargoes is a critical issue.
- Land conflicts between local communities and tree plantation companies caused the closure of one main tree company in the recent years.
- It seems that the policy for promoting the development very large-scale tree plantation areas in Niassa Province might have serious local social impacts resulting in the closure of the one main tree company. However, in the last 10 years, many lessons have been learned by the tree planting companies and local communities. Based on the learnt experiences and lessons, it seems to be able to sustain the tree planting activities.
- There is no sustainable forest management system to prevent uncontrolled and unnecessary deforestation. Strict regulation has not been so well enforced on illegal logging and export. There are no clearly designated boundaries by which to prevent agricultural land expansion.

14.3.3 Objectives for the Forestry Sector

The objectives for the forestry sector are defined as follows:

- To achieve the total sustainability of local communities, natural forest preservation, natural forest logging and industrial tree plantations
 - By seeking sustainability of the region-wide forest environment including not only of tree plantation areas but also natural forest areas
 - By pursuing sustainable relationships between local communities and tree plantations in respect of land disposal for and employment incomes from tree plantations
 - By achieving the business sustainability of tree plantations, including transportation of timber and wood products, as well as management of the relationships with local communities

14.3.4 Strategies for the Forestry Sector

In order to achieve the abovementioned objectives, the strategies for forestry sector are formulated as follows:

- To reconstruct and implement a forestry management policy and plan including natural forest preservation, natural forest logging and industrial tree plantation development in the Nacala Corridor Region for achieving the above mentioned objectives
- To establish a set of learnt experiences and lessons in the last 10 years so that tree planting companies and local communities to continue tree planting and to sustain tree plantations
- Vale's SCR initiative for the rehabilitation of Lichinga-Cuamba Railway should be materialized and accelerated so as to transport timber and wood products from Lichinga
- Although the rehabilitation work was started by Vale, the government should also take necessary actions to complete the rehabilitation work and to maintain the railway between Lichinga and Cuamba
- Conflict management systems on lands should be established by clarifying the roles of local communities, local governments and private companies
- The forestry administration should manage whole forestry areas in a proper manner not only for plantation areas and community areas, but also for existing natural forest areas
- The government should clarify and designate the areas where agricultural expansion is allowed

14.4 Mining Sector Development Strategies

14.4.1 Future Prospect of the Mining Sector

The plan for coal production by the four projects in Tete Province is as follows.

Table 14.4.1 Plan for Coal Production by Four Operating Projects in Tete Province

(Unit: million ton per year)

Project	2013	2017	2022
Beacon Hill	0.4	2.2	2.2
Vale	6.4	22.0	22.0
Rio Tinto	2.4	19.2	25.6
Jindal Steel	3.0	10.0	10.0
Total	12.2	53.4	59.8

Source: JICA Study Team based on NEDO, 2012

The total amount of coal production is planned to increase from 12 million tons per year in 2013 to 53 million tons in 2017 and 60 million tons in 2022.

There are plans for developing other mineral resources such as iron, phosphate, base metal, gold, REE, graphite, ilmenite, zircon and rutile in the Nacala Corridor Region.

14.4.2 Issues on the Mining Sector

The following issues are observed in mining sector.

- Scientific and geological information on mineral resources is lacking, especially in geographically remote areas, discouraging investments in exploration of mineral resources
- Poor infrastructure, especially infrastructure for transporting minerals to seaports, is discouraging investments in exploration and exploitation of mineral resources
- Little linkage between large-scale mining projects and the local economy (including domestic companies and local personnel) because most mineral resources are exported as raw material
- Lack of educated and trained personnel for the government's mining sector, making it difficult to manage and guide private mining operations
- Lack of educated and trained personnel who can work for private mining operations, making it difficult to take advantage of increasing employment opportunities for the beginning large-scale mining operations
- Mining operation requires resettlement, which has often times caused significant problems for residents when the resettlement process is not appropriately implemented according to the regulations, although a set of regulations for resettlement were prepared recently by the government
- Substantial environmental problems (coal dusts, noise and community severance) are expected in transporting coals by railways, especially in the case of through traffic of coal trains in urban areas of Nampula.

14.4.3 Objectives for the Mining Sector

The objectives of the mining sector development are defined as:

- To attract more foreign and domestic investments to mineral resources exploration and exploitation
- To develop the human resources of Mozambique by providing a wide range of education and training especially designed for the mining sector from on-the-job training, off-the-job training, technical vocational level and higher educational level
- To minimize and mitigate negative impacts for the environmental and social aspects of mining operation and transport of minerals for sustaining with a proper system of monitoring and management
- To promote mineral resources development not only for export of unprocessed minerals but also for processing minerals in manufacturing sectors in order to develop the regional industries and economy
- To promote the development of mineral resources and transportation for minerals as driving forces of economic development

14.4.4 Strategies for the Mining Sector

There are a number of strategies to achieve this objective. The strategies for mining sector development are the following:

- To establish a comprehensive information management system on mineral resources for providing private sectors with mineral resources information in order to promote inflow of private investments, both foreign and domestic, for mineral exploration and exploitation
- To improve technical higher educational and technical vocational institutions to educate and train human resources for the mining sector, for the purposes of providing mining companies with domestic managers, engineers, technical and skilled workers
- To encourage private mining companies to conduct on-the-job and off-the-job trainings in ongoing and prospective mining operations
- For the government to establish an information system for monitoring and management of mining activities of private sectors from exploration to exploitation
- To strengthen the capacity of the government to manage and monitor the environmental situation related to mineral resource development, especially by the following ways:
 - By encouraging coal mining companies to install dust protection net at coal yards for dust control
 - By encouraging coal mining companies to spray water at coal yards for dust control
 - By encouraging coal mining companies to implement dust control of coal wagons
 - By enforcing reduction of travelling speed of coal wagons in populated areas for reduction of noise and vibration
- For the government to provide incentives to private sectors and to encourage private investment for infrastructure for transporting minerals to major seaports, as well as mining exploration and exploitation
- For the government to provide incentives to private sectors and to encourage private investment for development of manufacturing industries by utilizing minerals for producing diversified chemical products, such as methanol, ammonia, phosphoric acid, and charcoal briquettes

14.4.5 Programmes and Projects for the Mining Sector

The following programmes, projects and measures are proposed:

- Mineral Resource Data Base Creation Project
- Natural gas related industry development in Cabo Delgado Province
- Coal related industry development in Tete Province
- Mining Skill Development Centre Project (for private sector)
- Capacity Development Project for Government Officers in the Mining Sector (for government sector)
- Human Resources Development Project for Mining Sector (both private sector and government sector)
- Environmental Capacity Development Project

Capacity development holds the key to linking the mining projects and the local economy. The government could encourage and support the initiatives by mining investors to train their local workers and technicians. Government officers should also be trained in technical aspects so that they will be able to support and monitor the activities of the mineral resources companies appropriately.

14.5 Natural Gas Development Strategies

14.5.1 Future Prospects of Natural Gas in the Nacala Corridor Region

Hydrocarbon resources are found successively throughout the Rovuma Basin that spreads along the coastal area from the southern part of Tanzania, Cabo Delgado Province to Nampula Province. The resources found are mostly natural gas. Developable petroleum resources have not been discovered so far.

The licence for offshore Area 1 (held by Anadarko and Mitsui & Co., Ltd.) will start its production in 2018. Other licences besides Area 1 and Area 4 are in their first stage of, or before their exploration stage. Anadarko, the operator of Area 1, plans to construct liquefaction plants onshore to produce liquid natural gas (LNG) in the amount of 10 million tons per year, which is to be expanded to 30 million tons per year in the future. The LNG that is produced is expected to be exported to countries such as Japan and India, and also used domestically.

The demand for natural gas for the Mozambican domestic market is determined by the kinds of industries that are to be developed in Mozambique. So far, proposed domestic mega-projects, except for electricity generation, are all export-oriented and thus have exposure to fluctuations in world commodity prices. Hence, a detailed forecast of gas demand for these industries remains speculative at this stage.

In its policy development, the Government of Mozambique has assumed the following potential “GMP³-scenario” for domestic gas consumption over the next 10 years:

- Gas from Pande-Temane continues to be exported to Secunda in South Africa. In addition it will be used by at least two 150 MW gas power plants, which are expected to be brought online in the near term by EDM and Sasol.
- In addition to the 3 million GJ/year the current Matola Gas Company (MGC) demands, approximately 500,000 GJ/year is supplied for SME use.
- In Northern Mozambique, it is likely that two 150 MW gas power plants will be set up in the short term; and these gas power plants will potentially expand to 300-500 MW gas combined cycle power plants in the medium term.
- In Cabo Delgado area, it is likely that one fertilizer (urea) plant with a manufacturing capacity of approximately 500,000 tons/year will be planned to support the agricultural demands for the country and the regional economy.
- In the Northern Mozambique, it is likely that one 50,000 barrel/day GTL plant will be built.

The expected gas demands for this GMP-scenario are shown in Table 14.5.1. In addition to the demands for domestic gas use, a significant volume of gas will still be exported from Pande-Temane fields to Secunda via the existing Sasol pipeline; and significant volume of gas from the Rovuma Basin will be exported in the form of LNG from Palma.

³ Natural Gas Master Plan

Table 14.5.1 Tentative Domestic Demand Estimates

GMP-Scenario Domestic Gas Demand (million GJ/year)									
	Current MGC Demand (from P-T fields)	SME MGC Demand (from P-T fields)	Power Plants in South (from P-T fields)	Power Plants in North (Rovuma)	Fertilizer (Rovuma)	GTL (Rovuma)	Total P-T	Total Rovuma	Grand Total
2014	3	0.2	4				7.2		7
2015	3	0.25	10				13.3		13
2016	3	0.3	10				13.3		13
2017	3	0.37	21				24.4		24
2018	3	0.43	21	10			24.4	10	34
2019	3	0.5	21	10	9		24.5	19	44
2020	3	0.5	21	21	18	90	24.5	129	154
2021	3	0.5	21	21	18	175	24.5	214	239
2022	3	0.5	21	21	18	175	24.5	214	239
2023	3	0.5	21	21	18	175	24.5	214	239
2024	3	0.5	21	33	18	175	24.5	226	251
2025	3	0.5	21	44	18	175	24.5	237	262

Source: GMP prepared in November 2013, page 22

14.5.2 Issues regarding Natural Gas Development

The following issues are identified for the natural gas development:

- Although LNG production and export is the most profitable for natural gas developers, the best way to promote development of chemical industries and construction of thermal power plants using natural gas are critical issues.
- For smooth and efficient extraction of natural gas from Area 1 and Area 2 of the offshore Rovuma Basin, it is necessary to develop a support base from the land in Pemba.
- For development of chemical industries in Northern Mozambique utilizing natural gas from Area 1 and Area 2 of Rovuma Basin, Palma and Nacala are preferable candidate coastal towns. In the case that natural gas related chemical industries are developed in Nacala, the construction of a long-distance and costly pipeline between Palma and Nacala is required.
- On the other hand, in the case that chemical industries are concentrated in Palma, it is necessary to develop a support base for chemical industries in Palma. This is because Palma does not have port facilities, electricity, water supply facilities, or urban areas strong enough to support economic and urban development in Palma Area.
- Once a recoverable reserve is discovered at offshore of Pemba, Nacala would become a higher potential site for chemical industries. This case would require the construction of a gas pipeline between Pemba and Nacala.
- The construction and operation of chemical industries utilising natural gas might affect negatively the environment of the sea and land. Careful environmental and social consideration and mitigation is necessary.
- The construction of pipelines for transporting natural gas might affect negatively the environment. Careful environmental and social consideration and mitigation is necessary.

14.5.3 Objectives for Natural Gas Development

The objectives for the natural gas development are defined as follows:

- To promote smooth and efficient extraction of natural gas extraction and processing and exporting of LNG for development of the national economy of Mozambique and for earning foreign exchange
- To develop domestic manufacturing industries utilizing natural gas from offshore Rovuma Basin

14.5.4 Strategies for Natural Gas Development

The strategies for natural gas development are formulated as follows:

- To develop a support base at Pemba for assisting natural gas extraction from onshore Pemba
- To develop infrastructures, such as a power plant and public port facilities for LNG manufacturing facilities and for natural gas related industries to be located in Palma, and to improve urban infrastructure including water supply, roads and drainage necessary for increasing urban population in Palma
- To conduct a study for developing a gas pipeline and chemical industries utilizing the natural gas of Rovuma Basin in Nacala Bay Area, which is planned to become the largest urban centre in the Nacala Corridor Region
- To conduct proper environmental management by conducting environmental monitoring of the environment of the sea and land where natural gas is extracted and/or chemical industries are developed and operated

14.5.5 Programmes and Projects for Natural Gas Development

The following projects are proposed which are in line with the above strategies:

- Pemba Support Base Development Project for Natural Gas Extraction in Rovuma Basin
- Palma Port Project
- Palma Urban Water Supply Project
- Palma Thermal Power Plant Project
- Palma-Pemba-Nacala Transmission Line Project
- Palma Urban Expansion Project
- Pemba-Nacala Gas Pipeline for Chemical Industrial Facilities (if recoverable gas was discovered offshore of Pemba)
- Environmental Management Capacity Development Project including Establishment of Environmental Laboratory in Nacala (whose activities cover the northern region of Mozambique)

14.6 Processing Industry Sector Development Strategies

14.6.1 Future Prospects of the Processing Industry Sector

(1) Prospective Industries

Prospective types of processing industries in each province of the Nacala Corridor Region are identified by the government as shown in Table 14.6.1. The following types of processing industries are recommended in addition as important and prospective in the near future. Some industries are already beginning to emerge.

Table 14.6.1 New Encouraging and Prospective Industries

Province	Kinds of Industry	Remarks
Cabo Delgado	<ul style="list-style-type: none"> Repairing & maintenance factory for various equipment (electrical equipment, mechanical machines) 	For off-shore gas development at Pemba (from 2012~)
	<ul style="list-style-type: none"> Small docks for repairing service boats 	For service boats for gas fields at Pemba (from 2013~)
	<ul style="list-style-type: none"> Fresh Vegetable & Fruit processing factory 	Supply to Offshore rigs and to cities at Pemba (from 2012~)
	<ul style="list-style-type: none"> Drilling Pipe Cutting Factory 	For offshore gas development (from 2014~)
	<ul style="list-style-type: none"> LNG plant and LNG Storage Tanks 	At Palma (from 2018)
	<ul style="list-style-type: none"> Fertilizer Plant (urea, Ammonium Nitrate, Ammonium Nitrate Phosphate, DAP, TST, etc.) 	At Palma (from 2018~)
	<ul style="list-style-type: none"> Petrochemical Factory (methanol,ethylene, HDPE, LDPE and downstream products of natural gas) 	At Palma (from 2018~)
Nampula	<ul style="list-style-type: none"> Chemical, glass, ceramic industry Dry dock for ship-repairing Plastic products/parts factory (pipe, domestic products, packing materials etc.) Metal industry (steel mill for reinforcing steel bar, steel wire, steel fabrication) Cable factory for industrial use Assembling of agricultural equipment and other machinery for various fields Light industries 	At Nacala SEZ/IFZ (from 2014~)
Zambezia	<ul style="list-style-type: none"> Agro-products such processed fresh vegetables for overseas market, dry fruits, flavours, cultivated shrimp processing, etc.) 	At Quelimane and production area(from 2013~)
	<ul style="list-style-type: none"> Plastic Industry especially for packing materials such as plastic film, bags, etc. 	At Quelimane (from 2013~)
Niassa	<ul style="list-style-type: none"> Wood-industry for export (plywood, printed plywood, furniture, especially made of plywood etc.) 	At Lichinga (from 2013~)
Tete	<ul style="list-style-type: none"> Industry related to mining (Such as repairing of mining machinery and equipment, or goods and equipment used for mining.) Environmental protection industry (such as sanitation facilities, water filter equipment, etc.) 	At Tete (already started from pipes etc.)

Notes: () shows the prospected starting year.

14.6.2 Issues on the Processing Industry Sector

The issues of processing industries are as follows:

- Mozambique has imported a lot of processed goods from other countries because domestic processed goods are of low quality and their production is of low productivity, although Mozambique is rich in raw materials
- Mozambique's domestic processing industries are lacking in technology for better quality and productivity for processing, resulting in difficulty in developing markets
- Mozambique's domestic companies are not good at creating new business areas, resulting in limited contribution to economic development

14.6.3 Objectives for the Processing Industry Sector

The objective of processing industry promotion is defined as:

- To promote development of processing industries for producing products oriented not only to domestic markets, but also to export markets
- To improve the quality of processed goods (consumer goods) for domestic markets so as to compete with imported goods, especially to improve the quality of agro-processing products
- To upgrade technologies and improve productivity of processing industries in order to broaden areas for processing industries, including processing of food crops, cash crops, seafood and woods for the purpose of creating higher value-added
- To vitalize small and medium-sized enterprises (SMEs) in order to create new businesses and services for the purpose of generating employment opportunities and stimulating the regional economy

14.6.4 Strategies for the Processing Industry Sector

The strategies for the processing industry sector are the following:

- To promote foreign investments, as well as domestic investments, in processing industries by targeting both domestic markets and export markets
- To establish industrial parks equipped with infrastructure in major urban centres on the Nacala Corridor, such as Nacala, Nampula, Palma, Tete, Cuamba and Lichinga, for improving and expanding the capacity of accommodating processing industries
- To develop and improve infrastructures, such as electricity supply, water supply, roads, and railways in order to satisfy the demand from existing and potential factories and offices for processing industries in major urban centres including Nacala, Nampula, Palma, Tete, Cuamba and Lichinga
- To nurture SMEs in the area of processing industries by targeting import-substitution, including beverages, chemical products, and electrical machinery
- To improve technical higher educational and technical vocational institutions in order to educate and train people to be managers, engineers, technical workers and skilled workers for processing industries
- To promote on-the-job and off-the-job trainings in ongoing and prospective operations of processing companies

14.6.5 Programmes and Projects for the Processing Industry Sector

The following programmes and projects are proposed:

- Nacala IFZ Establishment Project
- Nampula Industrial Park Project
- Cuamba Industrial Park Project
- Nacala Business Centre Project (with function of One-Stop-Service for promoting investment attraction and assisting smooth operation, as well as the function of business incubation)
- SME Promotion Project
- Nacala Vocational and Technical Training Centre Project
- Nampula Vocational and Technical Training Centre Project
- Pemba Vocational and Technical Training Centre Project
- Lichinga Vocational and Technical Training Centre Project
- Tete Vocational and Technical Training Centre Project
- Quelimane Vocational and Technical Training Centre Project

14.7 Logistics Sector Development Strategies

14.7.1 Future Prospects of the Logistics Sector

(1) Future Prospects and Demand for Cargo Transport in 2025 and 2035

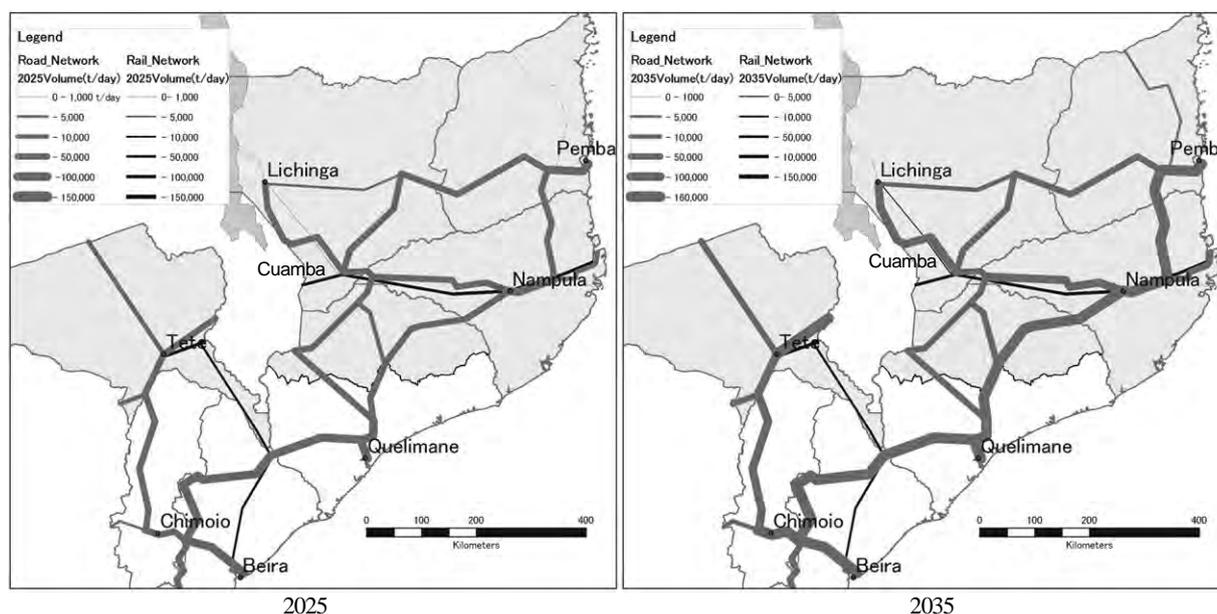
By the Year 2017, all roads currently under construction will be completed and railway operation⁴ between Entre Lagos and Tete will be started. Due to these two factors, the Nacala Corridor will emerge onto the international stage.

The following table estimates the total cargo volume demand among fifteen predetermined zones, which are mostly represented by provincial capitals as centre points, in and around the Nacala Corridor Region for the Years 2025 and 2035⁵. This means that the transport volumes in the Nacala Corridor Region will increase 2.3 times in 2025 and 5.0 times in 2035 from that of 2012.

Table 14.7.1 Transport Volume Forecast of Nacala Corridor Region

Year	Cargo Volume (ton/day)	Annual Growth Rate (%)
2012	195,000	6.6%
2025	449,000	
2035	1,038,000	8.7%

Source: JICA Study Team based on Transport Survey



Source: JICA Study Team

Figure 14.7.1 Cargo Transport Volumes in 2025 and 2035

⁴ According to Vale, the railway coal operation between Moatize and Nacala-a-Velha will be started toward the end of 2014.

⁵ This is based on the current OD (Origin-Destination) pairs indicated in the Transport Survey and is forecast using a gravity model. Modal share between roads and railway is assumed based on the existing conditions. OD pairs are assigned to network segment by the shortest time path. Future projects and new networks are considered.

These Figures imply the importance of lower Niassa Province as a hub of the road network and road - railway connection. Specifically, the location of Cuamba City will be more important in the future.

(2) Future Prospects of Cargo from Malawi and Zambia

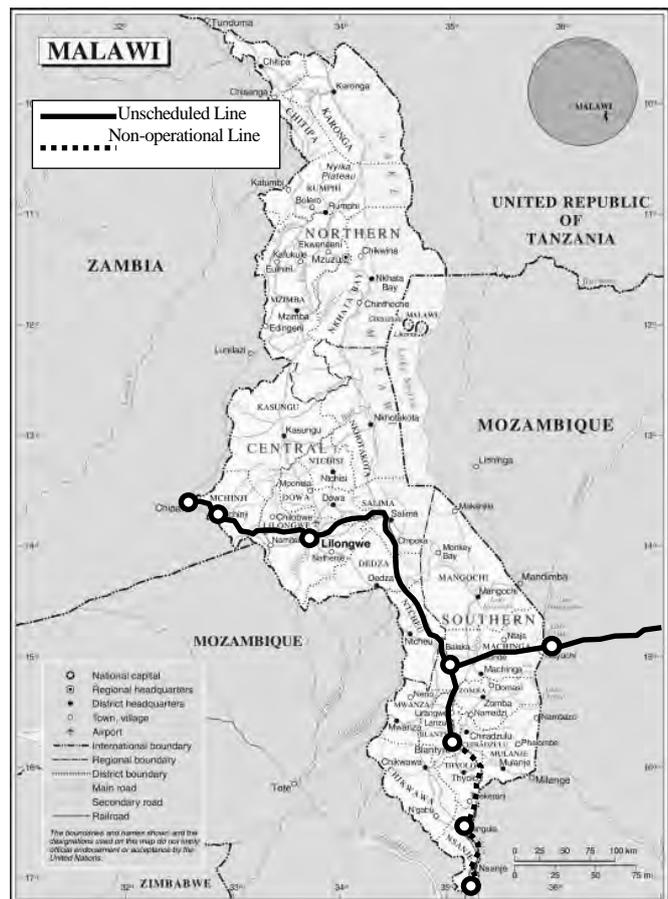
The construction and upgrade of roads and railways in Mozambique will also increase the cargo from Malawi and Zambia to Nacala Port due to the reduction of transit time.

1) Malawi

Malawi's export and import currently depends on Beira Port, Durban Port, Dar es Salam Port and Nacala Port. Beira Port is the closest port from Malawi (approximately 800 km by road from Blantyre) and also handles the most transit cargo to and from Malawi. However, Beira Port will be reaching its capacity soon. Under these circumstances, Nacala Port which is the second closest port (approximately 950km by road and 800km by railway from Blantyre after all construction is completed) is expected to take over most of the future increasing demand from Malawi. This would happen because the railway's transport capacity would increase and its transport costs would decline due to the upgrading of the Nacala Corridor Railway connecting Malawi to Nacala Port.

Malawi's major agriculture products, such as tobacco and tea, are at present mostly transported to South Africa by road through Zimbabwe or through Zambia and Botswana. Despite the reduction of transit time to Nacala Port from Malawi, these products are expected to continue to be transported to South Africa. This is because these products are mainly sent to Johannesburg and Durban for maturing and packaging.

On the other hand, it is likely that agriculture products, such as sugar, beans, cotton and tobacco, currently transported to Beira Port and Dar es Salam Port as well as fuel and fertilizer imported via these ports would gradually shift to Nacala Port due to lower transport costs using the Nacala Corridor, once the road between Cuamba and Mandimba is upgraded and Nacala Railway starts its full operation.



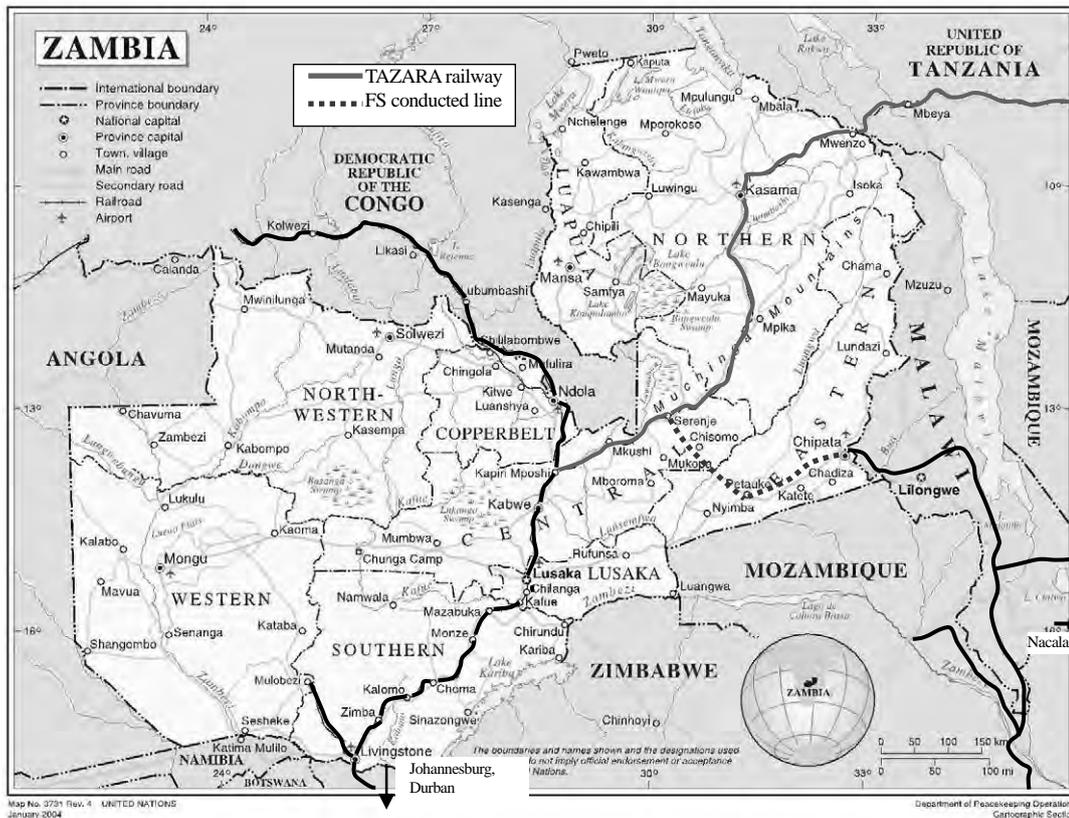
Source: JICA Study Team based on UN Map

Figure 14.7.2 Railway Network of Malawi

2) Zambia

The ports that Zambia currently uses include Dar es Salam Port, Durban Port and Beira Port. Zambia has a strategy to diversify routes and ports for cargo transit by using Walvis Bay Port, and Nacala Port. As part of this strategy, a railway section was constructed from Chipata to the border with Malawi and connected with the Malawi Railway line. Chipata is one of the major cities in eastern Zambia. This railway was launched in May 2014 by operating a trial train between Chipata and Nacala Port.

The Government of Zambia has been upgrading the road between Lusaka and Chipata, and is also considering connecting this railway from Chipata with the TAZARA railway. One of the main objectives for this railway connection is to export copper from Copperbelt Province and DR Congo via Nacala Port as an alternative route to the Dar es Salam Port. Located on the eastern coast of Africa, Nacala Port has the possibility to become an important gateway to the Middle-East and Asia for Zambia.



Source: JICA Study Team based on UN Map

Figure 14.7.3 Railway Network of Zambia

14.7.2 Issues on the Logistics Industry

The road upgrading projects currently under construction will be completed by 2017. They include the road sections between Nampula and Lichinga, and between Marupa and Montepuez. In addition, the road section between Lichinga and Cuamba through Mamdimba will be upgraded. The railway connection between Tete and Nacala Port and between Lichinga and Cuamba will also be partially finished.

Under the situation, the logistics of the road transportation will be significantly improved in the Nacala

Corridor Region and inland towns such as Cuamba and Lichinga will benefit. Their access to import and export routes will be improved and they will have more opportunities for agricultural diversification and other industries.

However, even under these circumstances, there will be constraints in the logistics sector as explained below.

(1) High Transportation Costs

A lot of on-going and planned projects for rehabilitating and upgrading transportation including trunk roads, sea ports and railways are expected to largely change the current poor transport situation in the Nacala Corridor Region, and especially the upgrading of major railway corridors from Tete through Malawi to Nacala Port is very much promising in its contribution to reduction in transport costs and enhancement of transport reliability in the Nacala Corridor.

However, even after the completion of these transportation projects, there are many things left to be improved for enhancing the connection between different transport modes, for example, between ports and roads, ports and railways, and railway and roads, in order to improve the efficiency and reliability of the total system of transportation and logistics for the Nacala Corridor Region.

Even after the completion of these transportation projects, vast inland areas will remain poorly accessible and dependant on roads. In general, long-distance road transport requires higher costs than railway transport. Moreover, due to the low density population and land use, it is not easy for the government to establish and maintain an extensive road network to cover the vast inland areas. As a result, local residents, traders and businesses have to bear relatively high costs for transporting daily products, construction material and fuels, as well as their products.

As a result, relatively high transportation costs due to persistent dependence on road transportation would be a barrier to the development of logistics sectors in the Nacala Corridor Region.

(2) Road Maintenance for Transit Transport

Currently the transit transport of Nacala Port is mostly handled by railway. In the future, more transit cargoes will be transported by railway, especially by the railway to be upgraded for transporting coal from Tete to Nacala Port.

On the other hand, the transit transport by road is also expected to increase in the future, when the trunk roads are upgraded for connecting Malawi and the areas inland of Niassa Province to Nacala Port through Cuamba and Nampula. More trucks will operate on the long distance trunk roads and they would be more seriously damaged.

In this situation, one of the critical issues on road maintenance is to establish a maintenance system for technically maintaining paved roads. Critical issues also include how to share increasing costs for road maintenance in the future when the Nacala Corridor has to accommodate more heavy-loaded trucks for transit transport among users.

(3) Insufficient Logistics Facilities and Services

In the Nacala Corridor Region, at present, logistics facilities and services are limited to privately owned warehouses (used for private companies' own purposes), and there are no warehouses run by logistics companies especially for third parties. Furthermore, there are no multi-modal terminal facilities, which

are designed for efficiently connecting railway transport and road transport.

In order to establish an effective and efficient transportation and logistics system for a wide region like the Nacala Corridor Region, one of the important issues is to develop logistics facilities and services for connecting different transport modes, such as warehouses and multi-modal terminals. Environmental and social impacts will be limited due to improved energy efficiency in transport by establishment of a multi-modal logistics system in the region.

(4) Customs Operation

Transit transport crossing national borders on roads and railways is expected to increase significantly, when trunk roads on the Nacala Corridor are upgraded and connected to Nacala Port and railways from Tete to Nacala Port are upgraded. Under this situation, customs operation will become more important in reducing the time and cost for cargo transport on the Nacala Corridor. The existing customs processing is manually operated and it will not be able to cope with a growing volume of cargo traffic.

(5) Preparation for Regional Transport on Railways

A new railway connection between Entre Lagos of Niassa Province and Moatize of Tete Province through Malawi and upgrading of the existing railway between Entre Lagos and Nacala will increase transport capacity for non-coal cargoes by taking advantage of the “regional transport quota for general cargo and passengers” in the concession agreement. In order to utilize this enhanced transport capacity for non-coal cargo, it is necessary to prepare multi-modal facilities between roads and railways and between the railway and sea ports.

14.7.3 Objectives for the Logistics Sector

The objectives of logistics industry are defined as:

- To establish a long-haul logistics system (in order to take advantage of the upgrading of the railway between Tete and Nacala Port)
- To establish a multi-modal regional logistics system (in order to fully utilize the upgraded railway and increase energy efficiency of transport)
- To ensure smooth logistics operation crossing borders (in order to manage the increase in cargo traffic on trunk roads between Malawi and Nacala Port on the Nacala Corridor)
- To promote development of logistics industries (by taking advantage of the upgrading of transport corridors)
- To manage an international transport and logistics corridor in an effective and efficient way (in order to cope with the increase in international railway and road traffic)

14.7.4 Strategies for the Logistics Industry

The strategies for the logistics industry sector are the following:

- To promote containerisation of railway transport by taking advantage of the upgraded railway between Tete and Nacala Port
- To integrate railway transport and road transport by establishing multi-modal terminals between railways and roads at Nacala, Nampula, Cuamba
- To improve procedures and facilities for border crossing of cargoes by establishing and operationalising “One Stop Border Posts”

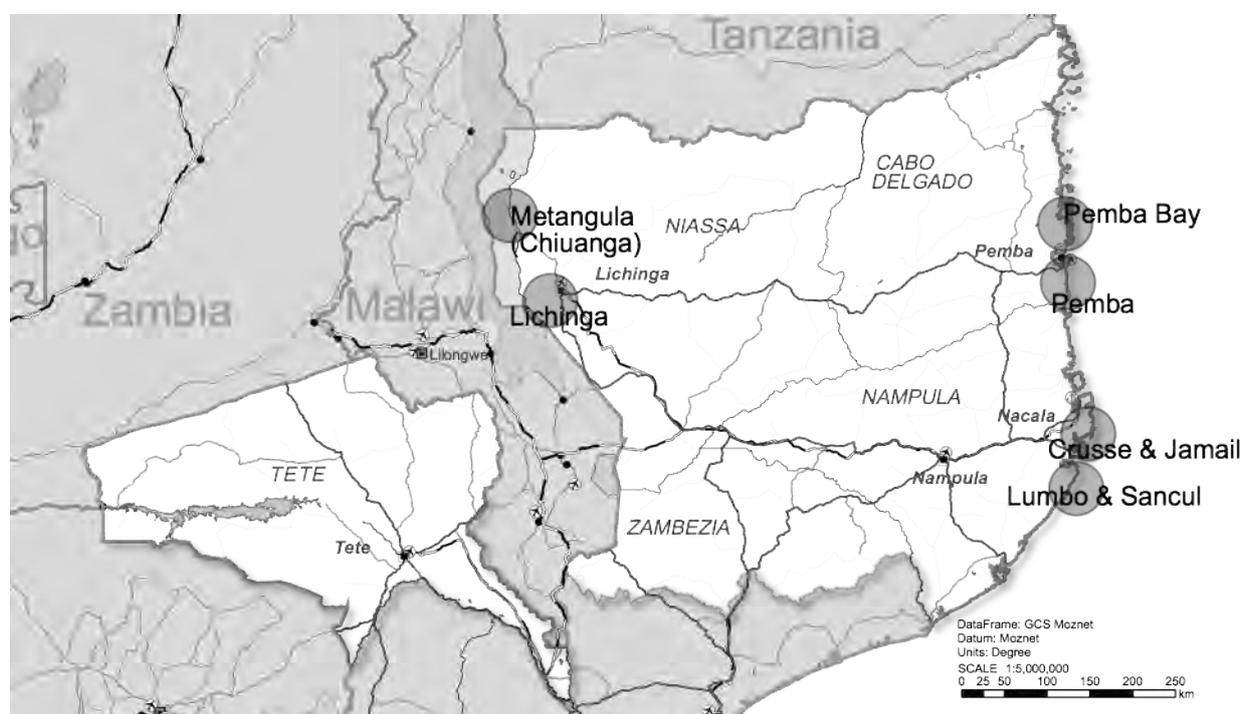
- To provide support to logistics companies (ex. financial support for renewing trucks, training for drivers) by mobilizing government resources for providing support to logistics companies
- To establish a logistics monitoring and control system through the international corridors 1) by strengthening INATTER (a land transport regulatory body for Mozambique) in monitoring and controlling both railway transport and road transport and 2) by establishing a cooperative system among neighbouring countries

14.8 Tourism Sector Development Strategies

14.8.1 Future Prospects of the Tourism Sector

(1) Tourism Interest Zones

Based on the existing proposals on priority area for tourism development, MITUR designated 7 Tourism Interest Zone (TIZ) in December 2010. TIZs were selected from PATI of the Strategic Plan in 2004, the Anchor Projects and the Arco Norte Project. Out of 7 TIZs, 6 sites are located in the Nacala Corridor Region as indicated in Table 14.8.1. It means that MITUR and INATUR prioritize the northern Mozambique although tourism development has been limited to date. INATUR is responsible for promotion of private investment. However, efforts to invite private investment have not been successful so far.



Source: Prepared by the study team based on information from INATUR

Figure 14.8.1 Tourist Interest Zones in Nacala Corridor Region

Table 14.8.1 Tourism Interest Zones in Nacala Corridor Region

Province	Name of Place	Area (ha)
Niassa	Lichinga	100
	Metangula (Chiuanga Beach)	80
Cabo Delgado	Pemba Peninsula	1,081
	Pemba Bay	1,400
Nampula	Lumbo and Mozambique Island	1,087
	Matibane and Crusse and Jamali Islands	1,750

Source: Ministry Decree on Tourism Zones, December 2010

TIZ land is classified as agricultural area, accommodation area, residential area, entertainment area and commercial area. Private investors will form a TIZ management company, and work for making such plans, construction of necessary infrastructure and facilities, inviting tenants (hotel management companies, restaurants and other commercial & entertainment companies) and managing infrastructure

and facilities. The TIZ management company will have the same function as a management company of industrial estates.

14.8.2 Issues on the Tourism Sector

The issues of tourism industries are as follows.

- The number of tourists has not increased much in the Nacala Corridor Region, while the number of visitors for business purposes has largely increased because of the roaring mining related activities in the Nacala Corridor Region.
- Most of the tourism resources, including the World Heritage Site of Mozambique Island, have not been utilized, while beach tourism resources in Cabo Delgado Province have been developed to a certain level.
- Private investments for developing tourism products and destinations, including accommodations, have been limited in the Nacala Corridor Region. Especially, investments in accommodation development have been limited because infrastructure (roads, electricity and water supply) to support accommodation development also has been limited. As a result, such infrastructure to support accommodation development will be limited because investments in accommodation development are limited.
- Training and education institutions for hospitality businesses exist in the Nacala Corridor Region, but their graduates have not been well utilized for existing hotels partly because their businesses are of small scale and partly because the number of visitors has not been increasing much.
- Tourism Investment Zones (TIZ) are important tools for promoting private investments in tourism development for destinations, products and accommodations. However, proposed TIZ are far from major roads and access roads are not well developed. Moreover, electricity and water supply have not yet been developed for TIZs.
- Potential private investors are concerned about the difficulty in getting land for actual development, because local people still live in and communities still stay in the designated areas for TIZs.
- These issues mentioned above were essentially caused by the limited number of visitors to the Nacala Corridor Region. However, this situation started to change in recent years due to the large increase of international visitors related to the roaring mining businesses in Tete Province and Cabo Delgado Province.

14.8.3 Objectives for the Tourism Sector

The objective of tourism industry promotion is defined as:

- To attract and increase more international tourists to the Region for longer stays, 1) firstly from neighbouring countries, such as South Africa and other SADC countries, in the short term and 2) secondly from European countries and other long-haul international tourist markets in the medium and long terms
- To promote private investments in TIZs by clarifying and elaborating incentives of TIZs and by providing infrastructures to support the development of TIZs
- To establish investor-community partnership through promotion of community participation in the tourism sector both for making linkages between tourism companies and the local economy and for seeking sustainable development in tourism areas

14.8.4 Strategies for the Tourism Sector

The strategies for tourism industry sector are the following:

- To target international visitors coming for mining related business (including their families) and from neighbouring countries in the short term
- To widen the target markets by diversifying tourism products in the medium and long terms
- To promote MICE (Meeting, Incentive, Conference or Convention and Exhibition) tourism by targeting mining related businesses that are located in Tete Province and Cabo Delgado Province and other businesses in Nacala Bay Area, in the short term and in later terms
- For the national government, to concentrate its efforts at attracting private investments for the development on Matibane-Crusse-Jamali Island TIZ and Pemba Peninsula TIZ in the short term, not only by implementing investment promotion measures and assisting acquisition of land use rights (DUAT) for TIZs, but also by providing infrastructure to support the development of TIZs
- To expand the target for private investment promotion to other TIZs (Pemba Bay TIZ, Lumbo & Sancul TIZ, Metangula TIZ and Lichinga TIZ) and potential beach resort areas like Quirimba Islands, in the middle and long terms
- For provincial tourism departments, 1) to concentrate their efforts and resources at their own strong points of tourism resources, including Mozambique Island, Quirimbas National Park, Niassa Reserve and Cahora Bassa Lake, and 2) to implement destination marketing and promotion measures by strengthening the linkage of tourism related organisations with other tourism products including cultural and historical tourism, safari tourism, camping and ecotourism and community-based tourism
- To establish a hospitality business training centre in Nacala SEZ to strengthen the capacity of human resources for the tourism sector
- To encourage private tourism companies to involve local communities and local people partly as employees for hotels and other tourism service operators, and partly as recipients of CSR activities
- To start the promotion of community-based tourism near major tourist sites like Mozambique Island in order to mitigate problems in marketing

14.8.5 Programmes and Projects for the Tourism Sector

The following programmes and projects are proposed:

- Matibane-Crusse-Jamali Island Tourism Interest Zone Development Programme
- Lichinga Tourist Zone Development Programme (Niassa Province)
- Metangula Tourist Zone Development Programme (Niassa Province)
- Pemba/Pemba Bay Tourist Interest Zone Development Programme (Cabo Delgado Province)
- Quirimbas Island Tourism Development Programme (Cabo Delgado Province)
- Tete MICE Tourism Development Programme (Tete Province)
- Cahora Bassa Inland Water Tourism Development Programme (Tete Province)
- Northern Zambezia Agro-Tourism Development Programme (Zambezia Province)
- Lumbo-Mozambique Island Tourist Interest Zone development Programme (Nampula Province)
- Nacala Hospitality Business Training Centre Project (Nampula Province)

14.9 Investment Promotion

14.9.1 Issues on Investment Promotion

The issues of investment promotion are as follows.

- No strategic measures with specific focus on certain sectors or geographical areas have been utilized for promoting private investment in Mozambique as a whole, or to the Nacala Corridor Region, except for Nacala SEZ.
- Investors and existing enterprises are attracted by the strategic location of Nacala because of Nacala Port and Nacala Corridor. However, other rather difficult problems for investors and industrial operators, such as poor infrastructure, difficulty in acquiring land use rights, and increasing crimes have not been well resolved.
- For the Nacala Corridor Region, as well as Mozambique as a whole, the infrastructure capacity and management capacity for accommodating incoming investments and supporting actual operations to ensure productive operation is weak.
- There is no strong concern about this weak physical and management capacity for accommodating investments and supporting productions, although the system for investment incentives has been relatively well established.

14.9.2 Objectives for Investment Promotion

The objective of investment promotion is defined as:

- To promote investment with strategic focuses on specific geographical areas and specific sectors in order to enhance the competitive edge of the Nacala Corridor Region
- To promote investment not only by providing incentives but also by providing the physical and management capacity to accommodate incoming investments and facilitate the operation of economic production by enhancing the management of SEZs and IFZs
- To give priority in investment promotion to the following sectors:
 - Processing Industries including Chemical Industries
 - Tourism Sector
 - Agricultural Sector
 - Forestry Sector
- To give priority in investment promotion to the following geographical areas:
 - Processing Industries: Nacala Bay Area, Greater Nampula, Cuamba, Lighinca, Mocuba and Palma
 - Tourism Sector: Matibane-Crusse-Jamali Island TIZ and Pemba Peninsula TIZ
 - Agricultural Sector: 19 Districts along the Nacala Corridor from Lichinga to Nacala, and Angonia-Tsangano and north-eastern part of Cabo Delgado
 - Forestry (Industrial Tree Plantation): northern part of Niassa Province

14.9.3 Strategies for Investment Promotion

The strategies for investment promotion for the Nacala Corridor Region are composed of a wide range of measures from incentives to infrastructure provision and management improvement as follows:

- To enhance the capacity of CPI for accelerating investment promotion in a proactive way following the “Strategic Plan for Promotion of Private Investment in Mozambique (PEPIP 2014-2016)”

- To enhance GAZEDA's management of SEZs and IFZs for improving the physical and non-physical capacity of SEZs and IFZs to accommodate incoming investments and facilitating industrial operation in SEZs and IFZs
- To promote investment by improving the operation of customs with clear rules and application of tax exemptions, at Nacala Seaport, Nacala Airport and Nampula Airport
- To promote linkage between large-scale incoming investment projects and local industries by creating company database of local SMEs and by matching both of these
- To promote investment in processing industries in Nacala Bay Area, Greater Nampula, Cuamba, Lichinga, Mocuba and Palma by providing infrastructures necessary for industrial operation, such as water, electricity and roads
- For Nacala Bay Area, Cuamba and Mocuba, to promote investment in processing industries by establishing industrial parks taking advantage of the incentives of SEZ and IFZ
- For Palma, to promote investment in chemical industries utilizing natural gas by establishing a public port and by providing infrastructure, such as roads, drainage, electricity and water, for urban expansion for supporting chemical industries
- For Lichinga, to promote investment in wood processing industries by ensuring the upgrading of the railway and trunk roads between Lichinga and Cuamba and by providing stable electricity and water supply, as well as by nurturing sustainable partnership between tree plantation companies and the communities
- To promote investment in the tourism sector, especially in Matibane-Crusse- Jamali Island TIZ and Pemba Peninsula TIZ not only by clarifying incentives to be obtained by investing in TIZs, but also by providing supporting infrastructure, such as feeder roads, local roads and electricity supply.
- To promote investment in the agricultural sector following "Principles for Responsible Investment in Agriculture and Food System (rai Principles)" and "Voluntary Guidelines on the Responsible Governance of Tenure (VGGT) of Land, Fisheries and Forests in the Context of National Food Security" along the Nacala Corridor from Lichinga to Nacala and in Angonia-Tsusangano areas and northern Cabo Delgado
- To promote investment in the forestry sector (industrial tree plantation) in northern Niassa by assuring the operation of upgraded railway, especially between Lichinga and Cuamba, and furthermore to Nacala
- To improve not only higher technical education, vocational education and vocational training, but also to strengthen primary and secondary education by implementing strategies and programmes/projects recommended by PEDEC-Nacala
- To assure the functioning of the upgraded transport corridor consisting of trunk roads and railways for pursuing strong integration with the regional economies of Southern Africa
- To consider the importance and possibility to re-join the COMESA for seeking benefits from establishment of a regional customs union and trade liberation and improvement of cross-border transport administration

14.9.4 Programmes and Projects for Investment Promotion

The following projects and measures are proposed:

- The Project for Enhance Investment Promotion and Facilitation by CPI
- SEZ/IFZ Management Improvement Project (GAZEDA's capacity development for increasing physical and soft capacity of Nacala SEZ)
- Large-Scale Projects and Local Industry Linkage Project

Chapter 15 Infrastructure Sectors Development Strategies

15.1 Introduction

This chapter covers infrastructure sectors including roads, railways, ports, water resources, power, telecommunications and rural water supply.

The road, railway and port sectors are major infrastructures to compose the transport corridors in the Nacala Corridor Region. A substantial number of projects for trunk road development, railway upgrading and port rehabilitation and upgrading are under implementation and some projects are waiting to be implemented. By utilizing on-going and planned transport infrastructure projects, development strategies and priority projects are proposed for functionalizing multi-modal transport corridors (including multi-modal terminals, truck terminals and inland container depots).

Water resources development strategies and priority projects are proposed for major urban centres, namely Nacala Bay Area, Greater Nampula, Cuamba, Pemba and Lichinga. In the formulation of these proposals, environmental and social concerns, as well as the current shortage of water and increasing water demand by expected economic sectors development are considered. Since a relatively large scale water resource development is proposed for Nacala Bay Area, special care should be taken of environmental and social impacts. In addition, the reconstruction of the metrological and hydrological observation network for basic data on rainfall and river water is proposed as a high priority project so as to assure appropriate analysis of integrated water resources management (IWRM).

Development of power generation, transmission and distribution is considered for satisfying the growing demand for electricity not only in the Nacala Corridor Region, but also in Mozambique as a whole.

The strategies for rural water supply are proposed considering them as a part of the social development strategies.

15.2 Development Strategies for Roads

15.2.1 Issues of Roads in the Nacala Corridor Region

A high-standard strategic road network in the Nacala Corridor Region is planned to be completed by 2017 based on the Integrated Road Sector Programme (PRISE) 2011-2014 and PII 2012-2015. The completion of these road projects will provide comfortable and reliable transport with all provincial capitals linked by these trunk roads.

However, there are still many issues to be solved for growing the regional economy. Additionally, these road improvements will trigger some new problems such as road safety and road maintenance. These issues and problems are summarized below.

(1) Inadequate Accessibility in Rural Areas

Accessibility means to provide at least minimal access throughout the year to communities and districts to which existing access roads have deteriorated to the extent that they are cut off from the main trunk network.



Source: Photo by JICA Study Team

Photo 15.2.1 Impassable Roads in Rainy Season (Left: To Lalaua, Right: To Mecburi)

(2) Lack of Reliable Alternative Routes and Redundancy

Even if on-going road projects and planned projects are completed, reliable alternative routes, detours and/or backup routes for main trunk roads will be insufficient in terms of the road density.



Source: Photo by JICA Study Team

Photo 15.2.2 Weight Limit for Bridge (R658)



Source: Photo by JICA Study Team

Photo 15.2.3 Rolled Truck at Narrow Bridge (R658)

(3) Lack of Suitable Urban Road Network

The road network in urban areas such as Nampula city has a limited road network capacity and cannot accept the high volume of traffic that is expected after completion of Nacala Corridor and expansion of Nacala Port. The conditions for living in such cities are expected to get worse over the next few years due to increasing goods transportation (heavy trucks), car ownership and population growth.



Source: Photo by JICA Study Team

Photo 15.2.4 Long Queue of Vehicles in the Evening Peak Hour in Nampula



Source: Photo by JICA Study Team

Photo 15.2.5 Access Road to Nacala Port (no pedestrian way)

(4) Road and Traffic Safety Risk in Major Cities and Railway Level Crossings

Almost all trunk roads pass through the centres of cities and towns having a large number of pedestrians. An increase in traffic will also increase the risk of traffic accidents, primarily to the detriment of the most vulnerable road users, and negatively impact on the living conditions in the towns. In addition, the increase in the number of railway operations will cause a rise in conflicts with vehicle traffic at level crossings.

(5) Limited Capacity for Road Maintenance

Although the District Administrations have been expecting to benefit from fiscal decentralization, their available funding and technical capacity is, at this stage, insufficient to cope with their role in road construction and maintenance. It is for this reason that the District Administrations are often side lined when it comes to designing and implementing district roads.

(6) Limited Financial and Technical Capacity of Construction Contractors

A specific problem related to the road sector is the limited availability of capable small-scale contractors to carry out labour based road works on tertiary and district roads. The few contractors available are occupied with works on the classified network.

15.2.2 Objectives for Roads in the Nacala Corridor Region

Based on the discussion of current conditions written in Chapter 5 and issues as mentioned above, the objectives of the Road Sector are set as follows:

(1) To upgrade the accessibility and the functionality of the roads in the Region

- By improving regional, provincial and district roads from agricultural/ fishing and tourism potential areas the trunk roads to contribute to the expansion of markets

- By ensuring access to districts with the greatest economic potential, focusing on provinces with high population densities and high concentration of poverty
 - By upgrading impassable roads to provide at least minimal access throughout the year to communities and districts
 - By strengthening regional connectivity between the major regions in the Nacala Corridor Region by formulating the main corridors
- (2) **To establish urban road networks suitable for enhanced urban functions and increasing populations and economic activities**
- By establishing hierarchical road networks
 - For contributing to smooth connection to main corridors from industrial and business areas.
 - For supporting efficient economic activities in city centres and new development areas
 - By providing sufficient road capacities for the future traffic demand
- (3) **To provide safe and environmentally desirable road infrastructures by providing ring roads, bypass roads, multi-lane roads, flyovers, parking space and comfortable pedestrian routes**
- (4) **To establish reliable and efficient road networks by providing backup and/or alternative roads to supplement the main corridors and by providing transport terminals for smooth modal changes**
- (5) **To improve road maintenance capacities not only for national roads of the international corridors, but also regional and rural roads**

15.2.3 Strategies for Roads in the Nacala Corridor Region

The strategies to achieve the objectives of the Road Sector are formulated as follows:

- (1) **Strategy 1:** To provide and improve roads for serving particular areas of high potential for agricultural development and other economic development
- By upgrading national roads which compose feeder lines
 - For establishing a ladder-shape network to connect the main corridor in order to improve reliability and redundancy of the regional road network
 - By upgrading other national roads
 - For improving market access from areas of high development potential
 - For securing minimal access by providing passable roads from production areas
 - For providing equal opportunities to access social services
- (2) **Strategy 2:** To establish and maintain a region-wide trunk road network consisting of main corridors and sub-corridors for the purpose of covering wide areas in the Nacala Corridor Region
- By upgrading and maintaining the national roads that compose the international major corridor from Nacala Port through Nampula, Cuamba, Mandimba, Liwonde, Lilongwe and Chipata up to Lusaka
 - For strengthening of the international corridor connecting Zambia, Malawi and northern Mozambique
 - By upgrading and maintaining the national roads that compose the major corridors 1) between Mandimba and Lichinga and 2) between Mandimba and Tete-Moatize thorough Malawi
 - For extending the coverage of the upgraded trunk road network (not simply a single corridor, but to organise an extended corridor network)

- By upgrading and maintaining the national roads that compose the sub-corridor between Lichinga and Pemba through Montepuez
 - For extending the upgraded trunk road network in the areas without railways
- (3) **Strategy 3:** To provide and improve urban roads for establishing hierarchical urban road networks to avoid concentrated traffic coming into the city centres, to provide access for new industrial areas and logistics areas, to guide urban development and to form new urban areas
 - For assuring the transport function of the Main Corridors in the Region
 - For supporting existing and prospective economic sectors' activities
 - For creating better residential and business environments
- (4) **Strategy 4:** To implement comprehensive measures for securing traffic safety through inter-provincial efforts, coordination with neighbouring countries
 - By paying attention to car users, pedestrians and bicycle riders
 - By considering the quality of life in residential areas along roads
- (5) **Strategy 5:** To develop a proper road maintenance mechanism through international and interprovincial coordination
 - By establishing a specialized implementation unit for maintaining national roads that compose the international main corridors, main corridors and sub-corridors
 - By establishing and using a road inventory database
- (6) **Strategy 6:** To create a sustainable management system and capacity development for construction and maintenance for regional and rural roads
 - Because it is expected that paved roads and urban roads will be expanded in the Region
 - For capacity development of paved road maintenance for both government and private sectors under outsourcing schemes
 - For capacity development for the government sector regarding planning budget and using budget for road maintenance
 - By paying attention not only to technical issues but also to creation of employment opportunities through road construction and maintenance work

15.2.4 Programmes and Projects for Roads in the Nacala Corridor Region

(1) Criteria for Selecting Short-Term, Medium-Term and Long-Term Projects

For project identification in the Road Sector, the following are proposed criteria for prioritization for road improvement:

Criteria for Selecting Short-Term Targets

- Completion of the backlogged and effective projects proposed by both PRISE and IIP
- Enhancement of accessibility to the large markets from high potential agricultural areas
- Support for on-going economic investment
- Securing of immediate road safety
- Establishment of actual plan for feeder and non-classified road improvement

Criteria for Selecting Medium-Term Targets

- Improvement of the road network in wider urban areas within planned urban areas for supporting economic activities and urban residential environment
- Enhancement of accessibility for high economic potential areas (agriculture, fishing and tourism)
- Enhancement of capacity and expansion of network for international transportation routes
- Establishment of suitable road maintenance systems for both national/regional roads and district/feeder level roads

Criteria for Selecting Long-Term Targets

- Provision of improved roads for rural areas to connect with urban centres for better accessibility to job opportunities and other urban activities
- Formation and securing of reliable road network with improvement of detours

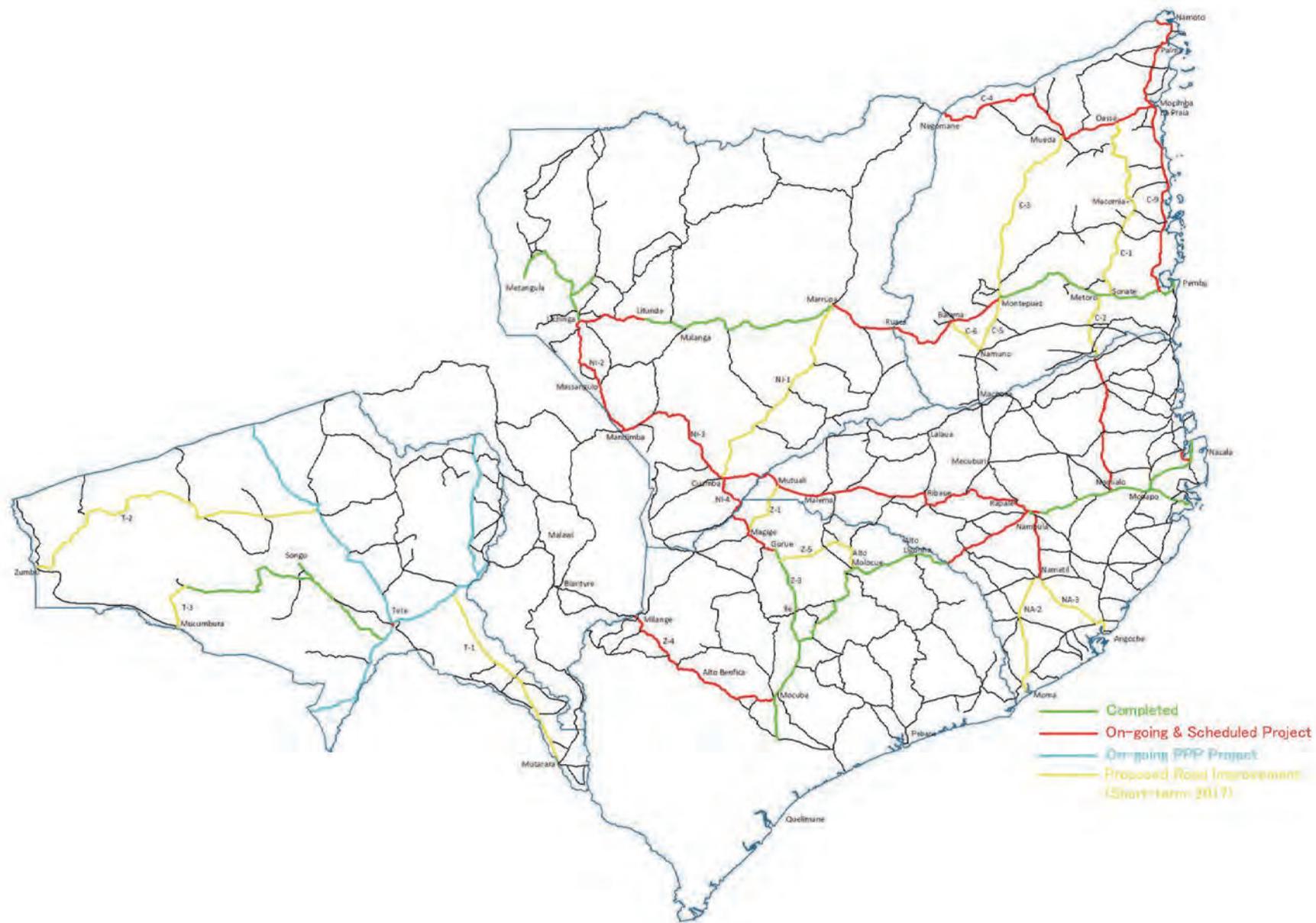
(2) Short-Term, Medium-Term and Long-Term Projects

Based on the above discussion, the identified list of projects which mainly have route numbers with their target-terms is shown in Table 15.2.1.

Table 15.2.1 Strategies and Project List for Roads in the Nacala Corridor Region

Strategy	Project/Route No.	Location	Code	Corridor	Length (km)	Planned By	Term					Project Type	
							Short			Middle	Long		
							Scheduled	Proposed	Priority				
Strategy-1 Road Network Improvement Potential Areas	R698: Mueda -Montepuez	Cabo Delgado	C-3		216	PII 2012 - 2015						Upgrading	
	R698: Montepuez - Namuno	Cabo Delgado	C-5	Feeder Line	55	Study Team						Upgrading	
	R698: Namuno - Machoca	Cabo Delgado	C-6	Feeder Line	55	Study Team						Upgrading	
	R760: Balama - Namuno	Cabo Delgado	C-7		40	Study Team						Upgrading	
	R760: Pemba - Rio Lurio (Lurio Br.)	Cabo Delgado	C-8		55	Study Team						Upgrading	
	N360,Cuamba - Marrupa	Niassa	NI-1	Feeder Line	249	PII 2012 - 2015						Upgrading	
	R726,R732: Chimbonila - Unango	Niassa	NI-7		60	Study Team						Upgrading	
	R729: Massangulo - Malanga	Niassa	NI-8		107	Study Team						Upgrading	
	R1214: Nairubi - Mitande	Niassa	NI-9		55	Study Team						Upgrading	
	R723: Maiaça - Nungo (Rio Lurio Br.)	Niassa	NI-10		95	Study Team						Upgrading	
	R720: Cuamba - Insaca	Niassa	NI-11		80	Study Team						Upgrading	
	New: N13 - N360	Niassa	NI-12		30	Study Team						New Construction	
	N325,N324,Malei-Olinga-Pebane	Zambézia	Z-2		191	PII 2012 - 2015						Upgrading	
	R655: Gurue - Alto Molocue	Zambézia	Z-5	Feeder Line	92	Study Team						Upgrading	
	N326: Malema - Alto Molocue	Zambézia	Z-6		38	Study Team						Upgrading	
	N323: Alto Ligonha - Gile	Zambézia	Z-7		84	Study Team						Upgrading	
	N324: Pebane - Moma (Ligonha Br.)	Zambézia	Z-8		145	Study Team						Upgrading	
	R646: Gile - Puna	Zambézia	Z-10		80	Study Team						Upgrading	
	R689, Monapo-Angoche	Nampula	NA-1		173	PII 2012 - 2015						Upgrading	
	N104: Nampula-Namitil	Nampula	NA-2-1	Feeder Line	60	PII 2012 - 2015 PRISE						Upgrading	
	R683,R680,N324 e N320: Namitil-Chalaua-Moma	Nampula	NA-2-2	Feeder Line	159	PII 2012 - 2015 PRISE						Upgrading	
	N104: Namitil - Angoche	Nampula	NA-3	Feeder Line	80	Study Team						Upgrading	
	N324: Moma - Boila	Nampula	NA-4		80	Study Team						Upgrading	
	R696,R698: Ranale - Machoca (Rurio)	Nampula	NA-5	Feeder Line	110	Study Team						Upgrading	
	R694,R695: Ribaeue - Machoca	Nampula	NA-6		120	Study Team						Upgrading	
	N326: Malema - Alto Molocue	Nampula	NA-7		35	Study Team						Upgrading	
	R691,R1151,R695: Malema - Lalaua	Nampula	NA-8		173	Study Team						Upgrading	
	R698,R706: Machoca - Napaco (N1)	Nampula	NA-9		135	Study Team						Upgrading	
	R705,R706: Memba - Arua	Nampula	NA-10	Feeder Line	95	Study Team						Upgrading	
	R705: Nampuecha - Rio Lurio	Nampula	NA-11		63	Study Team						Upgrading	
	New: Nacala - Memba Road	Nampula	NA-18		60	Study Team						New Construction	
	N303: Bene-Figoe-Zumbo	Tete	T-2	Feeder Line	348	PII 2012 - 2012						Upgrading	
	R602: Mphende - Mukumbura	Tete	T-3		50	PRISE						Upgrading	
	N302: Tete - Mualadze	Tete	T-4		255	Study Team						Upgrading	
	R603, R604: Bene - Furancungo - Villa Coutinho	Tete	T-5		170	Study Team						Upgrading	
	Non-classified: N7 - R302	Tete	T-6		55	Study Team						Upgrading	
	R762: Metuga - Palma	Cabo Delgado	C-9	Tourism Corridor	190	Study Team						Upgrading	
	N361: Lichinga - Metangula	Niassa	NI-6	Feeder Line.	110	Study Team						Rehabilitation	
	ITZ Access Road	Nampula	NA-13	Tourism Corridor	45	Study Team						Upgrading and New Construction	
	Nacala Tourism Roads Improvement	Nampula	NA-21	Tourism Corridor	235	Study Team						Upgrading	
	Strategy-2 Establishment of Region-Wide Road Network consisting of Main Corridors and Sub-Corridors	N380 Sonate-Macomia-Oasse	Cabo-Delgado	C-1	Negomane Corridor Sub-Corridor	189	PII 2012 - 2015						Rehabilitation and Bridge Replacement
		N1:Rio Lúrio- Meteorocom	Cabo-Delgado	C-2	Mozambique Highway Sub-Corridor	74	PII 2012 - 2015						Rehabilitation
		N381/R1251: Negomane - Mueda	Cabo Delgado	C-4	Nagomane Corridor	175	PRISE						Upgrading
		N13: Lichinga - Mandimba	Niassa	NI-2	Niassa Corridor Main Corridor	150	PRISE						Upgrading
		N13: Mandimba - Cuamba	Niassa	NI-3	Nacala Corridor, Niassa Corridor, Main Corridor	152	PRISE						Upgrading
R657: Magige - Cuamba		Niassa	NI-4	Niassa Corridor, Main Corridor, Feeder Line	90	PRISE						Upgrading	
R733,R1215: Unango - Matchezdje		Niassa	NI-5	Metangula Corridor	155	Study Team						Upgrading	
N103: Magige-Lioma Mutuali-Lioma		Zambézia	Z-1	Main Corridor	67	PII 2012 - 2015						Upgrading	
N103: Rehabilitation of Existing I3		Zambézia	Z-3	Niassa Corridor	-	PRISE						Rehabilitation	
N11: Milange - Alt Benfca		Zambézia	Z-4	Quelimane Corridor	94	PRISE						Upgrading	
R650,R658: Magige - Milange		Zambézia	Z-9	Main Corridor	143	Study Team						Upgrading	
N1,N12: Nampula - Nacala (4-lane)		Nampula	NA-12	Main Corridor	145	Study Team						Widening	
New Nacala Port Access		Nampula, Nacala	NA-17	Main Corridor	14	Study Team						New Construction	
N322: Madamba Mutarara		Tete	T-1	Mutarara Corridor	350	PII 2012 - 2012						Upgrading	
Strategy-3 Urban Road Network		New: Cuamba Bypass	Niassa, Cuamba C	NI-13		12	Study Team						New Construction
	Cuamba Urban Road Improvement	Niassa, Cuamba C	NI-14		9	Study Team						Upgrading and New Construction	
	New: Nampula Ring Road (South)	Nampula, Nampul	NA-14-1		33	Study Team						New Construction	
	New: Nampula Ring Road (North)	Nampula, Nampul	NA-14-2		26	Study Team						New Construction	
	New: Nampula Outer Road (North)	Nampula, Nampul	NA-15		151	Study Team						New Construction	
	New: Nampula Urban Road	Nampula, Nampul	NA-16		3	Study Team						New Construction	
	Nacala Wide Area Urban Roads Improvement	Nampula, Nacala	NA-19		230	Study Team						New Construction	
R703: Nacala - Nacala Velha	Nampula, Nacala	NA-20		18							Upgrading		
Strategy-4 Road Safety	Level Crossing Improvement	Nampula	RS-1		0.4	Study Team						New Construction	
	Accident database system development	Whole Country	RS-2			Study Team						Study and/or Training	
	Safety engineering improvement	Whole Country	RS-3			Study Team						Study and/or Training	
	Safety Enforcement	Whole Country	RS-4			Study Team						Legal System	
Strategy-5 Strategy-6 Road Maintenance	Capacity Development for Budget Plan and Use	Whole Country	RM-1			Study Team						Study and/or Training	
	Road Inventory Database (Provincial, District Level)	Whole Country	RM-2			Study Team						Study and/or Training	
	LBT Training (Pilot Project) and Generalization	Whole Country	RM-3			Study Team						Study and/or Training	
	Establishment of Specialized Maintenance Unit	Whole Country	RM-4			Study Team						Study and/or Training	

Source: JICA Study Team



Source: JICA Study Team

Figure 15.2.1 Proposed Short-Term Road Improvement Projects

15.3 Development Strategies for Railways

15.3.1 Future Prospects: Railway Demand Forecast

Traffic volume of railway transportation is based on the forecast of cargo handled at the Nacala Port and Nacala-a-Velha Port.¹ According to Vale S.A., the amount of coal to be transported by railway is 18 million ton per annum (MTPA) in 2017, 20 MTPA in 2025 and 30 MTPA in 2035.

**Table 15.3.1 Forecast of Cargoes Handled at Nacala Port
(Import and Transit to Neighbouring Countries)**

	Commodity	2017	2025	2035	
Internal/Regional Cargo including Import to Nacala Region	Containers	275	511	1,274	
	Bulk (Fuel)	252	480	1,125	
	Bulk (Clinker)	390	210	24	
	Bulk (Wheat)	225	277	420	
	Bulk (Rice)	333	333	708	
	Vehicles	49	49	283	
	Bulk (Others)	0	168	850	
	Mineral (Coal, empty)	0	0	0	
	Mineral (Other, empty)	0	0	0	
	Total		1,524	2,028	4,684
Transit Cargo to Neighbouring Countries	Malawi				
	Containers	472	1,009	2,465	
	Bulk (Fuel)	295	487	925	
	Bulk (Wheat)	116	115	98	
	Vehicles	69	148	298	
	Bulk (Others)	286	565	1,144	
	Sub-total	1,238	2,324	4,930	
	Zambia				
	Containers	92	184	357	
	Bulk (Fuel)	63	100	179	
	Bulk (Wheat)	9	21	31	
	Vehicles	8	13	23	
	Bulk (Others)	52	114	241	
	Sub-total	224	432	831	
	Tanzania				
	Bulk (Wheat)	0	175	194	
	Sub-total	0	175	194	
	Total		1,462	2,931	5,955
	Ground Total		2,986	4,959	10,639

Source: JICA Study Team

¹ Coal will be handled at the port in Nacala-a-Velha and all other cargoes will be handled at Nacala Port in Nacala Municipality.

**Table 15.3.2 Forecast of Cargoes Handled at Nacala Port
(Export and Transit from Neighbouring Countries)**

	Commodity	2017	2025	2035
Internal/Regional Cargo including Export from Nacala Region	Container	412	1,027	2,631
	Mineral (Others)	0	5,000	7,500
	Bulk (Wood chip)	0	192	576
	Bulk (Others)	76	189	485
	Total	488	6,408	11,192
Transit Cargo from Neighbouring Countries	Malawi			
	Containers	255	438	886
	Bulk (Others)	90	156	315
	Sub-total	345	594	1,201
	Zambia			
	Containers	4	8	15
	Bulk (Others)	10	19	36
	Sub-total	14	27	51
	Tanzania			
	Bulk (Food)	0	175	194
	Sub-total	0	175	194
	Total	359	796	1,446
	Ground Total		847	7,204

Source: JICA Study Team

It is assumed that the railways will transport the above cargoes in accordance with the modal share ratio shown in the table below.

Table 15.3.3 Assumed Modal Share of Railways for Estimation of Railway Cargo Demand

Type of Traffic	Commodity	Modal Share (Rail)			Type of Wagon
		2017	2025	2035	
Internal/Regional	Containers	5%	10%		Flat wagon for containers
	Coal	100%			Flat wagon for coal
	Other minerals	100%			Flat wagon for ore
	Wood chips	5%	10%		Flat wagon
	Fuel	5%	10%		Tank wagon
	Clinker	5%	10%		Hopper wagon for clinker
	Wheat	5%	10%		Hopper wagon for wheat
	Rice	5%	10%		Box wagon
	Vehicles	0%			----
	Others	5%	10%		Box wagon
Transit	Containers	50%			Flat wagon for containers
	Fuel	100%			Tank wagon
	Wheat	50%			Hopper wagon
	Vehicles	5%			Flat wagon
	Others	50%			Box wagon

Source: JICA Study Team

15.3.2 Required Number of Trains

Based on the estimated traffic volume of cargoes for railway, the required number of wagons for each type of commodity and required number of trains are calculated.

The network capacity dedicated for coal is estimated based on the volume of coal (to be transported from Moatize to Nacala) that was reported by Vale S.A. The network capacities for other goods (general cargo, other minerals, and passengers) in 2025 and 2035 are estimated based on the ratio of the number of trains (5 pairs/day) and network capacity in 2017 (4 million tons per annum; MTPA).

Table 15.3.4 Required Network Capacity of the Nacala Corridor Railway between Moatize and Nacala

Year	Required Number of Trains (pairs)						Network Capacity (MTPA)*
	General Cargo	Coal	Other Minerals	Passengers	Others	Total	
2017	2	9	0	1	2	14	22 (18)
2025	4	10	8	1	2	19	28 (20)
2035	9	14	11	1	2	28	42 (30)

Note: * () is network capacity for coal transportation
Source: JICA Study Team

In 2017, the network capacity should be 22 million tons per annum (hereinafter “MTPA”) to meet traffic demand. However, it is necessary to increase its capacity up to 28 MTPA by 2025 and 42 MTPA by 2035.

15.3.3 Issues of the Nacala Corridor Railway

The issues for the railway sector for promoting integrated development for the Nacala Corridor Region are described below.

(1) How to realise benefits by upgrading of railways between Moatize and Nacala through Malawi for promoting development for the Nacala Corridor Region

By the completion of the upgrading of railways between Moatize and Nacala through Malawi, the number of trains and their average speed will increase. As a result, it is expected that the line capacity for general cargo will increase and their transportation cost will be reduced partly because the transit time between inland areas and Nacala will be reduced and partly because of improved efficiency of transport. Critical issues in the railway sector include how to realise or utilise benefits to be attained by upgrading of the railways between Moatize and Nacala through Malawi for promoting development for the Nacala Corridor Region.

(2) How to maintain or upgrade the line capacity of the railways and the railway cargo handling capacity

On the other hand, there is a concern that the railway line capacity will be insufficient for the expected growth of cargo demand. The handling capacity of the cargo stations will also be insufficient because the sites (cargo handling space) for cargo stations, especially those of Nacala and Nampula, are limited. When the expansion of the cargo station sites is difficult, the relocation of cargo stations might be required. To accommodate the growth in traffic volume, the doubling of railway tracks or the construction of bypasses for some cities might also be required. Another

critical issue in the railway sector is how to maintain or upgrade the line capacity of railways and handling capacity for cargos shipped by railway.

(3) How to deal with Social and Environmental Impacts of Coal Trains in Urban Areas

Moreover, there is a concern that running long and heavy trains will cause social and environmental impacts including noise, vibration and the increase in time required for closing level-crossings. Especially, at the level-crossings close to railway stations, since the long coal trains (on the way back to Tete from Nacala) run very slowly with closing time reaching over 10 minutes. This will cause traffic congestion in major urban areas. The number of trains which run through these areas is estimated to be 14 trains per day (in one direction) in 2017, 19 trains (in one direction) in 2025 and 28 trains (in one direction) in 2035. Out of these trains 9 trains in 2017, 10 trains in 2025 and 14 trains in 2035 will be coal trains of Vale.

(4) How to efficiently deal with international operation of trains

The Nacala Corridor Railway is expected to transport international cargoes between Zambia, Malawi, and Mozambique. The cargo demand from Zambia and Malawi should also be attended by the Nacala Corridor Railway connecting Moatize and Nacala. Under the circumstances of frequent operation of long coal trains, it is not easy to operate other cargo trains to satisfy the cargo demand from Zambia, Malawi and inland Mozambique (Niassa Province and Tete Province). One of the critical issues on the railway sector is how to efficiently deal with international operation of trains.

(5) How to transport more non-coal cargoes over the Nacala Corridor Railway

The Nacala Corridor Railway should be upgraded and operated in compliance with the concession agreements. Although the railway operating company is more concerned about efficiency and volume of coal transport, how to maintain and increase the railway capacity for non-coal cargoes, as well as for passengers, is a very critical issue for regional development.

(6) How to strengthen the railway line between Lichinga and Cuamba

In addition to the main corridor, the railway line between Lichinga and Cuamba is also an important line for northern Niassa. It is also important to expand the railway network in wider areas of the Nacala Corridor Region. The railway section between Cuamba and Moatize is also important for transporting non-coal cargoes for diversifying the economic sectors of Tete Province.

15.3.4 Objectives for the Nacala Corridor Railway

Considering how to take advantage of upgrading of the Nacala Corridor Railway between Moatize and Nacala, the objectives of the railway sector are set as follows:

- To actively promote utilization of railways for long-haul transport (both international and domestic)
- To promote containerisation of railway transport in order to achieve higher efficiency and increase the transport capacity in both domestic transport and transit (international) transport
- To promote integration of railway and road transport (To increase the acceptance of more cargoes from road transport)
- To realize safe operation of the railway system

- To reorganise railway routes in harmony with the urban structure, especially for reducing interruption of road traffic at railway crossings in city centres, as well as environmental impacts (noise and vibration) on the residential environment
- To secure the profitability of railway operation (including upgrading and maintenance) by creating cargo demand by promoting development of diversified economic sectors in the Nacala Corridor Region

15.3.5 Strategies for the Nacala Corridor Railway

The strategies of the railway sector are formulated as follows:

- To strengthen the capacity of INATTER, a regulatory body for railway transport for ensuring that the concessionaire fulfils all obligations for regional transport of non-coal cargoes under the concession agreement
- To establish container depots in Zambia and Malawi and to introduce a tracking system for containers for promoting containerisation of railway cargo
- To establish multi-modal terminals between railways and roads at Nacala, Nampula and Cuamba for integrating railway transport and road transport
- To improve railway crossings as well as railway traffic control for promoting railway transport safety
- To construct railway bypasses to reduce social and environmental impacts (interruption of road traffic, noise and vibration) of coal railway operation in urban areas, especially in the city centre
- To promote various businesses related to the railway in order to sustain the management of railway operation, for example, by promoting tourism and by redeveloping former railway facilities
- To rehabilitate and resume operation of Lichinga-Cuamba Railway for expanding the railway network

15.3.6 Programmes and Projects for the Nacala Corridor Railway

For implementing the strategies recommended in the previous section, the following programmes and projects are proposed:

- Nacala Corridor Railway Capacity Expansion Programme
- International Railway Network Integrated Operation Promotion Project
- Inland Container Depots (ICD) Development Projects in Nacala, Chipata, and at the border with Malawi
- ICT Applied Tracking Service Development Project
- Transportation Management System Development Project
- Grade Separation Programme at the Railway and Highway Crossings
- Railway Traffic Control System Implementation Project
- Railway Signalling Facilities Implementation Project
- Capacity Enhancement Project for INATTER
- Multimodal Logistics Centre Implementation Programme in Mutuali and Nampula
- Zoning Coordination Projects at Nacala and Nampula Industrial Areas
- Nampula Railway Bypass Route Construction Project
- Optical Fibre Cable Installation Project between Nampula and Nacala

- Seasonal Railway Promotion Project to the Island of Mozambique
- Nampula Depot Redevelopment Project

15.3.7 Nacala Corridor Railway Capacity Expansion Programme

Among these programmes and projects, the most important programme is the Nacala Corridor Railway Capacity Expansion Programme.

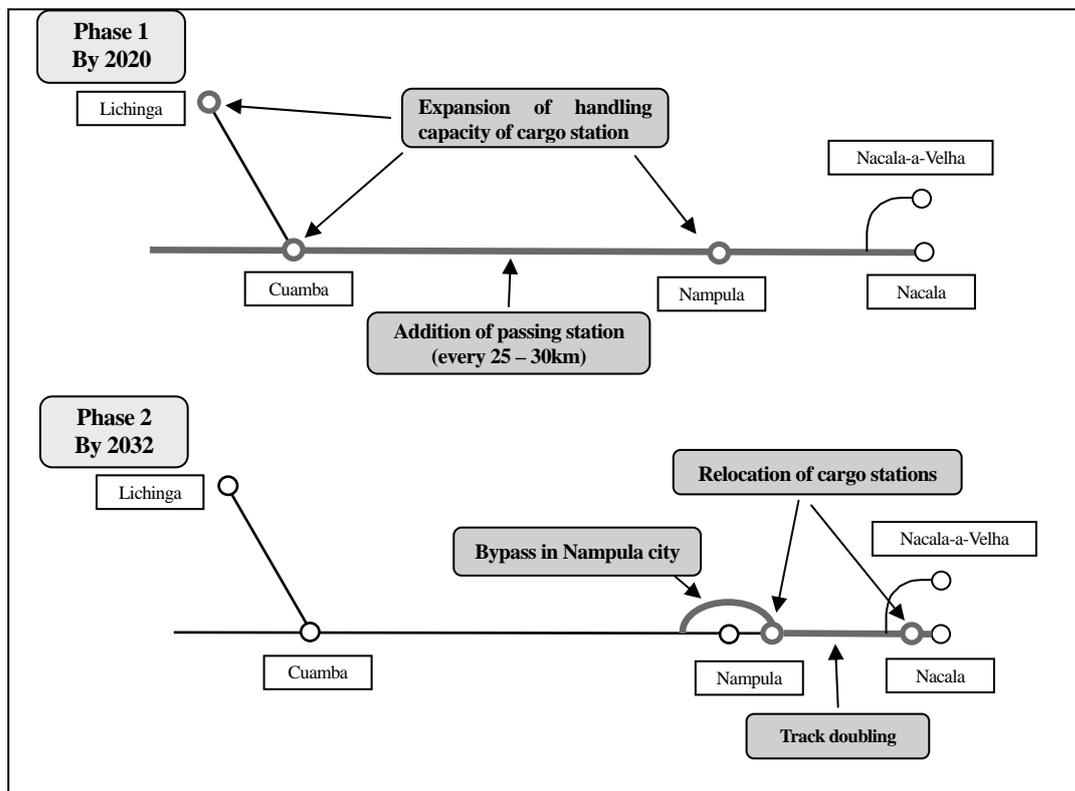
Scope of Major Projects

Key steps and major projects for the Nacala Railway Capacity Expansion Programme are as below.

Table 15.3.5 Major Projects composing the Nacala Railway Capacity Expansion Programme

	Main Projects
Phase 1 (by 2020)	Addition of passing stations (every 25 – 30km)
	Expansion of handling capacity of cargo stations (Nampula, Cuamba, Lichinga)
	Procurement of rolling stock (locomotives and wagons)
Phase 2 (by 2032)	Double tracking (Nacala – Nampula)
	Relocation of cargo stations (Nacala and Nampula)
	Construction of bypass (Nampula)
	Procurement of rolling stock (locomotives and wagons)

Source: JICA Study Team



Source: JICA Study Team

Figure 15.3.1 Main Projects for Nacala Railway Capacity Expansion Programme

15.4 Development Strategies for Ports

15.4.1 Future Prospects: Cargo Demand Forecast for Nacala Port

Currently the Nacala Corridor Region has two important existing ports, namely Nacala Port and Pemba Port. In the future, it will be necessary to effectively and widely utilize Nacala Bay by locating port facilities within Nacala Bay. As for Pemba Bay and Pemba Peninsula, there are other needs including tourism resort development and a support base for offshore natural gas exploitation. Furthermore, special attention is required for Palma Bay because of the prospective LNG production and other possibilities of chemical industries using offshore natural gas.

(1) Cargo Demand for the Ports of Nacala Bay including Nacala Port and Coal Terminal

The upgrading of trunk roads and railways along the Nacala Corridor would connect Eastern Zambia, Malawi and inland part of Northern Mozambique to Nacala Port. This brings a wider catchment of cargoes to Nacala Port. Quite a large percentage of Malawi export and import cargoes would turn to the Nacala Corridor and Nacala Port with the upgrading of the transport function of the Nacala Corridor. Moreover, the improved connectivity of the Nacala Corridor Region to Nacala Port would enhance development potential of various economic sectors.

Because of this widened cargo catchment and improved connectivity for the Nacala Corridor Region, as well as Malawi and Eastern Zambia, the volume of cargoes for Nacala Port is considered to increase largely.

The cargo demand for Nacala Port was projected for the years 2017, 2025, and 2035. Firstly, the actual cargo handled in Nacala Port (up to the year 2011) was estimated by upgraded statistical data based on the socio-economic framework established for the Nacala Corridor Region as the macro forecast. Furthermore, the existing forecast for cargo demand was adjusted based on the socioeconomic framework set by PEDEC-Nacala and considering future cargo prospects from the agriculture and mining sectors. The result of total cargo volumes in the target years is shown in Table 15.4.1.

It should be noted that the “Mineral” in the table below stands for coal to be transported from the Moatize coal mine (Vale S.A) and exported from the coal terminal in Nacala-a-Velha.

In addition to these cargo demands, more coal will be transported from Tete to Nacala Port for other mining companies; therefore, another large-scale coal terminal will be necessary in Nacala Bay. Furthermore, if another offshore natural gas reserve is discovered closer to Nacala, another LNG plant and other chemical industries will be developed in the Nacala Bay Area, requiring a new industrial port with a hinterland for accommodating chemical industries. Considering these future prospects, it is necessary to prepare a master plan for the ports within Nacala Bay.

Table 15.4.1 Cargo Throughput

Type of Cargo		Unit: 1,000 ton		
		2017	2025	2035
①	Container Cargo (Container Cargo) (1,000 TEU)	1,770 (192)	3,713 (393)	8,959 (944)
②	Mineral	18,000 ^a	25,000	37,500
③	Bulk (Wood Chip & Clinker)	490	577	951
④	Bulk (Liquid)	653	1,151	2,423
⑤	Bulk (Food)	683	974	2,379
⑥	Bulk (Others)	414	868	2,235
⑦	Vehicle	126	282	604
Total		22,136 ^a	32,565	55,051

Source: JICA Study Team

(2) Ports of Pemba Bay

Pemba has an existing port with a jetty and container yard, as well as warehouses. There is an expansion plan for Pemba Port, which was recently prepared for a new location south of the existing port. The expanded port area and facilities will be initially developed as a supply base for offshore oil/gas exploration and for drilling rig/pipeline construction, and then the expanded port is expected to grow as it takes on the role of the service port for the economic sectors and urban centre in Pemba. If an offshore natural gas reserve is discovered, this expanded Pemba Port would serve as an industrial port for the gas-related chemical industries in the future.

(3) A New Port for Palma

In the southern part of Palma Bay, ENH reserves an area of 25,700 ha for an industrial development centring on the LNG plants and including other chemical industries that utilize natural gas, as well as for supporting the economic sectors and infrastructure. Anadarco's LNG plant construction plan, including their jetties and other port facilities, has been well advanced; however, the plan does not consider the location of the public port facilities or access to the sea from other land use areas including other chemical industries and supporting sectors. It is necessary to establish a port development plan including hinterland utilization, considering the whole situation of LNG plants, other chemical industries, and the public port function and access to the sea from other land use areas, as well as supporting sectors and infrastructure.

15.4.2 Issues on the Ports in the Nacala Corridor Region

Considering the present situations and future prospects, the following issues are defined for the Port Sector:

- Overall: Considering the a variety of prospective development opportunities in the coastal areas of the Nacala Corridor Region, it is necessary to have a clear future vision, differentiated roles and functions of the seaports of Nacala Bay, Pemba and Palma in order to promote development of the Nacala Corridor Region.
- Seaports of Nacala Bay: The present Nacala Port does not have enough land or adjacent space to expand its capacity to accommodate the increasing demand for cargoes in the face of the Nacala Corridor Region's development in the future. Considering the possibilities 1) to receive an additional railway line for transporting coal from Tete and 2) to accommodate chemical industries in the coastal areas of Nacala Bay, it is necessary to develop the port facilities by widely using the whole of Nacala Bay.

- **Pemba Port:** It is necessary to determine the future roles of Pemba Port and its expansion by considering tourism resort development in Pemba Peninsula and its surrounding areas, the need to support the natural gas exploitation in Palma's offshore gas field, the possibility of locating LNG plants and other chemical industries if further offshore natural gas reserves are discovered and confirmed near Pemba. Because of the uncertainty of these future situations, flexible coastal planning and utilization of Pemba Bay and Pemba Peninsula is essential.
- The tourism resort base will be expanded in Pemba Peninsula and its surrounding areas. At the same time, Pemba Peninsula is expected to accommodate a support base for natural gas exploitation for a certain period.
- **Natural Gas and Seaports:** It is necessary to consider the roles of the seaports for supporting not only natural gas exploitation but also to support industrial chemical development using natural gas. The natural gas reserve has been confirmed only in the northern Area-1 and Area-4 of the Rovuma Basin. Currently, there is possibility for Palma to accommodate LNG plants and chemical industries including methanol and ammonia. However, if natural gas reserve is confirmed in other areas in the Rovuma Basin, which are closer to Pemba and Nacala, Pemba and Nacala will have possibilities to accommodate LNG plants and other chemical industries using natural gas.

15.4.3 Objectives for the Ports in the Nacala Corridor Region

It is necessary to consider a variety of development opportunities and potentials available to different sea ports on the east coast of the Nacala Corridor Region. Seaports are an important part of the transport corridors which should form a region wide network in the Nacala Corridor Region.

The objective for the development of Ports in the Nacala Corridor Region is defined as follows:

- To develop and utilize seaports of the eastern coast of the Nacala Corridor Region under clear visions and roles in order to contribute to development of diversified economic sectors in the Nacala Corridor Region by flexibly fulfilling development opportunities available to different seaports

15.4.4 Strategies for the Ports in the Nacala Corridor Region

Strategies for the development of ports are as follows:

- To develop the seaports on the east coast of the Nacala Corridor Region in connection with the main corridors, sub-corridors and feeder lines, as well as emerging development opportunities for different seaports, and to effectively operate sea transport (both ocean-going and coastal shipping)
- To develop the seaports on Nacala Bay for fulfilling comprehensive functions of 1st-class international gateway and production centre, including 1) import and export of containers and general cargoes, 2) export of coking coal, 3) import of fuel, and 4) industrial port for the chemical industry (if natural gas is exploited in offshore gas fields near Pemba or Nacala)
- To develop Pemba Port as a support base for natural gas exploitation, as well as a sub-regional port
- To develop Palma Port as an industrial port to support the development of chemical industries, such as chemical processing of LNG, methanol and ammonia utilizing natural gas from the offshore natural gas fields in Rovuma Basin.

15.4.5 Programmes and Projects for the Ports in the Nacala Corridor Region

The following programmes, projects and measures are proposed, which are in line with the above Strategies:

Nacala Bay Area

- Nacala Port Management Improvement Project (on-going with assistance of the Japanese Government)
- Nacala Port Rehabilitation Project (on-going with the assistance of the Japanese Government)
- Nacala Port Upgrading Project (on-going with assistance of the Japanese Government)
- Project for Integration of Nacala Port with Railways
- Project for Nacala Port Access Road for better integration of Nacala Port with Roads
- Port Development Master Planning Study for Nacala Bay Area (Nacala and Nacala-a-Velha)
- Development of a New Industrial Port for Chemical Industries in Porta Belmore, North west of Nacala Bay
- Creation of Amusement Areas, such as Fishermen's Wharf and Historical Building Renovation in relation to Nacala Port
- Nacala Shipyard Construction (Dry Dock)

Pemba Port

- Pemba Port Expansion to become a Support Base for Natural Gas Exploitation
- Pemba Port Passenger Berth Project

Palma Port

- Palma Port Development for Supporting Natural Gas Exploitation and Gas-Based Chemical Industries

Other Ports

- Angoche Fishery Port Improvement Project
- Metangula Passenger/Cargo Berth for International Ships Project

Overall

- Port Sales Capacity Development
- Promotion of Nacala-Maputo Coastal Cargo Shipping
- Introduction of Short and Medium Haul Passenger Boat Service for Tourism and Regional Transport (Nacala-Pemba, Pemba-Palma)
- Customs, Immigration, and Quarantine (CIQ) Systems Improvement Project for Enhancing Safety and Convenience for Consignors
- Port Operation and Management Improvement

15.5 Development Strategies for Water Resources

15.5.1 Future Prospects: Water Demand

The water demand in the Nacala Corridor Region is expected to increase in line with the development of diversified economic sectors and the increase of population. Major water demand increase would come from the prospective economic sectors and population increase in major urban centres including Greater Nampula, Nacala Bay Area, Cuamba City and Pemba City and Lichinga City.

Table 15.5.1 through Table 15.5.5 shows the future water demand estimated for Greater Nampula Area, Nacala Bay Area, Cuamba City, Pemba City, and Lichinga City for the years 2017, 2020, 2025 and 2035. This estimation was done for water demand by residential population and institutions and that by industries.

Table 15.5.1 Estimated Water Demand of Greater Nampula

Unit: m³/day

			2017	2020	2025	2035
Parameters for Water Demand by Residential Population	Ratio in Urban Population (%)	House Connection	10.3%	15.5%	20.4%	34.8%
		Yard Tap	34.6%	34.9%	38.9%	39.2%
		Public Standpipe	55.1%	49.6%	40.7%	25.9%
	Per Capita Demand	House Connection	150	150	150	200
		Yard Tap	90	90	90	90
		Public Standpipe	30	30	30	30
Water Demand by Residential Population and Institutions			86,968	93,820	141,220	267,961
Water Demand by Industries			53,000	68,500	94,000	120,000
Total Water Demand			139,968	162,320	235,220	387,961

Source: JICA Study Team

Table 15.5.2 Estimated Water Demand of Nacala Bay Area

Unit: m³/day

			2017	2020	2025	2035
Parameters for Water Demand by Residential Population	Ratio in Urban Population (%)	House Connection	15.2%	19.9%	23.9%	37.5%
		Yard Tap	25.2%	30.5%	38.1%	31.1%
		Public Standpipe	59.7%	49.7%	38.0%	31.5%
	Per Capita Demand	House Connection	150	150	150	200
		Yard Tap	90	90	90	90
		Public Standpipe	30	30	30	30
Water Demand by Residential Population and Institutions			55,808	67,038	85,319	186,112
Water Demand by Industries			71,000	80,250	105,500	185,000
Total Water Demand			126,808	147,288	190,819	371,112

Source: JICA Study Team

Table 15.5.3 Estimated Water Demand of Cuamba CityUnit: m³/day

			2017	2020	2025	2035
Parameters for Water Demand by Residential Population	Ratio in Urban Population (%)	House Connection	5.0%	7.5%	10.0%	15.0%
		Yard Tap	10.0%	12.5%	15.0%	35.0%
		Public Standpipe	85.0%	80.0%	75.0%	50.0%
	Per Capita Demand	House Connection	150	150	150	200
		Yard Tap	90	90	90	90
		Public Standpipe	30	30	30	30
Water Demand by Residential Population and Institutions			11,713	11,058	17,213	36,474
Water Demand by Industries			7,800	20,000	32,000	52,000
Total Water Demand			19,513	31,058	49,213	88,474

Source: JICA Study Team

Table 15.5.4 Estimated Water Demand of Pemba CityUnit: m³/day

			2017	2020	2025	2035
Parameters for Water Demand by Residential Population	Ratio in Urban Population (%)	House Connection	5.0%	10.0%	12.5%	15.0%
		Yard Tap	20.0%	25.0%	30.0%	30.0%
		Public Standpipe	75.0%	65.0%	57.5%	55.0%
	Per Capita Demand	House Connection	125	125	150	200
		Yard Tap	70	70	90	90
		Public Standpipe	30	30	30	30
Water Demand by Residential Population and Institutions			21,181	25,781	35,100	62,213
Water Demand by Tourism			750	2,250	3,000	4,905
Total Water Demand			21,931	28,031	38,100	67,118

Source: JICA Study Team

Table 15.5.5 Estimated Water Demand of Lichinga CityUnit: m³/day

			2017	2020	2025	2035
Parameters for Water Demand by Residential Population	Ratio in Urban Population (%)	House Connection	5.0%	7.5%	10.0%	15.0%
		Yard Tap	10.0%	12.5%	15.0%	30.0%
		Public Standpipe	85.0%	80.0%	75.0%	55.0%
	Per Capita Demand	House Connection	125	125	150	200
		Yard Tap	70	70	90	90
		Public Standpipe	30	30	30	30
Water Demand by Residential Population and Institutions			19,991	23,608	28,323	56,700
Water Demand by Industries			2,500	4,000	5,000	7,500
Total Water Demand			22,491	27,608	33,323	64,200

Source: JICA Study Team

15.5.2 Issues on Water Resources Development

Considering the existing conditions on water resources and future prospects, the following issues are defined:

(1) Lack of Meteorological and Hydrological Data

The numbers of meteorological and hydrological monitoring stations that are functional and obtaining data are not sufficient. In addition, the observation period of the existing equipment is short. As a result, the current data is not sufficient to analyse the water resources of the wide Nacala Corridor Region.

(2) Lack of Overall Water Resources Development Plan

At the moment, individual studies and projects are being carried out in order to meet at least the minimum requirements for water in major cities. These efforts are vital to satisfy the immediate everyday demand. However, they will not be a solution for the long term future demand.

(3) Difficulty in Implementing Integrated Water Resources Management

Since there are no sufficient metrological and hydrological data in the Nacala Corridor Region, it is difficult to establish an integrated water resources management plan and to conduct an integrated water resources management. Under this situation, there are risks in allowing negative impacts on the water resources and the environment of particular river basins by implementing water resources development like construction of dams for water supply.

15.5.3 Objectives for Water Resources Development

The estimated water demand in the above section is indispensable to realize the economic growth of the Nacala Corridor Region. In other words, the economic growth will not be realized without a sufficient amount of water. Thus, the objective of the development of water resources is defined as:

- To develop water resources to meet water demand for growing areas in an efficient and timely manner
- To conduct Integrated Water Resources Management (IWRM) by utilising appropriate metrological and hydrological data
- To sustain the water environment by conducting wise utilisation of water resources through the Integrated Water Resources Management (IWRM)

15.5.4 Strategies for Water Resources Development

Strategies of the development of water resources are as follows:

Strategy 1: To strengthen the data collection system and prepare an overall water resources development plan for the Nacala Corridor Region.

Strategy 2: To conduct Integrated Water Resources Management utilizing the data collection system on water resources

Strategy 3: To meet the immediate demand by small-scale water resources development and water supply systems

Strategy 4: At the same time, to conduct studies on major water resources development and water supply systems for satisfying long-term demand

Development of water sources should be determined by water demand and located as close as possible to the demand areas. When planning water sources, it is indispensable to consider the hydrological, meteorological and geographical situation of the surrounding area and to estimate the potential of surface water and groundwater. However, at the present, the number of reliable

meteorology and hydrology monitoring stations are not sufficient to analyse the whole of the Nacala Corridor Region.

Therefore, the first step should be to establish a hydrological and meteorological data collection network in order to obtain basic data for planning and designing projects. Then, based on the obtained data, a study on Integrated Water Resources Management (IWRM) should be carried out to verify the water potential of the areas. These works will take time to develop.

On the other hand, the government needs to tackle the imminent lack of water supply. Considering the limited funds and time available, reinforcement of existing dams and wells should be carried out as an urgent action to relieve the situation as much as possible.

15.5.5 Programme and Projects for the Water Resources Development

Programmes and projects are proposed, which are in line with the above strategies. The number of each programme corresponds to the strategy number.

Programme 1.1 Conduct Data Collection by Reinforcement of the Metrological and Hydrological Network for the Nacala Corridor Region

- Project: Procurement of hydrometric equipment
- Project : Training staff of ARA-N and ARA-C

Programme 1.2 Implementation of an Integrated Water Resources Management (IWRM) Study

- Project: IWRM study on the water basins of Megaruma River, Lurio River, Mecuburi River, Monapo River, Sanhute River, and Meluli River.

Programme 2.1 Greater Nampula

- Project: Monapo Dam rehabilitation on the Monapo River (2013)
- Project : Monte Tiza Dam construction on the Meluli River (medium-term)
- Project: Mutelele Dam construction on the Ligonha River (medium-term)

Programme 2.2 Nacala Bay Area

- Project: Raising the height of Muecula Dam on the Muecula River (May 2013)
- Project: Development of additional wells in Mutuzi and M'paco Well Fields (short-term)
- Project: Construction of Sanhute Dam on the Sanhute River (short-term)
- Project: Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin (medium-term)
- Project: Project for Desalination Plant in Nacala Bay Area (to satisfy increasing water demand in Nacala Bay Area) (long-term)

Programme 2.3 Cuamba City

- Project: Raising the height of Mepopole Dam (short-term)
- Project: Construction of Mecuca Dam on the Muecula River (medium-term)
- Project: Construction of Chichemunda Dam (long-term)

Programme 2.4 Pemba City

- Project: Development of additional wells in the Metuge Well Field (medium-term)

- Project: Construction of Megaruma Dam (long-term)

Programme 2.5 Lichinga City

- Project: Construction of Mbahu Dam (medium-term)
- Project: Construction of a new dam (to be identified, long term)

The water supply sources and their potential supply amount after the implementation of the above programmes and projects in Greater Nampula Area and Nacala Bay Area are as shown in the table below.

Table 15.5.6 Proposed Major Water Supply Sources and Potential Supply Amount

Area	Dam	River	Supply Amount (m ³ /day)
Greater Nampula	Monapo Dam	Monapo River	20,000
	Monte Tiza Dam	Meluli River	259,000
	Mutelele Dam	Ligonha River	121,000
Nacala Bay Area	Muecula Dam	Muecula River	33,000
	Sanhute Dam	Sanhute River	40,000
	Lurio Dam	Lurio River	430,000

Source: JICA Study Team

The location of existing and planned dams in the Greater Nampula and Nacala Bay Areas are shown in Figure 15.5.1.

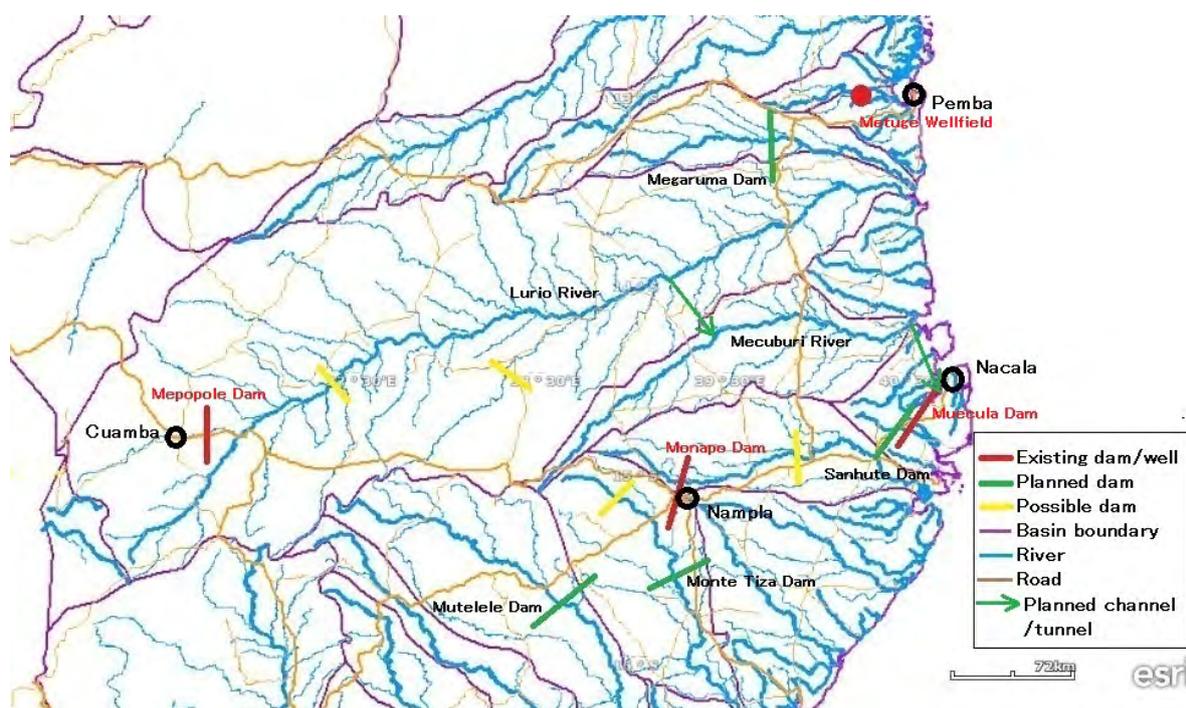


Figure 15.5.1 Existing and Planned Dams in Greater Nampula and Nacala Bay Area

The estimated water demand and the water supply from the proposed water resource projects are shown in Table 15.5.7.

Table 15.5.7 Water Demand and Proposed Supply Sources for Greater Nampula and Nacala Bay Area

Area	Demand / Supply Source		2017	2025	2035
			(m ³ /day)	(m ³ /day)	(m ³ /day)
Greater Nampula	Demand	Expanded Supply Area	140,000	235,000	389,000
		Limited Supply Area	131,000	217,000	341,000
	Supply Source	Monapo Dam	20,000		
		Monapo Dam+Monte Tiza Dam	279,000		
		Monapo Dam + Monte Tiza Dam + Mutelele Dam	400,000		
Nacala Bay Area	Demand	Expanded Supply Area	127,000	191,000	371,000
		Limited Supply Area	120,000	180,000	344,000
	Supply Source	Muecula Dam + Sanhute Dam	73,000		
		Muecula Dam + Sanhute Dam + Lurio River Reserve	503,000		
			503,000	503,000	

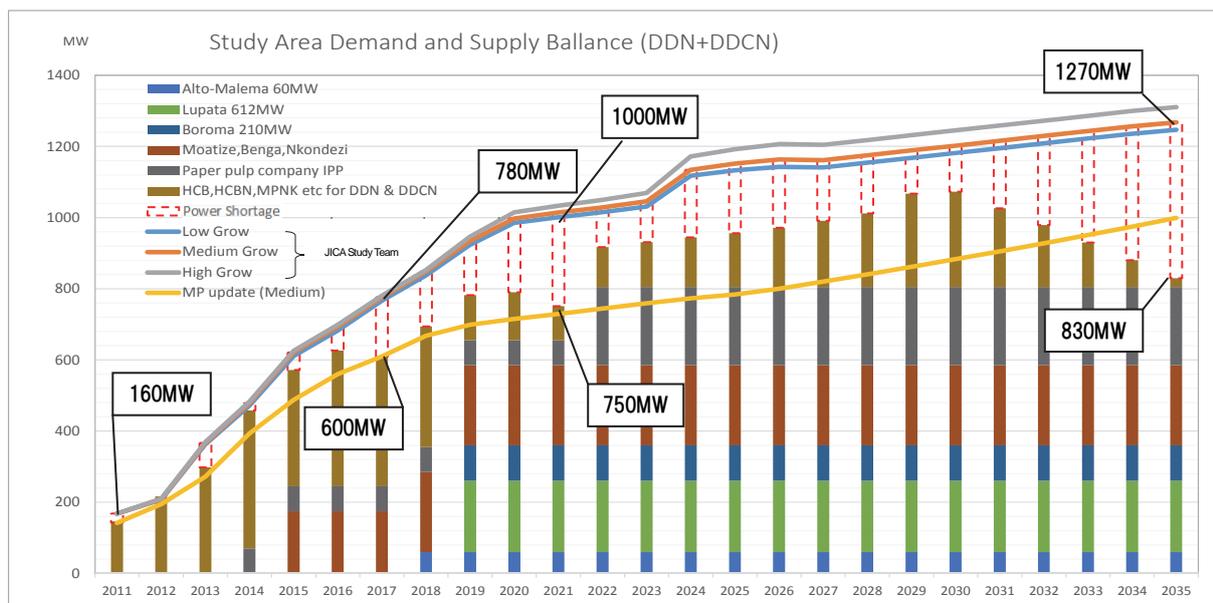
Source: JICA Study Team

Note: Expanded Supply Area will serve 100% of the urban population while Limited Supply Area will serve 80% of the urban population

15.6 Development Strategies for Power Sector

15.6.1 Future Prospects: Power Demand and Supply

The estimated results of future power demand and power supply capacity in the Nacala Corridor Region are shown in Figure 15.6.1. The columns (vertical bars) represent the power generation capacity and the line graph represents the demand for power. The blue, orange, and grey lines show low-growth, medium-growth and high-growth scenarios, respectively, in accordance with the future socio-economic frameworks projected by this Study. For reference, the demand estimation made by the “Master Plan Update Report, Volume II Load Forecast Report (EDM)” (hereinafter “EDM Master Plan”) is shown as a yellow line. Both demand scenarios consider natural growth (population, economy) and large customer growth (individual reports from prospective customers). The difference between the two demand estimations, this Study and the EDM Master Plan, is mainly due to the difference in the big consumers in the economic framework scenarios. The decrease of generation capacity from 2031 is based on an assumption that the generated power of HCB and others will be shifted to supply the growing demand in the southern area of Mozambique via the South African Power Pool.



Source: JICA Study Team based on Draft Master Plan Update Report (Volume II Load Forecast Report, EDM Dec 2012)

Figure 15.6.1 Balance of Demand and Supply of Power (Peak Demand and Supply)

The medium growth scenario shows that the demand will be 7.7 times greater in 2035, compared to actual demand in 2011. The generation shortage will be significant from 2017 at around 180 MW, and in 2021 at around 250MW (red dotted column). It is proposed in the EDM Master Plan to install Static VAR Compensators (hereinafter “SVC”) which is expected to compensate the power factor, and as a result, increase the network capacity by around 200 MW. Nevertheless, it is assumed that in year 2021 the power shortage will become around 50 MW, and in year 2035 around 200 MW.

The other main points of each event and/or necessity on the graph shown in Figure 15.6.1 are as follows:

- 2015: Peak demand might exceed the base power ability, thus EDM will have to purchase more power from IPPs and/or install the SVC at over capacity substations in the north eastern area of the Nacala Corridor Region.
- 2017: Renewing of the contract for increasing the power volume to be purchased from Cahora Bassa hydro power station and so on will be necessary.
- 2019: The operation of new big hydro power stations, such as Cahora Bassa north, and Mphanda Nkuwa must be started for future increasing demand. Currently only 10% of the power generated in Cahora Bassa is purchased for domestic power supply. Almost all the power of Cahora Bassa is sent to other countries. By 2019, more purchasing plans will be needed.
- 2015-2023: The number of IPP contracts and power volume to be purchased will be increased (Brown & Grey bar, such as Moatize, Benga and Nkondezi etc.)
- 2019-2020: The power demand from the Sothern Region of Mozambique will be largely increased mainly by industrial demand increase. Thus, operation of planned middle-class hydro power stations, such as Alto-Malema, Lupata and Boroma, will have to be started by 2020 at the latest.
- 2022: Lurio paper pulp plant will start operation, additional IPP power supply will be needed.
- 2024: The power demand in the northern provinces will be increased by the increase in coal production and manufacturing sector demands for power.
- 2030- : Due there being no plan to begin new power generation construction or new additional power purchasing from IPP or PPP, the rapid increase in demand in the southern provinces of Mozambique would have an impact on the power supply capacity for the northern provinces and produce a serious power shortage, caused by most of the power being transferred to the South African Power Pool.

15.6.2 Issues on the Power Sector

Nampula and Nacala are the centres of economic activities in the Nacala Corridor Region and it is expected that they will continue to become more important urban centres in the face of the upgrading of Nacala Corridor and Nacala Port in the future. However, the facilities to supply power to these areas are old and their capacities are not sufficient even to meet the current demand.

If this situation continues, unreliable power supply will become the limiting factor for Nacala Bay Area and Greater Nampula to become the driving force for economic development of the Nacala Corridor Region. The current issues in the power sector are as follows.

(1) Power Supply in Nacala Bay Area and Greater Nampula, in the Near Future

In general, the main target to be achieved during the first stage of power sector development is electrification of the area. After the subject area is electrified to a certain point, or if possible, even earlier depending upon the situation, the next stage will target increasing the reliability of power supply. Today, the Nacala Corridor Region can be said to be somewhere between these two stages.

As discussed above, Nampula already does not meet the power demand. It is critical to replace the old and overloaded transformers to enable the future development of the city.

In addition, Nacala is expected to grow rapidly with the on-going rehabilitation of the port and railway. Therefore, the same situation in Nampula will be seen in Nacala in the near future.

(2) Long Distance and Nonredundant Transmission

Nampula and Nacala receive power from Cahora Bassa Hydro Power Plant, which is more than 1,000 km distant from Tete Province. The transmission line between Nacala/Nampula and Cahora Bassa does not have redundancy in terms of the transmission network. Moreover, the existing transmission line is a single line. Such long and nonredundant transmission lines increase the risk of long-time blackout. In fact, this happened due to a heavy rainfall and flooding in January in 2015.

Furthermore, the condition of the transmission lines is one of the main reasons for the power loss because of its length. Even though EDM has a plan to install Static VAR Compensators (hereinafter “SVC”) which are to control reactive power by decreasing electricity loss caused by power transmission and increase the network capacity, this will not be a fundamental solution considering the demand growth.

(3) Data Monitoring System

Old monitoring equipment and manual data recording are still used in the substations of Nampula 220, Nampula Central, and Nacala Substations. It is essential to obtain accurate data to plan for the future. Moreover, smooth and accurate communication between the substations is vital for reliable operation of the network.

15.6.3 Objectives for the Power Sector

Considering not only the whole system of power supply in Mozambique, but also the increasing power demand in the Nacala Corridor Region, the following objectives are set for developing the power supply sector:

- To develop a reliable power supply system in a timely manner in order to satisfy increasing demand for electricity in the Nacala Bay Area
- To improve the quality of power supply including reduction in interruption of power supply
- Upgrade the redundancy of the power supply system, especially for the Nacala Corridor Region
- To enhance the base power capacity not only getting power from large main power sources, but also purchasing additional power from sub power sources like IPP in order to satisfy the peak demand growth in the future
- To promote electrification in rural areas

15.6.4 Strategies for the Power Sector

Nampula and Nacala are, and will continue to be, the centres of economic activities in the Nacala Corridor Region. Therefore, it is essential to secure a stable and reliable power supply to Nampula and Nacala as soon as possible so that the economic sectors and their development will not be jeopardised due to insufficient supply of power.

However, the improvement of the power supply system cannot be carried out overnight. Considering the long time necessary for constructing new power plants, priority should be given to rehabilitation and reinforcement of the existing facilities in order to get full output from the existing system. At the same time, it is necessary to start a study for possible use of hydro, coal, and natural gas as sources of power generation. The consideration of diversification and dispersion of power sources is important from the point of view that the new anchor loads are expected to grow far from

the current main generation plant (Cahora Bassa Hydro Power Plant).

The following strategies for development of the power sector are recommended:

- To improve power substations and distribution for securing stable power supply to priority areas, such as Nacala Bay Area and Greater Nampula, in the short term
- To urgently install a thermal power generator (dual fuel turbine generator) in the short term in order to respond to long-time blackout risks due to no existence of power plants in Nacala Bay Area, as well as old transmission and distribution facilities
- To improve the situation of long-distance transmission by strengthening of transmission lines and substations, considering possible ways in diversification and dispersion of power sources in the medium term
- To establish a new power plant in or around Nacala Bay Area and its surrounding areas for reducing the long-distance transmission from Cahora Bassa Dam to Nacala Bay Area
- To establish a new power plant in or around Palma by utilizing natural gas to be exploited from Rovuma Basin for supplying power to Nacala Bay Area and Greater Nampula in the medium and long terms
- To continue monitoring of power generation, transmission, and distribution, and utilize the data for future planning by introducing and operating SCADA in the short, medium and long terms

15.6.5 Programmes and Projects for the Power Sector

The following projects are proposed (projects in italics are on-going or already committed to):

Short-Term Projects

- Urgent Installation of Thermal Power Generator with Capacity of 30-40MW (Dual Fuel Gas Turbine Generator) in Nacala Bay Area
- Nampula-Nacala Power Substation Reinforcement (Construction of New Namialo Substation and Rehabilitation of Substations - Nampula 220, Nampula Central, Monapo, Nacala Substations)
- Project for new transmission line Caia - Alto Molocue - Nampula - Namialo - Nacala (400kV/200kV)
- Project for installation of SVC (Static VAR Compensator) at Alto-Molocue (2016)
- Project for a new hydro power plant (Cahora Bassa North 2017)
- Project for a new hydro power plant (Mphanda Nkuwa 2017)
- Feasibility Study of Natural Gas Pipeline from Palma to Nacala (and further to Maptuo)

Medium-Term Projects

- Nacala Thermal Power Plant Project (2025)
- Palma Thermal Power Plant Project
- Palma-Pemba-Nacala Transmission Line Project
- Renewable Energy Power Plants Project (solar power, hydro-power and wind power)
- Project for New Hydro Power Plant for the Lurio River (2020)
- Project for New Hydro Power Plant at Alto Malema (2020)
- Project for New Substation for Nampula City Area (2020)

Medium to Long -Term Projects

- Project for New Transmission Line Namialo-Nacala (220kV)
- Project for New Transmission Line Namialo-Pemba (220kV)
- Project for Upgrading Substations at Cuamba, Marrupa, Lichinga, Ausse, Mocuba, and Nacala-a-Velha
- Palma-Thermal Power Generation Plant Project
- Palma-Pemba-Nacala Transmission Line Project

15.7 Development Strategies for Telecommunications Sector

15.7.1 Future Prospects for Telecommunications Sector

In general, the progress of innovation or advancement of information and communication technology is relatively faster than other technologies. Therefore, it is difficult to estimate the technology to be applied in the long term future, such as year 2035. In addition, since the communication network is mainly developed or improved by private companies, the development strategies, plans or methods are decided by individual companies.

The communication network in Mozambique will mainly be IP based NGN and it will have been interconnected with a Public Switched Telephone Network (PSTN) and Public Land Mobile Network (PLMN) by 2025. It is expected that the number of persons who use smartphones and/or tablets will increase and most of the government offices or private companies will be connected to the internet through internet service providers. The capacity of the backbone network for data communication or high speed wireless access points is expected to be improved according to the increase in the number of smart handset users. The technology to be applied to the communication network in year 2025 will be variable depending on the demand trends since the mobile phone carriers or internet service providers are operating in a competitive environment.

As for the coverage of communication networks in the territory of Mozambique, it is forecast that there will be no area where the people cannot access the communication network by the medium target year since INCM continues the universal access service project.

INCM, the regulator of the communication sector in Mozambique, is expected to supervise the improvement of the communication market in Mozambique by its function as a regulator such as monitoring the quality of services, competitive climate, authorized rights of granting licenses, and establishment of necessary decrees or regulations.

15.7.2 Issues on the Telecommunications Sector

Considering the existing conditions and development goals for the Nacala Corridor Region, for the telecommunications sector, the following issues are defined:

- (1) **Communication Infrastructure: Necessity to Expand Optic Fibre Network from the Backbone to Growing Areas**
 - Optical fibre cables are installed in the country as the backbone of the transmission network. In order to achieve reliable connections, the optic fibre network will need to be expanded from the backbone (trunk line) to high demand areas, especially to fastest-growing areas
 - Necessity of Circuit Leases to ISPs from the Owners of Communication Facilities
 - Circuit leases between the internet service providers (ISPs)/carriers and the owners of the communication facilities should be promoted in order to efficiently expand the internet service areas
- (2) **Coverage Area: Benefits and Necessity of Expansion of Coverage of Telecommunications**

There are still some areas which are not covered by telecommunications. The plan of INCM is to cover all areas of Mozambique within the next 10 years. Telecommunication facilities are quicker and easier to install compared to most of the other basic infrastructures, such as power, water, and

railways. Considering that telecommunications supports and benefits the quality of life and provides opportunities for businesses, the expansion of coverage of the telecommunications should be completed as soon as possible.

(3) Quality of Service: Necessity to Improve the Quality of Service of Voice and Data Communication

In 2009, voice communication quality was a serious issue in Mozambique. In 2011, a regulation on the obligation to secure quality of service was enforced. However, connection failures and system disruptions still occur in voice and data communication. This situation is not favourable to doing business and may discourage investors from coming to the Nacala Corridor Region.

(4) TV Communication System: Utilization of TV Communication System between Provincial Governments

TV conference facilities are installed in all provincial government offices in the provincial capitals. However, at the moment, these facilities may not be utilized effectively for communication between the provincial governments. Since the Nacala Corridor Region is very large, it is not always feasible to make a long trip to hold meetings. The TV conference system between provinces should be utilized as much as possible in order to discuss inter-provincial programmes and projects in the Nacala Corridor Region.

15.7.3 Objectives for the Telecommunications Sector

Considering their relatively ease, the objectives of the development of the telecommunications sector are defined as:

- To maintain a competitive environment in business for telecommunications for promoting the introduction of state of the art technologies
- To cope with the increasing demand for data communication in growing areas
- To expand the coverage areas to rural districts
- To raise the quality of voice and data communication
- To enhance the capacity of ICT users

15.7.4 Strategies for the Telecommunications Sector

Strategies for the development of the telecommunications sector are formulated as follows:

- For the government, to facilitate reasonable commercial contracts related to circuit leases between the telecommunications carrier and internet service providers (ISPs)
- For the government, to introduce field tests to monitor the indicators related to mobile phone carriers for improving the quality of service
- For the government, to continue government policies to encourage private sectors to expand their coverage areas for telecommunication services
- To expand capacity development programmes for ICT users, as well as to promote the continuation of existing and ongoing programmes
- To promote utilization of IT technology to allow efficient communication between the government authorities
- To promote utilization of IT technology to efficiently monitor and control the infrastructure provided by the government

15.7.5 Programmes and Projects for the Telecommunications Sector

The following programmes, projects and measures are proposed, which are in line with the above Strategies:

- Promotion of facility sharing of communication networks (short-term)
- Connection of Public Switched Telephone Network (PSTN) and Public Land Mobile Network (PLMN) with the IP based New Generation Network (NGN) (short-term)
- Implementation of field tests to monitor the quality of service and promote the private sector to comply with the "Quality of Service regulations" (short-term)
- Introduction of a TV conference system (as well as utilisation of the existing TV conference system) between the local and central government agencies related to the Nacala Corridor Development (short-term)
- Introduction of a Smart Industrial Free Zone in Nacala (short-term)
- Universal Service Fund Projects 1, 2, 3 (and further if necessary) (short-medium-term)
- Regulate protection of communication equipment (medium-term)
- Duct installation along the roads/railways for the installation of optical fibre cables in the future (medium-term)
- Enhancement of the backbone transmission network (long-term)

15.8 Development Strategies for Rural Water Supply

15.8.1 Issues on the Rural Water Supply Sector

The Nacala Corridor Region will continue to encompass vast rural areas even after the establishment of the region-wide transport corridor network in the future. In rural areas, rural water supply based on boreholes and hand pumps will continue to be essential tools for maintaining the quality of life. Considering the existing conditions and development goals, the following issues regarding rural water supply are defined:

(1) Two Different Indicators for Evaluating Water Supply Rates

At the moment two different indicators (“Access” and “Use”) for showing the conditions of water supply rates are used in Mozambique. There is a difference of approximately 1.5 to 1.7 times depending on which indicator is used. The “Access” rate is calculated using the number of facilities and served population per facility. The “Use” rate is calculated from the results of interviews with sampled villagers and is currently used by WHO/UNICEF to evaluate the progress of MDGs. This has been creating confusion for evaluating the progress towards the target.

(2) Usage of Unimproved Drinking Water Sources

The usage rate of unimproved drinking water sources (unprotected dug well, rivers, dams, lakes, ponds, etc.) is high in the rural areas of Nacala Corridor Region at over 40% while that of other provinces in Mozambique is below 30%. Out of the five provinces, Nampula Province has the highest rate of using unimproved drinking water at 50.5%.

(3) Inadequate Capacity of Operation and Maintenance of Boreholes with Hand Pumps

In many cases, the water committees, who should perform routine maintenance and minor repairs of hand pumps, do not work after the project period because they cannot collect fees from users unless major breakdowns occur. Even in the event that water committees are established, they do not undertake their responsibilities fully. In such areas although repairing with U-seals and O-rings is the task of the water committees, local mechanics should undertake the repair work.

(4) Poor Hand Pump Spare Parts Supply Network

Due to the limited locations where spare parts for hand pumps can be purchased, local area mechanics play a role as spare parts vendors. These vendors travel a long distance to provincial capitals or the few other places where such spare parts are sold. As a result, hand pump users have to purchase spare parts at high prices that include the transportation cost from the provincial capital. DNA is planning to approve some new hand pumps as well, which that means a better hand pump spare parts network is required. If the hand pump spare parts network is not maintained, the functional rates of facilities will deteriorate.

15.8.2 Objectives for Rural Water Supply

The objectives of the rural water supply sector are defined as:

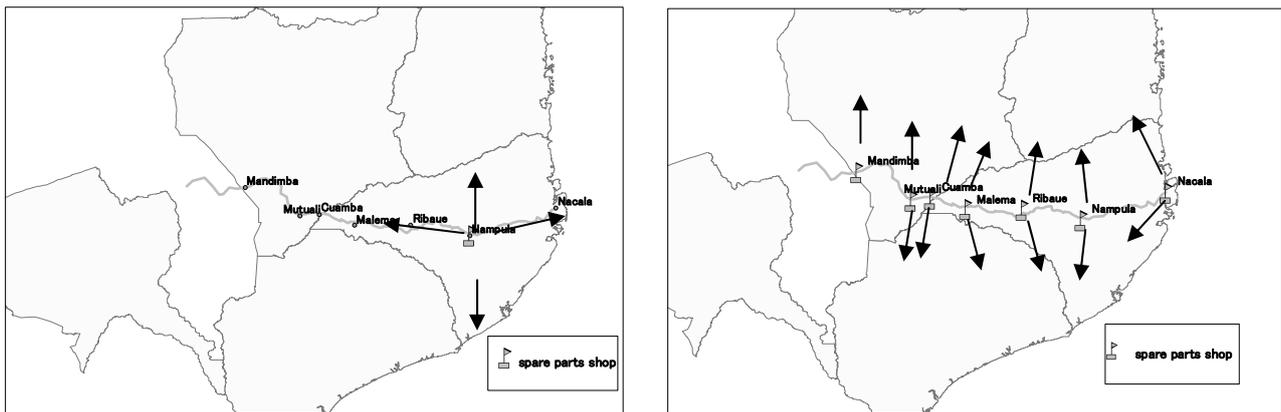
- To have a correct understanding of the situation of water supply in the rural area by uniting the indicators for evaluating the water supply rate

- To increase the access to safe and stable water supply for rural populations by reducing the number of rural residents that must use unimproved water sources as drinking water and by strengthening the maintenance capacity of the existing rural water supply facilities
- To expand a hand pump spare parts supply network along the transport corridors to be extended widely in the Nacala Corridor Region

15.8.3 Strategies for the Rural Water Supply

The strategies for the rural water supply sector are formulated as follows:

- To unite the indicators for evaluating the water supply rate by shifting the usage of “Access” rate to “Use” rate
- For the government, to support the expansion of the hand pump spare parts supply network by utilising District Planning and Infrastructure Offices (SDPIs) located along the transport corridors, which are to be extended widely in the Nacala Corridor Region
- For the government, to promote the implementation of new construction and rehabilitation of boreholes with hand pumps in order to increase the use rate of safe and stable water
- For the government, to activate or re-establish water committees for existing boreholes with hand pumps in order to maintain the hand pumps for boreholes



Source: JICA Study Team

**Figure 15.8.1 Expansion of Spare Parts Supply Network along Transport Corridors
(Left: Current Condition, Right: Future)**

15.8.4 Programmes and Projects for the Rural Water Supply

The following programmes, projects and measures are proposed for rural water supply:

- Hand Pump Spare Parts’ Supply Network Establishment Project
- Small Water Supply Facilities Rehabilitation Project
- Water Committee Establishment Programme
- Borehole Implementation and Rehabilitation Project
- Capacity Development Project for Local Area Mechanics

Chapter 16 Urban Development Strategies

16.1 Introduction

This chapter covers development strategies for major urban centres, namely, Nacala Bay Area, Greater Nampula, Cuamba, Lichinga and Pemba, in the Nacala Corridor.

Development of urban centres will increase their population and economic activities which might cause environmental and social problems, such as traffic congestion, lack of water supply and sewerage systems, and poor solid waste management. The strategies and projects proposed in this chapter are formulated considering such environmental and social problems.

The road network development proposed for Lichinga and Pemba could guide the urban development in these cities. The bypass roads proposed for Nacala Bay Area, Greater Nampula and Cuamba would reduce traffic volume in these city centres. The proposed ring road as well as relocation of the airport and rerouting of the railway for Greater Nampula could diversify the concentrated traffic and also secure good living conditions for the residents in Nampula.

Nature conservation is also considered for Nacala Bay Area and Pemba which both have a beautiful coast line with tourism potential.

16.2 Urban Development Strategies for Nacala Bay Area

16.2.1 Future Prospects for Nacala Bay Area

The existing deep seaport, together with the status of SEZ, will continue to attract FDIs heading to the area of the Nacala SEZ. The start of coal handling at the new port in Nacala-a-Velha will change the shape of the spatial structure. Employment opportunities will extend to the western side of Nacala Bay and dynamic movements of goods will take place along the coast.

Locating FDIs is critically important to the development of the Northern Region of the country beyond the Nacala SEZ alone. Preparation for an efficient and reliable base for operation of factories is the key to success accepting FDIs as envisaged. The industrial base for FDI promotion will include accommodation and housing, office and convention facilities, and resort and recreational spaces to support foreign expatriates, on top of the reliable infrastructure for manufacturing.

16.2.2 Vision for Nacala Bay Area

The target image for the development of Nacala Bay Area is to create a new international gateway to Africa, equipped with the first class urban environment, facilities and infrastructure to attract the FDIs. To this end, a longer vision needs to be established with possible involvement of the surrounding areas. For instance, the possibility of a third deep seaport development may need to be taken into consideration, and thus the planning area should include Memba-sede Administrative Post in Memba District located to the north of Nacala-a-Velha. Like-wise, inclusion of Matibane Administrative Post in Mossuril District is also necessary as available land for urban use is limited in the territory of Nacala Municipality. The future residential area will inevitably extend to the territory of Mossuril District.

16.2.3 Development Framework for Nacala Bay Area

A set of development frameworks for the Nacala Bay Area is forecast to the planning horizon as described below.

(1) Population Framework

The population of the Nacala Bay Area in 2035 will reach 1,309,000 persons combining a municipality and four administrative posts as summarized in Table 16.2.1. The total population will be doubled from the present level of around 600 thousand. The future urban population in the area may reach 927,000 persons in 2035 by faster growth rates compared with the growth rate of the total population. Table 16.2.2 presents forecasts of the urban population for Nacala Bay Area.

Table 16.2.1 Population Forecast for Nacala Bay Area

Municipality/District/ Administrative Post	Population				Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-17	2017-25	2025-35
Nacala Municipality	211,915	319,000	440,000	635,000	4.2%	4.1%	3.7%
Nacala-a-Velha District	90,991	131,000	189,000	300,000	3.7%	4.7%	4.7%
Memba-sede AP (Memba District)	109,899	144,000	187,000	269,000	2.8%	3.3%	3.7%
Matibane AP (Mossuril District)	24,075	53,000	73,000	105,000	4.3%	4.0%	3.8%
Total of Nacala Bay Area	379,733	648,000	889,000	1,309,000	3.8%	4.0%	4.0%

Source: JICA Study Team

Table 16.2.2 Forecast of Urban Population for Nacala Bay Area

Municipality/District/ Administrative Post	Population				Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-17	2017-25	2025-35
Nacala Municipality	211,915	319,300	440,000	634,900	4.2%	4.1%	3.7%
Nacala-a-Velha District	15,691	42,600	84,500	179,800	10.5%	9.0%	7.8%
Memba-sede AP (Memba District)	0	13,900	35,800	80,700	-	12.5%	8.5%
Matibane AP (Mossuril District)	62,219	11,800	18,700	31,700	6.6%	5.9%	5.4%
Total of Nacala Bay Area	233,825	387,600	579,000	927,100	5.2%	5.1%	4.8%

Source: JICA Study Team

(2) Urban Land Requirements

To accommodate the future population of the Nacala Bay Area, the land area required for urbanization is estimated as shown in Table 16.2.3. Since the level of urbanization may differ by location, the ratio of urban population is firstly examined and set for each administrative territory. The incremental urban population from year 2007 to 2035 will be around 693,000 persons, and will require an additional 14,000 ha to be used for residential, public facilities, office and commercial, urban infrastructure, and some cottage type industries. It should be noted that the urban land requirement by administrative area as presented in Table 16.2.3 is not necessarily supplied within the respective territories as movement of population may be likely to occur among the constituent administration areas.

Table 16.2.3 Urban Land Requirements for Nacala Bay Area

Municipality/District/ Administrative Post	Population Increase 2007-2035	Urban Population Share (%)	Urban Population Increase	Urban Land Requirement (ha)	Population Density (person/ha)
Nacala Municipality	423,000	100	423,000	8,460	50
Nacala-a-Velha District	209,000	60	164,000	3,282	50
Memba-sede AP (Memba District)	159,000	30	81,000	1,615	50
Matibane AP (Mossuril District)	71,000	30	25,000	510	50
Total	862,000	(average) 71	693,000	13,866	50

Source: JICA Study Team

(3) Industrial Land Requirements

The industrial land requirement is calculated separate from the urban land requirement, because the nature of industrial development in the Northern Region may be influenced largely by external factors, especially by the locations of FDIs. It is expected that the factories will be located mostly in the industrial estates in the future, and thus, the unit land area for a worker will be larger than the conventional type of factories. The estimate is made as a sequence of Table 16.2.4 and Table 16.2.5. The number of factory workers is firstly estimated based on the economic development forecast for Nampula Province, and assumed that half of the incremental number of workers in the province will be settled in Nacala Bay Area. The land requirement is then estimated by type of industry by year as shown in Table 16.2.6. It is assumed that the FDIs and new establishment of domestic factories will settle in areas relying on the existing infrastructure until 2017. The new establishment of factories after 2017 will be accommodated in industrial estates, except for cottage type industries. The total area required for an industrial estate will be around 700ha, among which, metals, machinery, electrical products and equipment will be dominant to cover 530ha.

Table 16.2.4 Economic Forecast for Nampula Province

Sector GRDP (MT million, 2003 constant price)	2007	2035	Share in 2035 (%)
Nampula Province	20,346	148,500	100.00
Agriculture		49,100	33.06
Mining		30	0.02
Manufacturing/Construction/Utilities		35,800	24.11
Services		63,600	42.83
Work Force of Nampula Province in Manufacturing			Annual Growth Rate (%)
Economically Active Population	38,467	161,238	5.25
Labour Productivity	59,179	135,397	3.00

Source: JICA Study Team

Table 16.2.5 Industrial Land Requirement for Nacala Bay Area

	2007	2035	Remarks
Economically Active Population in Manufacturing Industry (Nampula Province)	38,467	161,238	
Existing Industrial Land (Nampula Province) (ha)	385		100 persons/ha
Industrial Land Requirement (Nampula Province) (ha)		2,015	80 Persons/ha
Nacala SEZ+ Area Industrial Land Requirement (ha)	154	1,000	40% in 2007 50% in 2035

Source: JICA Study Team

Table 16.2.6 Industrial Land Requirement by Type by Year for Nacala Bay Area

Broad Type of Industry	Required Industrial Land				Increased Area
	2007	2012	2017	2035	2017-2035
Food/Beverage/Agro-processing (ha)	92.4	128.4	150	300	150
Metal/Machinery/Electrical products & equipment (ha)	15.4	21.4	70	600	530
Wood/Furniture, Construction Materials and Others (ha)	46.2	64.2	80	100	20
Total (ha)	154	214	300	1,000	700

Source: JICA Study Team

(4) Urban Water Requirements

To supply water for the future urban population in Nacala Bay Area, the demand for urban water is estimated as shown in the table below.

Table 16.2.7 Summary of Urban Water Demand for Nacala Bay Area

			2013*	2017	2025	2035
Demand (m ³ /d)	Expanded Supply Area	Domestic and Institutional Use		55,808	85,319	186,112
		Industrial Area		71,500	105,500	185,000
		Total	33,000	126,808	190,819	371,112
	Limited Supply Area	Domestic and Institutional Use		48,685	76,836	158,827
		Industrial Area		71,500	105,500	185,000
		Total	33,000	120,185	180,483	343,827

Source: JICA Study Team

Note*: Water supply volume after rehabilitation of existing source

16.2.4 Conceptual Spatial Structure for Nacala Bay Area

(1) Urban Cores

1) New CBD (Airport City)

Lands in the current city centre are almost fully occupied mostly by the mixed use of offices, commercial and other business usages. A new Business zone needs to be developed at a strategic location, with the growth of industry in Nacala-a-Velha taken into consideration. The location of the new CBD requires land availability, as well as closeness to the existing city centre. The area west of the airport seems suitable and most reliable, as the area is managed by the Mozambique Airport Authority on land distributed to the armed forces. Participation of various entities may be the key for successful development of the new CBD, or the Airport City. Inviting specialized land developers may be essential, while involving public bodies including the Airport Authority and the Army may be conditional.

2) MICE and Tourism Complex

It is fundamental to have high level MICE functions to attract the FDIs and support their operational activities. To this end, facilities and services need to be established for MICE and tourism with first class quality, and to become a part of the identities of the Nacala Bay Area. It is proposed that the development of Crusse and Jamali resorts should include the function of MICE, and should be connected with the existing and new CBDs efficiently. By doing so, the operation of Crusse and Jamali may also be stabilized by introduction of business visitors along with the resort tourists.

3) Industrial Zone

The current designated area for establishment of an Industrial Free Zone largely consists of steep slopes. This is a major disadvantage as the development cost will be hiked by the large amount of soil that must be moved for the grading of the estate plots. At the same time, the area is located near the coast, and thus, has an advantage in managing flood water drainage. It is proposed that the establishment of an IFZ should be realized in the area next to the originally designated IFZ area to avoid steep slopes and existing water channels from upstream areas.

As mentioned in the previous sub-section, the supply of industrial land may have to rely on readily available infrastructure during the earlier stage of the Nacala Bay Area development. In this line, the earlier part of the industrial land supply should take place south of the junction of NE-12 and the railway, where a new road is already constructed on a relatively flat hill-top. This will be considered as an extension of the ongoing concentration of factories along NE-12 within the territory of Nacala Municipality. Another area to accommodate spontaneous development of FDI factories may be at the south end of the Port Expressway which is proposed and described in the following sub-section.

For the subsequent years beyond 2017, part of the large-scale IFZ near the coast will become operational, and will start accepting operation of factories. The full scale development of this IFZ will be around 500ha to cope with the land requirement, mostly by industries involved in metals, machinery, electrical products and equipment.

4) New Housing Area and Guided Urbanization

It is important to prevent the formulation of ribbon type sprawl along the long extending coastal road and other regional trunk roads. To this end, a strategic introduction of urban trunk roads is

vitaly important. These will form a network and promote housing estate development by private land developers. The area suitable for extension of urbanization may be two directions; one to the area of Matibane Administrative Post, and the other at the coastal flat area near the expected third seaport. The development needs to be initiated for the former area, while the area for the latter should be well reserved until the development of the third seaport becomes a reality. Once the third seaport is developed, these two urbanization areas, along with the existing centres of Nacala Municipality and Nacala-a-Velha District, will be good locations for commuting to the new CBD, helped by introduction of a bridge over Nacala Bay.

5) Existing Built-up Area

There are two major urban areas in the current land use of the Nacala Bay Area as the central districts of Nacala Municipality and Nacala-a-Velha District. Both were developed at the time of Portuguese governance. The infrastructure of these districts are aged and overloaded by the increase of population. At the same time, surroundings of the central districts are populated by large informal settlements without necessary urban infrastructure. The existing central districts, together with the surrounding areas, will continue to be the host towns for the major part of the population who provide vital working force for the development of the Nacala Bay Area. The upgrading of the living environment in these areas needs to be pursued along with the development of new urban cores.

6) Suburban Agriculture Promotion Zone

The transformation of agricultural products needs to be promoted in the agricultural area within the Nacala Bay Area. Production of fresh vegetables, fruit, and other urban consumption needs should be achieved as much as possible, in order to provide an alternative to imports from South Africa.

7) Tourism Zones

In the Nacala Bay Area, two tourism zones are designated. One is the coastal areas on the north-east side of the Nacala-Port Municipality. The other is the Crusse and Jamali Resort area, which is a coastal area located to the south east of the Nacala Port. These tourism zones are based on the natural environment. It is important to balance development and nature conservation in these zones.

8) Transport System

The international airport, existing deep seaport for general cargos as well as the new bulk port under construction, and the location of a possible new deep seaport need to be well connected with each other. These key transport facilities also need to be connected with wider regions both by railway and road systems. The major components of the future transport system include the following:

Seaports

Nacala Port to be expanded as planned in the JICA Study, the bulk port for coal export, and the third port located at the southern end of Memba-sede Administrative Post with the possible function of an additional bulk and general cargo port.

Railways

The main structure of the railroad system will be formed by the following:

- The existing railway connecting to the Nacala Seaport from the entire catchment of the Nacala Corridor
- A new line to branch out from the existing railway to connect the bulk port under construction in Nacala-a-Velha
- A possible extension of the bulk port line to the north to connect to the third port

The last one is likely to be a different gauge size from the others if the envisaged alternative railway link from Tete to Nacala becomes a reality.

Road Network

The main structure of the road system will be formed by the following:

- Two wider access roads will connect the Nacala Bay Area with Nampula and Pemba.
- A circular road will be introduced to accept the traffic from the wider access roads as well as regional and urban trunk roads. This circular road may be completed by introduction of a great bridge over the mouth of the bay to link the currently separated two areas for promotion of urbanization, and establish the location of the Airport City at the central part between the urban areas of the east coast and west coast.
- The port-expressway, proposed by the Port Study funded by JICA, needs to be realized for the entire success of the efforts of Nacala Corridor development. The route is proposed to bypass the NE-12 which is heading to the Nacala seaport across the central area of the city of Nacala. The alignment of the port-express way is proposed to by-pass the central urban area of Nacala Municipality. At the same time the road will serve as the major access to the above mentioned large scale IFZ and the industrial area for the spontaneous factory development.
- Urban trunk roads need to be introduced in accordance with the pace of urbanization. Among the many possible routes, two segments are critically important, namely: a) a north-south line from the airport that runs parallel to the segment of EN-12 in the municipal area of Nacala to promote the housing estate development in the flat area of Matibane Administrative Post area, and b) a link to the Crusse and Jamali resort development area from the circular road mentioned above.

(2) Supporting Water Resources

The existing plan for water supply to Nacala and surroundings will not meet the demand generated by the future urbanization and industrial activities, even though the water supply will be enhanced by the Sanhute Dam project. The most promising option to achieve the water supply to meet the future requirements seems to be a water resource development of the Lurio River. This will be capable of transmitting more than 400,000m³/day of raw water. Some small portion of the transmitted raw water may be utilized for irrigation purposes in the proposed suburban agriculture promotion zone. This will be effective if combined with irrigation ponds for local water irrigation systems.

If more demand is generated by further development of the Nacala Bay Area, it will become necessary to construct a dam in the upstream reaches of Mecuburi River and/or Lurio River. The dam may be a multipurpose type, having functions of urban water supply, hydroelectric power generation, irrigation and flood mitigation.

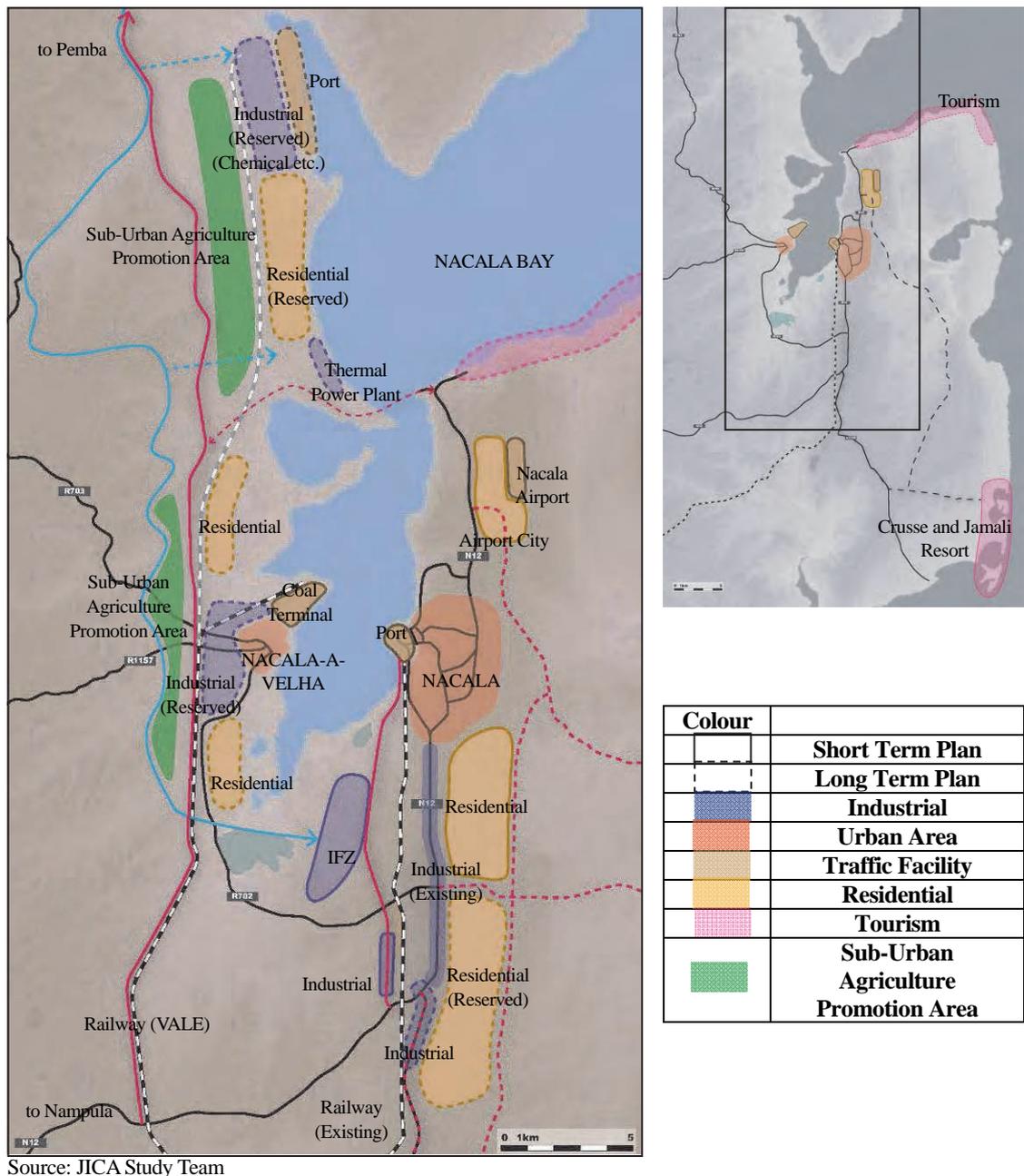


Figure 16.2.1 Conceptual Spatial Structure of Nacala Bay Area Development

16.2.5 Issues, Objectives, Strategies and Projects for Urban Development of Nacala Bay Area

(1) Issues regarding Urban Development of Nacala Bay Area

Considering the existing conditions and the future vision for urban development of Nacala Bay Area, the following issues are identified for strategy formulation for Nacala Bay Area:

- Rapid and disorderly urban expansion of Nacala
- Increased traffic congestion due to the poor road network and increasing development activities
- Poor integration of ongoing development projects: for example, port rehabilitation/upgrade projects and road development

- Little guidance regarding sites for industrial factories
- Inadequate economic infrastructure (electricity and water supply) to support not only current industrial development but also future industrial development
- Deteriorating residential environment due to increasing economic activities including port activities

(2) Objectives for Urban Development of Nacala Bay Area

In order to achieve the vision for Nacala Bay Area “the first class city for business, industry and tourism, a New International Gateway for Africa”, the following objectives are set:

- To eliminate bottlenecks in both infrastructure and services for industrial development
- To improve business and residential environments as the regional economic growth centre
- To enhance linkage with the agricultural lands of Nampula Province and Zambezia Province for stable shipping of farmed goods to develop the agro-industrial potential in Nacala Bay Area

(3) Strategies for Urban Development of Nacala Bay Area

In order to achieve the objectives identified above, the following strategies should be implemented:

- To improve the interconnection between Nacala Port, the railways and roads
- To upgrade the investment environment by improvement of SEZ laws and regulations
- To provide industrial parks supported by high-standard infrastructures
- To develop a sub-centre for increasing office space and hotel capacity
- To promote MICE by developing and utilizing city hotels and conference facilities
- To expand orderly residential areas by providing a reasonable standard of infrastructures
- To provide recreational facilities for urban dwellers
- To upgrade the airport to accommodate larger airplanes for developing an international hub for passengers and cargos

(4) Projects for Urban Development of Nacala Bay Area

In order to implement the strategies above, the implementation of the following various projects are required in an integrated manner:

- Nacala Port Access Road Project
- Nacala Multi-Modal Terminal and Railway Shunting Yard Development Project
- SEZ and IFZ Management Improvement Project (Investment Environment Upgrading Project)
- Nacala Industrial Park Project (IFZ establishment and IFZ Support Centre Project)
- Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin
- Nacala Urban Water Supply Expansion Project
- Nampula-Nacala Power Substation Reinforcement Project
- Nacala Thermal Power Plant Development Project for Upgrading Electricity Supply Nacala Airport City Development Project (for office space provision and MICE promotion)
- Nacala Recreation Area Development Project (including golf and multiple amusement facilities near Nacala International Airport)
- Nacala Airport Upgrading Project (further upgrading in the future)
- Nacala Industrial Waste Management Project
- Suburban Agriculture Promotion Project (improvement of investment climate, crop selection)

suitable for demand in Nacala, irrigation by pond water conveyance, farmers' organizations promotion, improvement of laws etc.)

16.2.6 Future Prospects, Objectives, Strategies and Projects for Urban Water Supply for Nacala Bay Area

(1) Future Prospects for Urban Water Supply for Nacala Bay Area

Nacala Bay Area is expected to grow as a business-commercial and industrial centre taking advantage of upgraded Nacala Port, corridor railways and roads. An adequate and stable water supply to the urban population and economic activities is essential. To supply water for the future urban population for Nacala Bay Area, the demand for water in the urban areas is estimated as shown in the table below. The water demand for Nacala Bay Area is estimated by assuming the following parameters for the future:

- In year 2017, 15% of the urban populations will use “house connections” at an average of 150 litre/day, 25% of the urban populations will use “yard taps” at an average of 90m litre/day, and 60% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2025, 24% of the urban populations will use “house connections” at an average of 150 litre/day, 38% of the urban populations will use “yard taps” at an average of 90m litre/day, and 38% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2035, 38% of the urban populations will use “house connections” at an average of 200 litre/day, 31% of the urban populations will use “yard taps” at an average of 90 litre/day, and 31% of the urban population will use “public standpipes” at an average of 30 litre/day.

Table 16.2.8 Urban Water Demand for Nacala Bay Area by Municipality and District

			2013*	2017	2025	2035
Demand (m ³ /day)	Expanded Supply Areas	Nacala		45,675	66,000	131,536
		Nacala-a-Velha		6,163	11,644	38,839
		Memba Sede AP		2,446	4,909	11,288
		Matibane AP		1,524	2,767	4,448
		Sub Total		55,808	85,319	186,112
		Industrial Area		71,500	105,500	185,000
		Total	33,000	126,808	190,819	371,112
	Limited Supply Areas	Nacala		40,890	57,514	112,032
		Nacala-a-Velha		4,159	6,585	32,560
		Memba Sede AP		2,212	4,348	9,895
		Matibane AP		1,224	2,895	3,899
		Sub Total		48,685	74,983	158,827
		Industrial Area		71,500	105,500	185,000
		Total	33,000	120,185	180,483	343,827

Source: JICA Study Team

Note*: Water supply volume after rehabilitation of existing source

(2) Issues on Urban Water Supply for Nacala Bay Area

Considering existing conditions and the future vision for urban development of Nacala Bay Area, the following issues are identified for strategy formulation regarding urban water supply:

- Current shortage of water resources available for urban water supply
- Relatively poor service level of water supply
- High cost of getting enough water for people's lives and industrial business operation
- Poor level of urban water supply to attract investors for manufacturing sectors for the future

(3) Objectives for Urban Water Supply for Nacala Bay Area

The objective for the urban water supply for Nacala Bay Area is as follows:

- To provide urban water supply at a high service level for supporting the development of a 1st-Class City for Business, Industry and Tourism by developing water resources in order to secure ample and stable water supply sources

(4) Strategies for Urban Water Supply for Nacala Bay Area

The following strategies are to be implemented for achieving the objectives above:

- To develop water resources for the long term, large enough to satisfy the demand for urban water to support the development of a 1st level city in the Nacala Corridor Region
- To develop water resources by constructing small-scale dams to satisfy urban water demand in the short term (until 2017)
- To expand service areas of urban water supply and at the same time to conduct water demand management until 2025 in order to minimize the increase in demand for urban water and to promote balanced water supply for domestic use, commercial-business use, industrial use and tourism use (because it would not be easy to complete large-scale water resources development by 2025)
- To encourage water users (domestic users, institutional users and industrial users) to implement water saving measures

(5) Projects for Urban Water Supply for Nacala Bay Area

In order to implement the proposed strategies above, the following projects are proposed:

Short-Term (2013-2017)

- Project for Sanhute River Water Resources Development by Construction of Sanhute Dam
- Project for Construction of Water Pipeline from Sanhute Dam to the Existing Water Treatment Plant (near Mecula Dam)

Medium and Long-Term Projects (2017-2025-2035)

- Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin
- Project for Construction of Mecuburi River Water Intake and Water Treatment Plant
- Project for Water Distribution System from Mecubri Water Treatment Plant to Greater Nacala (using Lurio River water)

16.2.7 Future Prospects, Objectives, Strategies and Projects for Sewerage and Drainage Systems for Nacala Bay Area

(1) Future Prospects for Sewerage and Drainage Systems for Nacala Bay Area

In order to achieve the vision of a 1st-Class City for Business, Industry and Tourism, the development of sewerage and drainage systems should be an essential part of urban development.

(2) Issues on Sewerage and Drainage Systems for Nacala Bay Area

Considering existing conditions and the future vision for urban development of Nacala Bay Area,

the following issues are identified for strategy formulation on sewage and drainage systems for Nacala Bay Area:

- Currently there is no substantial coverage of a modern sewerage system in Nacala Bay Area
- Poor management and utilisation of septic tanks due to the lack of septage treatment facilities
- Poor level of sanitary situation and sewerage system to attract investment for establishing a 1st-Class City for Business, Industry and Tourism

(3) Objective for Sewerage and Drainage Systems for Nacala Bay Area

The objective to develop sewerage and drainage systems for Nacala Bay Area is as follows:

- To create a sanitary environment and to reduce the occurrence of waterborne diseases for the increasing urban population and expanding urban areas in order to make Nacala Bay Area a 1st-Class City for Business, Industry and Tourism

(4) Strategies for Sewerage and Drainage Systems for Nacala Bay Area

The present situations of sanitation, sewerage and drainage are far behind the desirable situations in the Nacala Bay Area. Under this circumstance, the following strategies for sewerage and drainage systems for Nacala Bay Area are proposed:

- To make an effort at promoting the utilisation of safe sanitation facilities for the short term
- To prepare for establishment of treatment ponds for septage and sewerage systems and drainage systems for the central areas of the Nacala Bay Area for the short term
- To establish treatment ponds for septage and sewerage systems and drainage systems for the central areas for Nacala Bay Area for the medium term

(5) Projects for Sewerage and Drainage Systems for Nacala Bay Area

In order to achieve the identified objectives and to implement the proposed strategies above, the following projects are proposed:

Short-Term (-2017)

- Preparation of the project for treatment ponds for storage and treatment of septage from septic tanks/pit-latrines
- Preparation of the project for a sewerage system and drainage system for the central area and industrial zones (detailed design and bidding documents)
- Preparation and Implementation of the project for "Emergency Cleaning and Rehabilitation of septic tanks"
- Promotion of utilisation of low-cost sanitation facilities in peri-urban areas (suburban areas)
- Study on and implementation of collection systems and institutional frameworks for septage from septic tanks and pit-latrines

Medium-Term (2018-2025)

- Construction of treatment ponds for storage and treatment of septage from septic tanks/pit-latrines
- Construction of a sewerage system and drainage system for the central area (cement city) and industrial zones

Long-Term (2026-2035)

- Implementation of regular maintenance of septic systems
- Expansion of sewerage and drainage systems

16.2.8 Future Prospects, Objectives, Strategies and Projects for Solid Waste Management in Nacala Bay Area

(1) Future Prospects in Solid Waste in Nacala Bay Area

The solid waste generation in Nacala Bay Area is estimated by the following formula and basic units. The estimated result is shown in Table 16.2.9.

$$V_T = V_H + V_B$$

V_T : Total solid waste generation: is computed by adding together V_H (Household Waste Generation) and V_B (Business Waste Generation)

V_H : Household Waste Generation: is computed by multiplying its population by a basic volume of per capita waste generation per day (0.6-1.3kg/person/day are adopted by its district and year).

V_B : Business Waste Generation: is computed by multiplying V_H (Household Waste Generation) by a basic ratio (16%-35% are adopted by its district and year).

Table 16.2.9 Estimation of Future Waste Generation in Nacala Bay Area

		2011	2017	2025	2035
Waste Generation per day (Household) (ton/day)	Cidade de Nacala	191	319	528	825
	Nacala-Velha	64	105	189	360
	Memba-sede AP (Memba District)	66	101	168	269
	Matibane AP (Mossuril District)	21	37	66	106
	Sub Total	341	562	951	1,560
Waste Generation per day (Business) (ton/day)	Cidade de Nacala	38	80	158	289
	Nacala-Velha	11	21	47	108
	Memba-sede AP (Memba District)	11	15	34	67
	Matibane AP (Mossuril District)	3	6	13	26
	Sub Total	64	122	252	490
Total Waste Generation		405	684	1,203	2,050

Source: JICA Study Team

The total waste generation per day in the Nacala Bay Area is estimated to become 2,050 tonnes/day in 2035 which equals to more than 740,000 tonne per year. The total urban waste generation (in the Nacala Municipality) in 2011 was estimated to be 240 tonnes/day (=200+40 tonnes/day). Thus, the urban waste generation per day is estimated to increase 9 times in 24 years. In this sense, the current waste management system (just collecting and disposing to the open area) will not work well for such a large amount of solid waste. This would cause serious environment problems, which might not only deteriorate citizen's environmental health in the Nacala Bay Area, but also its economic development. Thus it is necessary to develop a proper waste management system for the future.

(2) Issues on Solid Waste Management in Nacala Bay Area

As mentioned above, the waste generation in 2035 will be more than eight times than the current standard. It is clear that the current waste management system has not enough capacity to deal with the increasing volume of solid waste. In addition, industrial waste from SEZ/IFZ without proper treatment would increase the risks for causing serious environmental damage.

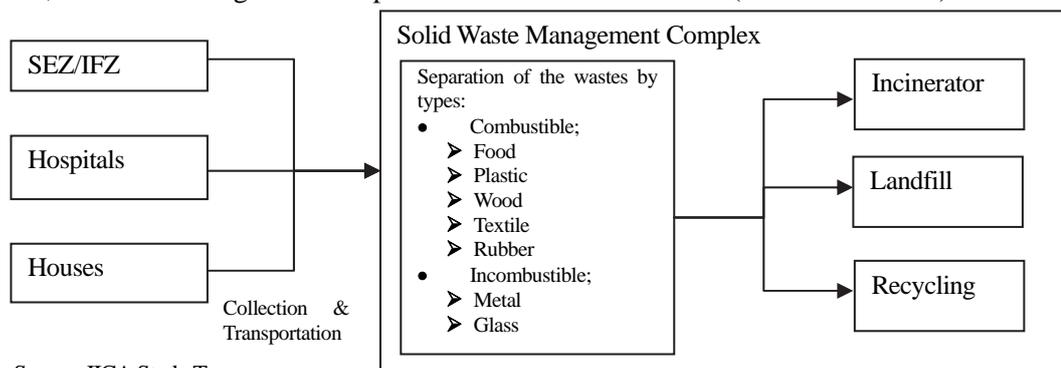
(3) Objective

The objective of solid waste management is “to develop a proper waste management system which meets the future solid waste generation due to rapid urban and industrial development for the Nacala Bay Area.”

(4) Overall Strategy

In general, it is difficult to secure a huge budget for waste management because the waste management itself cannot produce an economic effect in a direct way. Thus, it is necessary to develop an efficient solid waste management system. To save the cost of waste management, such as waste collection and transportation, a development of a solid waste management complex is necessary to collect and transport any type of waste to the site and conduct the proper treatment of it.

Therefore, the strategy for the solid waste management in the Nacala Bay Area is “To develop an efficient waste management system for treating all type of waste at the same place.” The proposed flow of solid waste management system can be seen in Figure 16.2.2. To deal with such amount of waste, the waste management complex needs to be at least 100 ha (see Table 16.2.10).



Source: JICA Study Team

Figure 16.2.2 Flow of Solid Waste Management

Table 16.2.10 Proposed Land Use for Waste Management Complex

Usage	Area (ha)
Treatment of industrial waste	5
Treatment of household waste	5
Treatment of medical waste	5
Landfill	60
Auxiliary facilities for protecting landfill	10
Administration building area	2
Handling zone by collector	10
Parking/ Green zone	3
Total	100

Source: JICA Study Team

(5) Programmes/ Projects

The following projects are proposed to achieve the above mentioned strategy:

Short-Term

- Project for Preparing a Nacala Bay Area Solid Waste Management Master Plan
- Feasibility Study for Constructing a Waste Management Complex

- Preparation of an Administration System for Management and Operation of Waste Management Complex

Medium-Term

- Preparation of a Management and Operation System for the Waste Management Complex
- Construction of a Waste Management Complex for Treating Household Waste and Industrial Waste
- Training Course for Workers and Public Officials related to Waste Management
- Public Education for Waste Generation Reduction

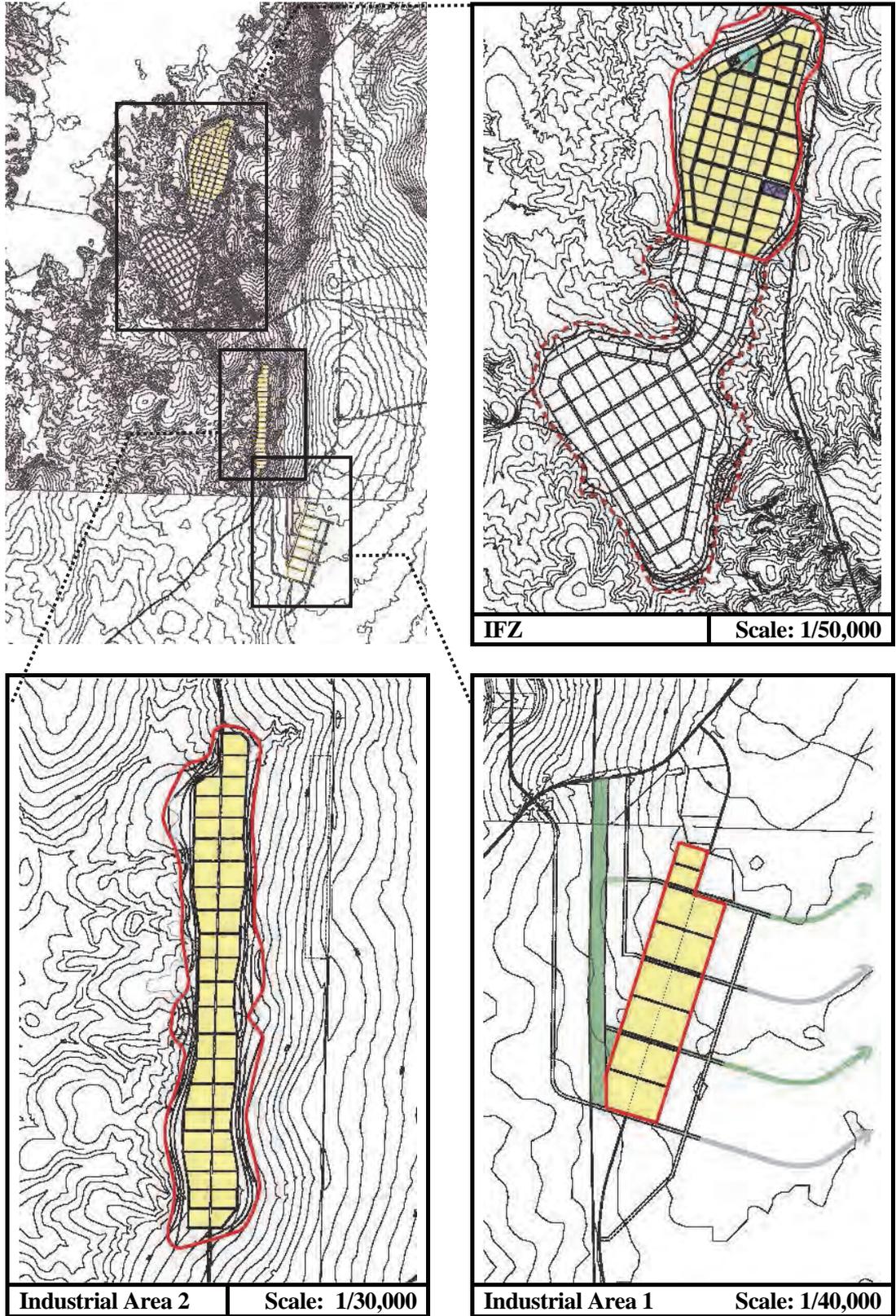
Long-Term

- Development of a Waste Recycle System for Thermal Energy or Chemical Materials
- Expansion of the Waste Management Complex

16.2.9 Conceptual Development Plan for Industrial Estates in Nacala Bay Area

(1) Strategic Provision of Industrial Land

As mentioned earlier, readily available land suitable for manufacturing direct investment is scarce in Nacala Bay Area. Many investors have visited Nacala but decided not to invest as they learned that the land plots for their factory construction have to be obtained by themselves through a set of legal procedures for establishment of DUAT. To avoid losing these investments, the Nacala Bay Area needs to secure readily available industrial land plots and simplify the leasing of land for the potential investors. The ultimate solution is to establish industrial estates with and without the status of IFZ. At the current stage, it is highly recommended to secure industrial land by the municipality or GAZEDA in suitable areas. The area should be designated in the Structure Plan of the Nacala Municipality through a minor modification and approval, so that to obtain legal base for the land acquisition together with allocation of budget for the required amount of compensation. The recommended sites are shown in the figure below, along with the recommended site for developing an Industrial Park. The area for the early industrial land, or the Industrial Belt, may be 50 to 100 ha.



Source: JICA Study Team

Figure 16.2.3 Proposed General Location and Conceptual Layout of Industrial Lands in Nacala Bay Area

(2) Conceptual Development Plan for Industrial Park in Nacala Bay Area

The originally designated area for the IFZ by GAZEDA seems unsuitable for the development of an industrial estate because of the topographic conditions.

Development Concepts

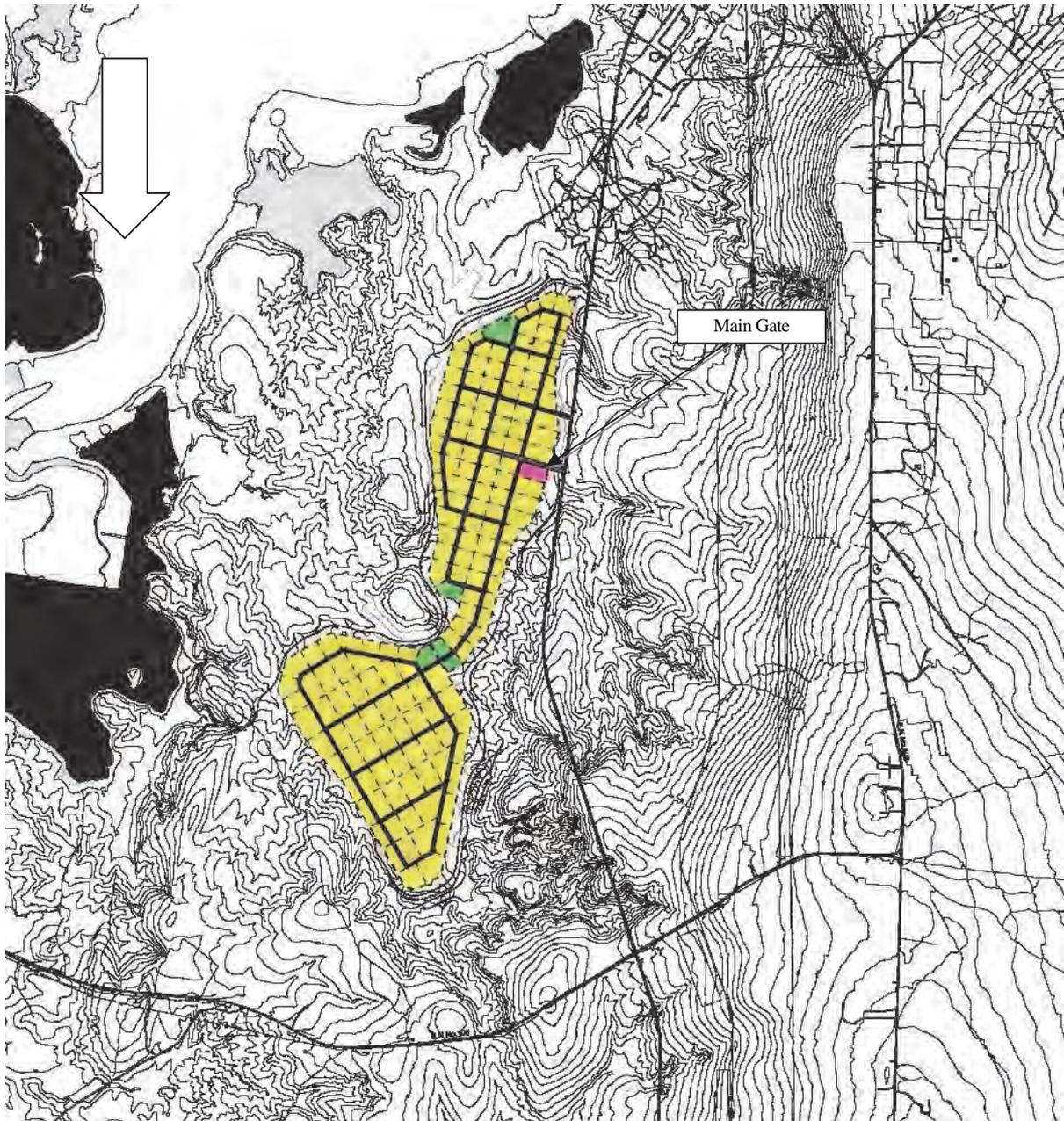
Target Industries: The assumption was made based on the current trends of the new factory investments, as well as expected type of industries in the middle to long term. The current major processing industries in Nampula Province are cement factories, agro-industry including wheat, milling factory and cashew nuts, and a plastic factory, while those along EN-12 are warehouses (7 factories), construction and metal products manufacturing industry (2), furniture and fixtures, plastic products, petroleum and coal products, and ceramics. In the coming decades, it is expected that mining factories (iron and coal), machinery (general machinery, precision machinery), and electrical products and equipment will increase.

Road Network Plan: The main access to the Industrial Park will be from the planned Port Express Way which will connect Nacala Seaport and the planned Logistic Terminal. The road network consists of a main straight road following from the entrance gate with 30m width. Service roads with 20 m width are planned to form an effective network system as well as enabling the division of land plots to have 1 to 5 ha. Since there are villages that have residents that will want to commute to the coast for fishing, the accessibility for them is secured by using some parts of the service roads. This eventually helps reduce the earthwork volume.

Land Use Plan: The size of industrial plots was assumed to be 1 to 5 ha. The main service facility was set adjacent to the entrance gate with 2 ha of land. Some green areas were planned for workers, while some large block of lands were kept untouched to avoid unnecessary land grading. The land use plan is depicted in the figure below.

Wastewater Treatment: The industrial wastewater shall be treated by two steps: first at the site of each factory and second by the treatment plant located in the green space at the lowest part in the north-end of the estate area.

Storm Water Drainage: Since there is some erosion observed in the upstream of the Industrial Park, the design work for the drainage system requires careful study and analysis. The overall policy should be to avoid erosion downstream of the Industrial Park, while permitting the water coming from upstream to drain out without obstacles. For the protection of the coastal environment, especially the salt fields and flamingos, the drained water should discharge after treatment in a sand basin.



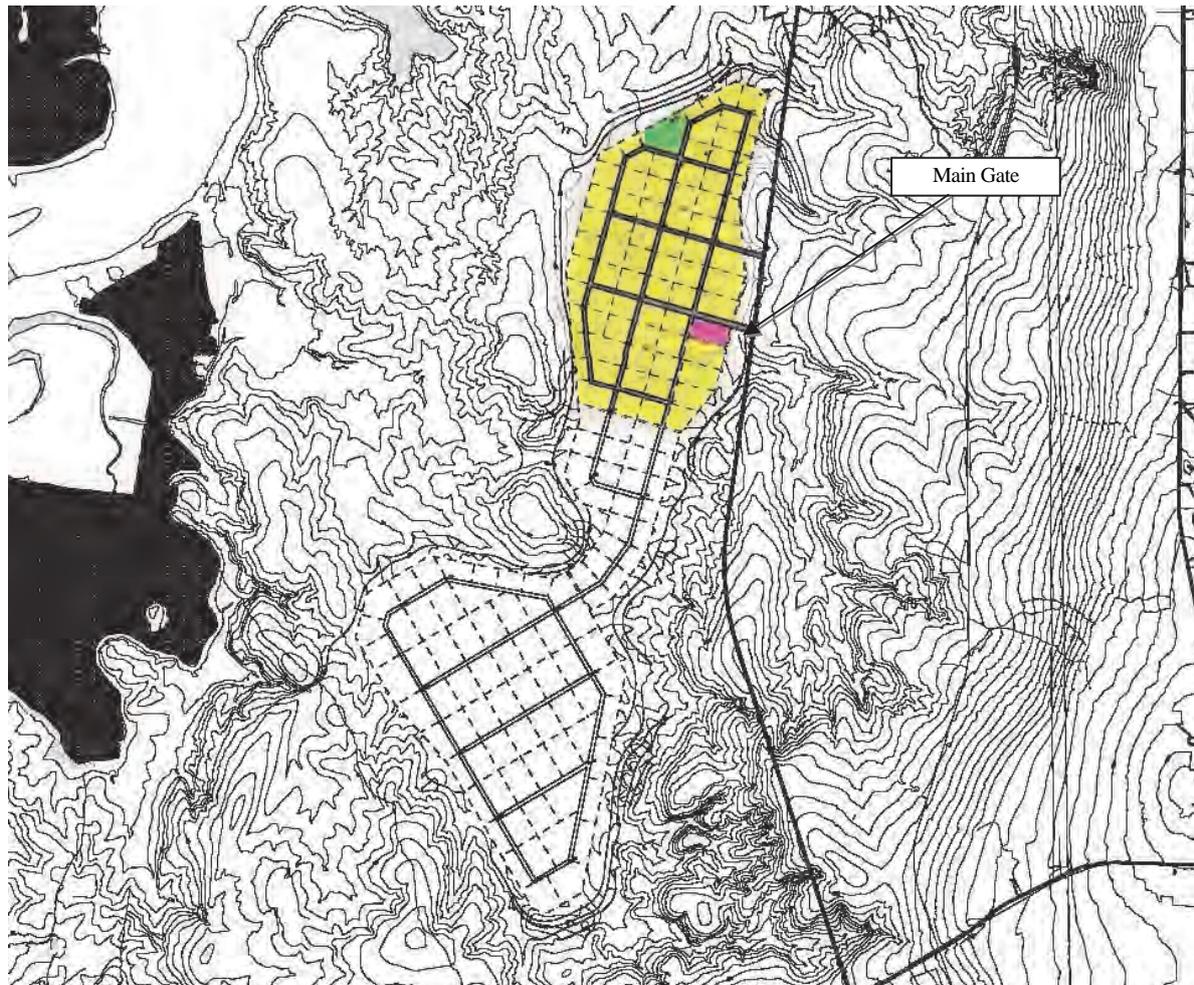
Colour	Type of Use	Area (ha)	Percentage (%)
	Industry	305	87
	Management	2	1
	Green Area	10	3
	Road	33	9
	Total	350	100

Source: JICA Study Team

Figure 16.2.4 Conceptual Land Use Plan of Nacala Industrial Park

(3) Phased Development Plan

The land provision of the Industrial Park at the full development of 500 ha will meet the total requirement of industrial use in the year 2035. A step-wise development of the Industrial Park is recommended as the available utilities infrastructure is limited at the earlier stages, while different sources of utilities may be introduced in the later stage. For the planning purpose, the size of the first phase of the Industrial Park development is set at 140ha, taking the demand curve of the industrial land requirements, and topographic and drainage conditions into account. The figure below shows the location and land use of the first phase development.



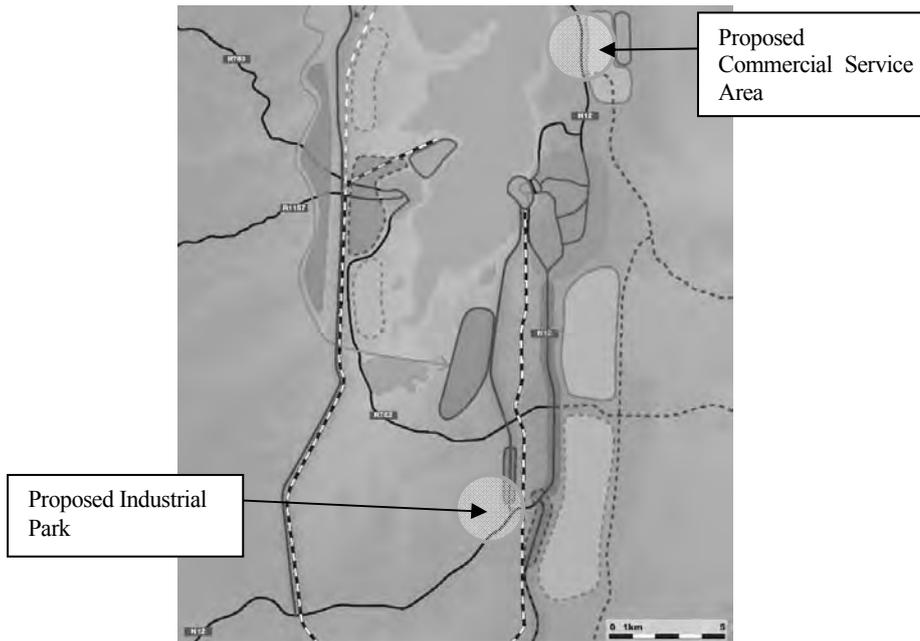
Colour	Type of Use	Area (ha)	Percentage (%)
	Industry	118	85
	Management	2	1
	Green Area	4	3
	Road	16	11
	Total	140	100

Source: JICA Study Team

Figure 16.2.5 Location and Land Use of the First Phase Development of Nacala Industrial Park

(4) On-going Plan

Currently Odebrecht International (Brazilian Construction Company) has an agreement with GAZEDA for the development of industrial park (60 ha) and commercial service area (50 ha) in the areas shown in Figure 16.2.6. This development will be funded by Brazilian government loan to Mozambique. The location for commercial service area is located in the west to the airport which is also the area which PEDEC-Nacala proposes an airport city. As of end of 2013, the Brazilian company has decided to start the preparation of developing the commercial and service area. On the other hand, the industrial park is planned close to the area where PEDEC-Nacala proposes the industrial area. However, the schedule for developing industrial park by Odebrecht International is uncertain.



Source: JICA Study Team based on information from GAZEDA

Figure 16.2.6 Proposed Location of Commercial Service Area and Industrial Park in Nacala Bay Area

16.3 Urban Development Strategies for Greater Nampula

16.3.1 Future Prospects for Greater Nampula

Being a major city in the Northern Region of the country, development of Nampula will keep a steady pace, even after significant development takes place in Nacala Bay Area. The city will continue to be the administration centre, as well as a centre of production and consumption with a significant scale. However, there are various risks for healthy development of Nampula City brought as side effects of being a major node of the Nacala transport corridor. The most explicit example is the increase of railway traffic caused by mass-scale coal transport. Significant efforts will be required by all relevant organisations to help avoid the risks of traffic accidents and degradation of the urban environment for ordinary lives. These efforts also need to consider effective contributions to create/enhance conditions for industry, services and other economic activities.

16.3.2 Vision for Greater Nampula

The target image of the development of Greater Nampula is to create a growth pole of the Northern Region and to contribute to the national development, not only by preventing the deterioration of the urban environment due to increased transport and other economic activities, but also by enhancing the quality of lives. To this end, it is critically important to concentrate efforts at development of transportation infrastructure for diversion of traffic away from the city centre. The function of production and service centre may be strengthened by creation of a highly efficient city with a compact built-up area. The ongoing rapid urbanization should be contained within a certain area, and it is necessary to prevent spreading and scattering of urban areas in neighbouring rural areas.

16.3.3 Development Framework for Greater Nampula

(1) Population

The population of the Greater Nampula in 2035 will reach almost 1,800,000 persons combining Nampula City and three neighbouring administrative posts of Nampula Rapale District as summarized in the Table 16.3.1. The total urban population in the same area in 2035 is forecast to be 1,322,000 persons as shown in Table 16.3.2. The pace of population increase will be moderate compared with the case of Nacala Bay Area, but still in a rapid state.

Table 16.3.1 Population Forecast for Greater Nampula

Municipality/District/ Administrative Post	Population				Average Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-2017	2017-2025	2025-2035
Nampula City	483,572	729,000	941,000	1,180,000	4.2%	3.2%	2.3%
Anchilo AP (Nampula Rapale District)	75,543	118,000	157,000	207,000	4.5%	3.7%	2.8%
Namaita AP (Nampula Rapale District)	52,464	86,000	117,000	156,000	5.1%	3.9%	2.9%
Rapale AP (Nampula Rapale District)	57,491	80,000	103,000	133,000	3.4%	3.1%	2.6%
Total of Greater Nampula	669,069	1014,000	1,318,000	1,676,000	4.2%	3.7%	2.4%

Source: JICA Study Team

Table 16.3.2 Forecast of Urban Population for Greater Nampula

Municipality/District/ Administrative Post	Population				Average Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-2017	2017-2025	2025-2035
Nampula City	483,572	729,100	941,000	1,180,000	4.2%	3.5%	2.6%
Anchilo AP (Nampula Rapale District)	0	12,600	30,300	62,100	-	11.6%	7.5%
Namaita AP (Nampula Rapale District)	0	9,300	22,600	46,900	-	11.8%	7.6%
Rapale AP (Nampula Rapale District)	0	8,600	19,900	39,900	-	11.0%	7.2%
Total of Greater Nampula	471,171	759,600	1,013,800	1,328,900	4.6%	3.7%	2.7%

Source: JICA Study Team

(2) Urban Land Requirement

To accommodate the future population of the Greater Nampula, the land area required for urbanization is estimated as shown in the table below. To promote the creation of a compact city, the ratio of urban population in the administrative posts of Nampula Rapale District is set to be 30%. The incremental urban population from year 2007 to 2035 will be around 850,000 persons, and will require an additional 22,000 ha to be urbanized for residential, public facilities, office and commercial uses, urban infrastructure, and some cottage type industries.

Table 16.3.3 Urban Land Requirement for Greater Nampula

Municipality/District/ Administrative Post	Population Increase 2007-2035	Urban Population Share (%)	Urban Population Increase	Urban Land Requirement (ha)	Population Density (person/ha)
Nampula City	698,495	100	698,495	17,412	40
Anchilo AP (Nampula Rapale District)	131,400	30	62,100	2,069	30
Namaita AP (Nampula Rapale District)	103,800	30	46,900	1,562	30
Rapale AP (Nampula Rapale District)	75,600	30	39,900	1,331	30
Total of Greater Nampula	1,009,295	(Average) 79	846,495	22,374	38

Source: JICA Study Team

(3) Industrial Land Requirement

The industrial land requirement is calculated separately as it is promoted to locate the factories in the industrial estate as much as possible. Thus, the unit land area for a worker will be larger than the conventional type of factories. The estimation was done as shown in Table 16.3.4 and Table 16.3.5. The number of factory workers is estimated based on the economic development forecast of Nampula Province, and assuming that 25% of the incremental number of workers in the province will be settled in that area. The land requirement is then estimated by type of industry by year as shown in Table 16.3.6. The total area required for the industrial estate is around 300 to 350ha, among which, types of food, beverage, agro-processing will be dominant to cover more than 130ha.

Table 16.3.4 Economic Forecast for Nampula Province

GRDP by Sector (MT million, 2003 constant price)	2007	2035	Share in 2035 (%)
Nampula Province	20,346	148,500	100.00
Agriculture		49,100	33.06
Mining		30	0.02
Manufacturing/Construction/Utilities		35,800	24.11
Services		63,600	42.83
Work Force of Nampula Province Manufacturing			Annual Growth Rate (%)
Economically Active Population (Persons)	38,467	161,238	5.25
Labour Productivity (Persons)	59,179	135,397	3.00

Source: JICA Study Team

Table 16.3.5 Industrial Land Requirement for Greater Nampula

	2007	2035	Remarks
Economically Active Population in Manufacturing (Nampula Province)	38,467	161,238	
Existing Industrial Land (Nampula Province) (ha)	385		100 persons/ha
Industrial Land Requirement (Nampula Province) (ha)		2,015	80 Persons/ha
Greater Nampula Area Industrial Land Requirement	154	500	40% in 2007 25% in 2035

Source: JICA Study Team

Table 16.3.6 Industrial Land Requirement by Type by Year for Greater Nampula

Unit: ha

Broad Type of Industry	2007	2012	2017	2035
Food/Beverage/Agro-processing	92.4	104.4	120	250
Metal/Machinery/Electrical Products & Equipment	15.4	17.4	20	150
Wood/Furniture, Construction Materials and Others	46.2	52.2	60	100
Total	154	174	200	500

Source: JICA Study Team

(4) Urban Water Requirements

To supply water for the future urban population in Greater Nampula, the demand for urban water is estimated as shown in the table below.

Table 16.3.7 Summary of Urban Water Supply Demand for Greater Nampula

		2013*	2017	2025	2035	
Demand (m ³ /d)	Expanded Supply Area	Sub Total		86,968	141,220	267,961
		Industrial Area		53,000	94,000	120,000
		Total	20,000	139,968	235,220	387,961
	Limited Supply Area	Sub Total		78,095	123,870	221,467
		Industrial Area		53,000	94,000	120,000
		Total	20,000	131,095	217,870	341,467

Source: JICA Study Team

Note*: Water supply volume after rehabilitation of existing source

16.3.4 Conceptual Spatial Structure for Greater Nampula**(1) Diversion of Concentrated Traffic**

The most critical factor for the development of Greater Nampula is to divert the existing concentrated traffic to prevent risks of deterioration of both residents' quality of life and economic activities' efficiency. The effort to match the changed nature of the transport is required even though it is costly. Major components for the diversion of existing traffic include the following:

1) Rerouting of Railway for Coal Transport

The highest risk potential to the urban lives will be brought by the change of the nature of railway operation. By the significant increase of the number of trains (28pairs/day in 2035), the city will be totally divided as crossing of the railway will become a very time consuming factor. Plus the current ground level separation of the space from the ROW of the railway will cause the risk of accidents and may create social instability. After analyses for several options, it is proposed to divert the coal transport portion of the railway traffic to a new line in the north of the municipal territory, while trains for general cargos and passengers will continue to use the present alignment. The new

segment of the diverted route will be less undulating and far enough to be involved into the built-up area again.

2) Relocation of Airport

The existing airport is located at the centre of the city and is causing incredibly loud noise in the city centre. Although it is convenient to have an international airport at the centre of the city, the number of airline operations seems incredibly high compared to other cities in the world. The threat to the health of the citizens caused by the jet noise will become a social issue sooner or later. The efficiency of the air operation will also face risk by increased air traffic. This will become more critical in the near future as the late night operation might be stopped. Thus the relocation of the airport is proposed as another key to create an efficient and competitive city with quality urban lives.

3) Relocation of Railway Shunting Yard

Currently a large scale shunting yard is located along the platform of Nampula Station. This is not causing critical risk to the city life, but the efficiency of land use is largely degraded as the facility is not useful for the ordinary citizens. In addition, if the coal train route is diverted, the coal trains will have very limited chance to utilize the shunting yard even in case of emergency. It is proposed that a new shunting yard be constructed at the eastern side of the branch point with the diverted railway dedicated to the coal transport.

4) Ring Road Development

A ring road has been proposed as a result of the joint effort by the municipality and UN-HABITAT. The general alignment is set to serve as the trunk road of the city as well as encouraging the through traffic to avoid reaching the city centre. This concept is effective and needs to be shared by the relevant authorities.

(2) Urban Cores for Greater Nampula

Along with the diversion of major transport infrastructure, there will be many opportunities generated to achieve formulation of a highly efficient and compact city. The major chances include the following:

1) New CBD at Shunting Yard and Airport Sites

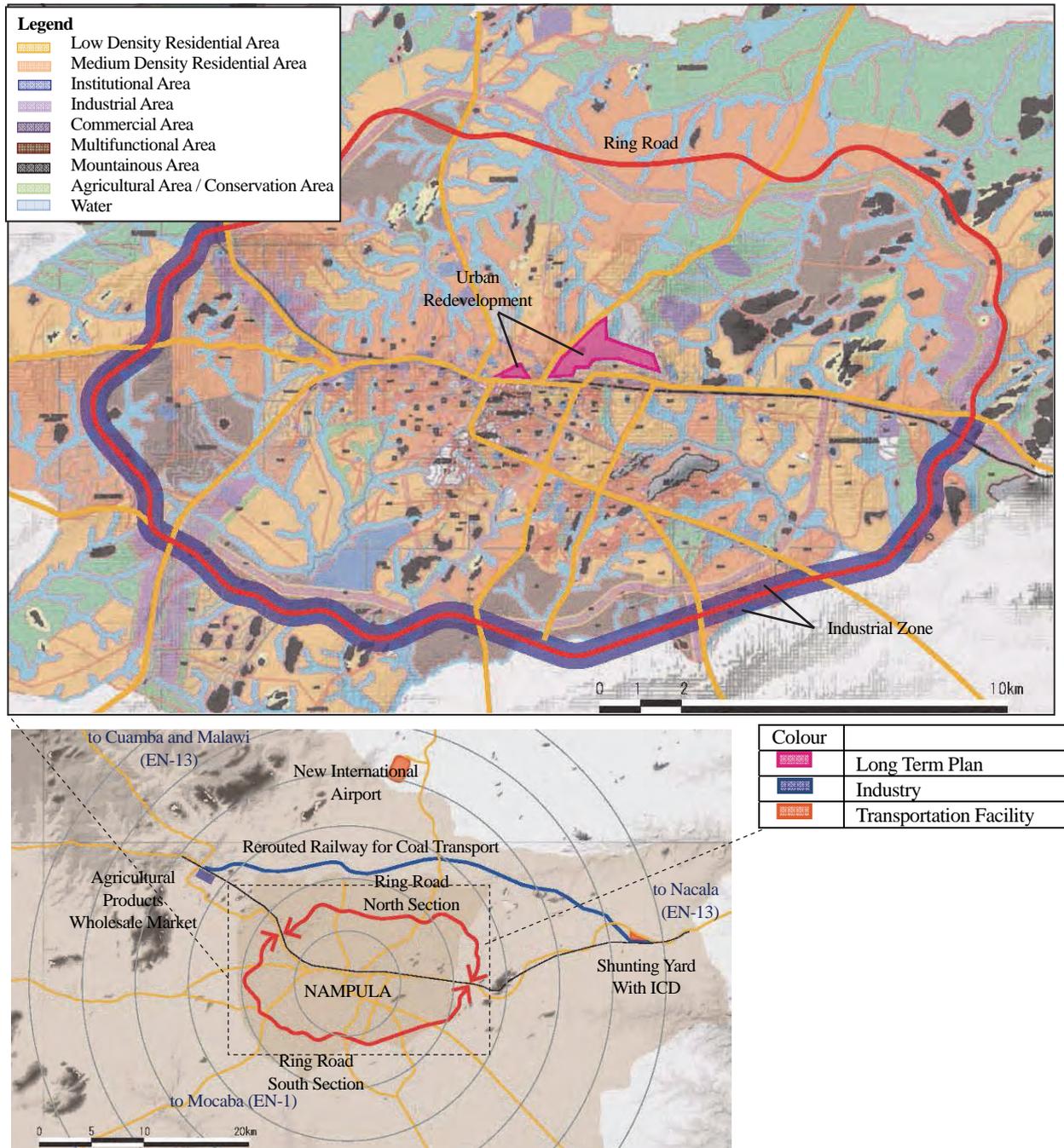
The site of the railway shunting yard is an ideal location to redevelop and form a new CBD for the city. As the most of the planned area is already occupied, the scarceness of office space will become critical. It is not promising to expect the reconstruction of old buildings as they are mostly apartments. As the price of properties in the central area is already reaching the level that would make construction of multi-story buildings viable, there is a high potential for projects for urban complex development. This is also true of the site of the airport.

2) Industrial Zones in Outskirts along Ring Road

Formation of industrial zones along the planned ring road is also proposed by the Municipality-Habitat joint effort. It is expected that this land use will help prevent creation of ribbon type sprawl.

3) New Housing Area and Urbanization

Having unique hills and rivers, the future urbanization needs to be effectively guided by a clear definition of the restricted area. To create a compact city it is also critically important to set the Urban Growth Boundary.



Source: JICA Study Team

Figure 16.3.1 Conceptual Spatial Structure of Greater Nampula Development

(3) Supporting Water Resources

Surface water of the Monapo River is important for both urban and irrigation water supplies. The water potential in the rainy season is sufficient, but it is scarce in the dry season. Utilizing surface water in the dry season is necessary for irrigation, especially in the downstream areas. Consequently,

the water source for urban water is considered to be conveyed from Meluli River. Construction of Monte Tiza Dam is proposed for the future water source of Nampula urban water that may satisfy the demand of 374,000m³/day in 2035. Detailed study is required for the development of dam construction conducted by IWRM.

16.3.5 Issues, Objectives, Strategies and Projects for Urban Development of Greater Nampula

(1) Issues on Urban Development of Greater Nampula

Considering the existing conditions and the future vision for urban development of Greater Nampula, the following issues are identified for strategy formulation for Greater Nampula:

- Increased traffic congestion partly due to increased concentration of through traffic at national roads in the central area, such as National Road No.13 and National Road No.1 and partly due to rapidly increasing development activities
- Poor coordination between ongoing development projects: for example, poor coordination between the upgrading of the railway for coal transport and the improvement of railway crossings
- Rapid and disorderly urban expansion from Nampula Municipality toward surrounding districts
- Inadequate infrastructure (electricity and water supply) for supporting not only the present urban people's lives and economic activities, but also future urban development including economic development
- Deterioration of the residential environment because it is difficult to provide sufficient infrastructure for maintaining the quality of the residential environment
- Poor preparation of the central area of Nampula Municipality for fulfilling higher urban functions as the regional growth centre

(2) Objectives for Urban Development of Greater Nampula

In order to achieve the vision for Greater Nampula: Regional Growth Pole of the Northern Region, the following objectives are set:

- **Objective 1:** To improve the business and residential environment as the regional economic growth centre
- **Objective 2:** To create a competitive environment for business by eliminating bottlenecks for economic development
- **Objective 3:** To enhance linkage with the agricultural lands of Nampula Province and Zambezia Province for stable shipment of farmed goods to develop the agro-industrial potential in Greater Nampula

(3) Strategies for Urban Development of Greater Nampula

In order to achieve the objectives identified above, the following strategies should be implemented:

Objective 1

- To mitigate negative environmental impacts due to prospective railway coal transport and increased road traffic in response to the opening of an upgraded trunk road for Lichinga-Mandimba-Cuamba-Nampula-Nacala

- To transform the transportation network
- To redevelop large sites for creation of business and residential functions in the central area of Nampula

Objective 2

- To strengthen economic infrastructures, such as water and electricity supply
- To develop human resources for economic development
- To support business start-up for entrepreneurs

Objective 3

- To upgrade new roads between Nampula and surrounding rural areas

(4) Projects for Urban Development of Greater Nampula

In order to achieve the identified objectives and to implement the proposed strategies above, the following projects are proposed:

Short-Term (-2017)

- Ring Road Construction Project Phase 1 (southern segment)
- Project for relocation of existing wholesale market to Rapale (to resolve congestion in downtown Nampula)
- Project for establishment of a multi-modal logistic terminal in Anchilo (efficient cargo transfer and improvement of urban environment)
- Industrial Human Resources Development Project
- Business Start-up Support Project (finance, incubation, legal issues etc.)

Medium to Long-Term (2018-2035)

- Railway Bypass Construction Project (for securing safety and efficiency of urban area, as well as mitigating environmental impacts)
- Ring Road Construction Project Phase 2 (northern segment)
- New Nampula International Airport Development Project
- New CBD Development Project (phase 1 at shunting yard, phase 2 at airport site)
- Urban Infrastructure Projects (water, electricity)

16.3.6 Future Prospects, Objectives, Strategies and Projects for Urban Water Supply for Greater Nampula

(1) Future Prospects on Urban Water Supply for Greater Nampula

Greater Nampula is expected to become a regional growth pole for the Northern Region taking advantage of its corridor of railways and roads, as well as its proximity to Nacala Port. Stable and extensive water supply to the urban population and economic activities is essential for supporting urban and economic development in Greater Nampula. To supply water for the future urban population for Greater Nampula, the future demand of urban water supply is estimated as shown in the table below. The water demand for Greater Nampula is estimated by assuming the following parameters for the future:

- In year 2017, 10% of the urban populations will use “house connections” at an average of 150 litre/day, 35% of the urban populations will use “yard taps” at an average of 90m litre/day, and 55% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2025, 20% of the urban populations will use “house connections” at an average of 150 litre/day, 40% of the urban populations will use “yard taps” at an average of 90m litre/day, and 40% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2035, 35% of the urban populations will use “house connections” at an average of 200 litre/day, 39% of the urban populations will use “yard taps” at an average of 90 litre/day, and 26% of the urban population will use “public standpipes” at an average of 30 litre/day.

Table 16.3.8 Urban Water Demand for Greater Nampula by Municipality and District

		2013*	2017	2025	2035
Demand (m ³ /d) Expanded Supply Area	Nampula		81,253	131,068	236,161
	Namaita AP		1,724	3,134	8,914
	Anchilo AP		2,366	4,232	12,114
	Rapale AP		1,624	2,786	7,771
	Sub Total		83,907	141,514	265,503
	Industrial Area		53,000	94,000	120,000
	Total	20,000	136,968	235,220	387,961
Demand (m ³ /d) Limited Supply Area	Nampula		72,900	114,936	196,807
	Namaita AP		1,568	2,781	7,829
	Anchilo AP		2,151	3,724	10,373
	Rapale AP		1,477	2,451	6,654
	Sub Total		75,314	119,863	219,828
	Industrial Area		53,000	94,000	120,000
	Total	20,000	131,095	217,870	341,467

Source: JICA Study Team

Note*: Water supply volume after rehabilitation of existing source

(2) Issues on Urban Water Supply for Greater Nampula

Considering existing conditions and the future vision for urban development of Greater Nampula, the following issues are identified for strategy formulation on urban water supply for Greater Nampula:

- Current shortage of water resources available for urban water supply not only for the present populations and economic activities, but also for the future populations and economic activities
- Relatively poor service level of water supply for the present populations
- High cost of getting enough water for people’s lives and industrial business operation
- Poor level of urban water supply to attract investors for manufacturing sectors for the future

(3) Objectives for Urban Water Supply for Greater Nampula

The objective for the urban water supply for Greater Nampula is as follows:

- To provide urban water supply at a reasonable service level for supporting the development of the Regional Growth Pole for the Northern Region

(4) Strategies for Urban Water Supply for Greater Nampula

The following strategies are to be implemented for achieving the objectives above:

- To fully utilize existing water resource facilities and water supply facilities
- To reduce Non-Revenue Water (NRW) and to increase water volume to be supplied for achieving healthier management of the water company

- To expand the service areas for urban water supply and at the same time to conduct water demand management by regulating the increase in the number of house connections
- To supply water to the central area of Greater Nampula at a higher service level than for other areas, for supporting the development of the Regional Growth Pole for the Northern Region

(5) Projects for Urban Water Supply for Greater Nampula

In order to implement the proposed strategies above, the following projects are proposed:

Short-Term (-2017)

- Project for Rehabilitation of Monapo Dam on the Monapo River (to increase the water supply capacity by 20,000 m³/day) by constructing a small weir on the Meluli River and taking water from the Meluli River for providing to the reservoir of Monapo Dam

Medium-Term (2018-2025, at the earlier time by 2025)

- Project for Development of Water Treatment Plant (to treat water from Monte Tiza Dam on the Meluli River to supply 259,000 m³/day of treated water to Greater Nampula) and Water Pipeline (for transmission of treated water to Greater Nampula)
- Project for Strengthening of Water Distribution System of Greater Nampula (for utilizing the water from Monte Tiza Dam)

Long-Terms (2025-2035, as soon as possible after 2025)

- Project for Development of Water Treatment Plant (to treat water from Mutelele Dam on the Ligonha River to supply treated water to Greater Nampula) and Water Pipeline (for transmission of treated water to Greater Nampula)
- Project for Strengthening of Water Distribution System of Greater Nampula (for utilizing the water from Mutelele Dam)

16.3.7 Sewerage and Drainage Systems for Greater Nampula

(1) Future Prospects on Sewerage and Drainage Systems for Greater Nampula

The present situations of sanitation, sewerage and drainage are far behind the desirable situations in Greater Nampula. However, in order to seek the vision of Regional Growth Pole for the Northern Region, the development of sewerage and drainage systems should be an essential part of urban development.

(2) Issues on Sewerage and Drainage Systems for Greater Nampula

Considering the existing conditions and the future vision for urban development of Greater Nampula, the following issues are identified for strategy formulation on sewage and drainage systems for Greater Nampula:

- Currently small coverage of a modern sewerage system in Nampula Municipality
- Poor management and utilisation of septic tanks due to the lack of septic treatment facilities
- Poor level of sanitary situation, sewerage and drainage systems to attract investment for establishing a Regional Growth Centre

(3) Objective for Sewerage and Drainage Systems for Greater Nampula

The objective to develop sewerage and drainage systems for Greater Nampula is identified as follows:

- To create a sanitary environment and to reduce the occurrence of waterborne diseases for increasing urban population and expanding urban areas in order to make Greater Nampula a Regional Growth Pole for the Northern Region.

(4) Strategies for Sewerage and Drainage Systems for Greater Nampula

Under this circumstance, the following strategies for sewerage and drainage systems for Greater Nampula are proposed:

- To make an effort at promoting the utilisation of safe sanitation facilities for the short term
- To prepare for establishment of treatment ponds for septage and sewerage systems and drainage systems for the central areas of Greater Nampula for the short term
- To establish treatment ponds for septage and sewerage systems and drainage systems for the central areas for Greater Nampula for the medium term

(5) Projects for Sewerage and Drainage Systems for Greater Nampula

In order to achieve the identified objectives and to implement the strategies proposed above, the following projects are proposed:

Short-Term (-2017)

- Preparation of the project for treatment ponds for storage and treatment of septage from septic tanks/pit-latrines
- Preparation of the project for a sewerage system and drainage system for the central area and industrial zones (detailed design and bidding documents)
- Preparation and Implementation of the project for "Emergency Cleaning and Rehabilitation of Septic Tanks"
- Promotion of utilisation of low-cost sanitation facilities in peri-urban areas (suburban areas)
- Study on and implementation of collection systems and institutional frameworks for septage from septic tanks and pit-latrines

Medium-Term (2018-2025)

- Construction of treatment ponds for storage and treatment of septage from septic tanks/pit-latrines
- Construction of a sewerage system and drainage system for the central area (cement city) and industrial zones

Long-Term (2026-2035)

- Implementation of regular maintenance of septic systems
- Expansion of sewerage and drainage systems

16.4 Urban Development Strategies for Cuamba City

16.4.1 Future Prospects for Cuamba City

The strategic location of the city has not been utilized effectively due largely to the poor conditions of national roads connecting Cuamba to other regions of the country. The urbanization, however, will be dramatically accelerated after completion of the improvement of the N-13 Nampula-Cuamba segment. Despite the fact that the past urbanization was in a moderate pace, the city is already facing the shortage of land for housing use of the migrants. It is necessary to expand the area for urbanization by connecting the flat area located north-east of the city centre across the river running roughly from west to east.

16.4.2 Vision for Cuamba City

The target image of the development of Cuamba City is to create an Inland Regional Logistics and Industrial Centre, which will help bring the benefit of the transport corridor development to the areas distant from the corridor route. In other words, the development of Cuamba is a touch stone to assess the effectiveness of the Nacala Corridor development as a development corridor beyond being a mere transport corridor. Expanding the dynamism of economic development along the corridor to the remote areas can be achieved by strengthening the urban functions of the central towns located along the corridor. In this light, the development of Cuamba needs to focus on accumulation of higher urban functions, such as efficient cargo transit, availability of higher education and health services, and creation of value added on the products of its remote catchment area.

16.4.3 Development Framework for Cuamba City

A set of development frameworks for Cuamba City is forecast to the planning horizon of 2017, 2025 and 2035.

(1) Population Framework

The population of the Cuamba Municipality area in 2035 is expected to be 267,000 persons, while that of the Cuamba District area is 446,000, as presented in Table 16.4.1. The total population will be tripled from the record of 2007 census population (79,013).

Table 16.4.1 Population Forecast for Cuamba

	Population				Average Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-2017	2017-2025	2025-2035
Cuamba District (incl. Municipality)	191,642	241,000	336,000	446,000	3.8%	3.1%	2.3%
Cuamba Municipality*	79,013	133,000	1789,000	267,000	5.3%	4.4%	3.5%

Source: JICA Study Team

Note*: Urban population of Cuamba District

(2) Urban Land Requirement

To accommodate the future population of the city, the land area required for urbanization is estimated as shown in Table 16.4.2. It is expected that over 5,000ha of urban land will be newly

required, even though the overall population density of the city will increase from 14.8 persons/ha in 2007 to 25.0 persons/ha in 2035.

Table 16.4.2 Urban Land Requirement for Cuamba City

	2007	2035	Increase
Population (persons)	79,013	267,000	187,987
Urban Land (ha)	5,347	10,680	5,333
Density (persons/ha)	14.8	25.0	

Source: JICA Study Team

(3) Industrial Land Requirement

The industrial land requirement is calculated from the share of the economically active population in Niassa Province. According to the census result for 2007, the economically active population in the manufacturing sector was 7,689 persons in the province, according to the census result. Assuming the density of the number of workers was 100 persons/ha in 2007, it is estimated that there might have been around 19.5ha of land in industrial use as a total in the municipality. Assuming the density will be reduced to 80 persons/ha in 2035, there will be 128ha of industrial land in the municipality as a whole. Thus the land requirement for industrial use from 2007 to 2035 is estimated to be around 109.5 ha. The share of the Cuamba Municipality, in terms of the number of workers is assumed to be 40%.

Table 16.4.3 Industrial Land Requirement for Cuamba City

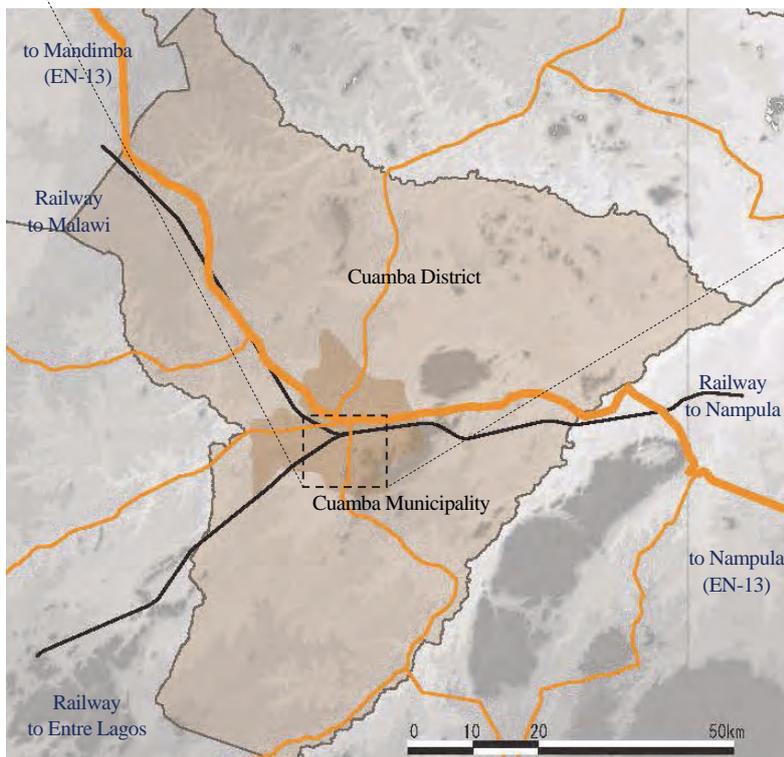
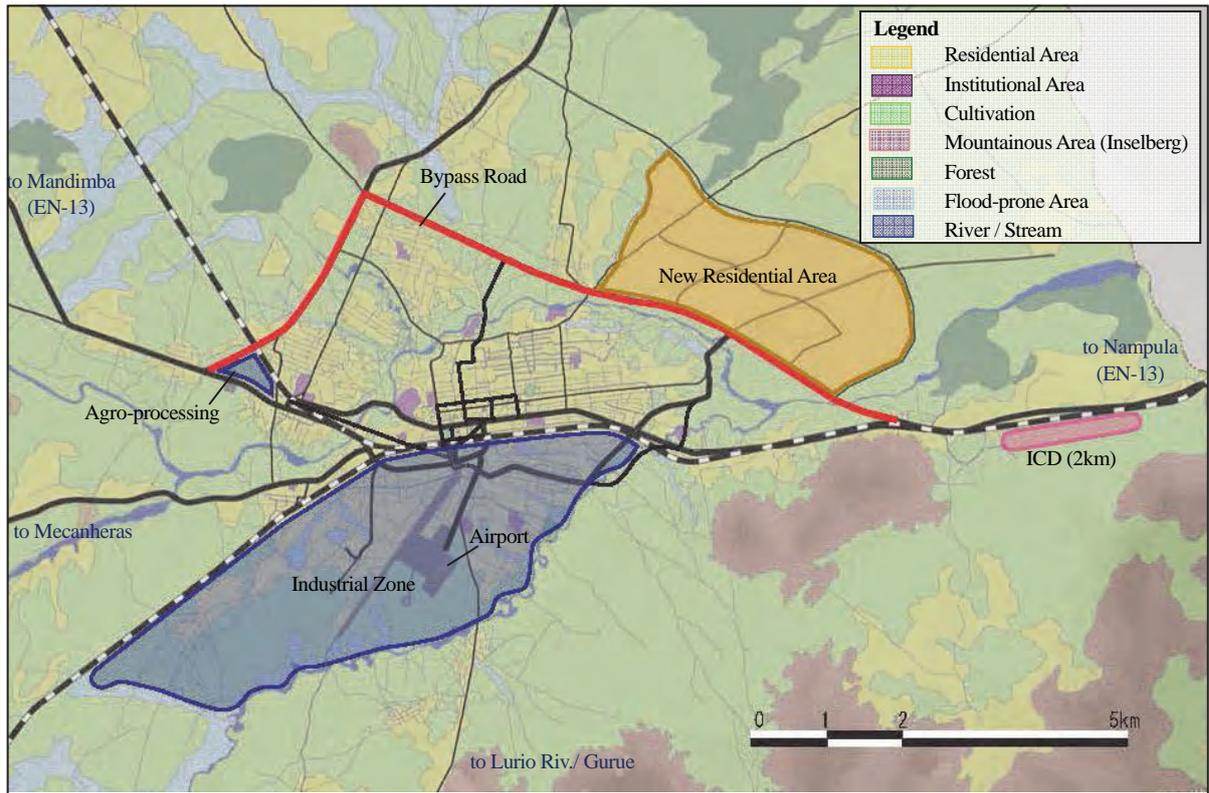
	2007	2035	Increase
Niassa Province (ha)	77.0	320+	Approx. 240
Cuamba Municipality (ha)	19.5	128+	Approx. 108
Share of Cuamba Municipality (%)		40	

Source: JICA Study Team

16.4.4 Conceptual Spatial Structure for Cuamba City

Similar to the case of Nampula City, the railway crosses the geographical centre of the urban area of the municipality. Therefore it is necessary to deal with the expected division of the city brought by the operation of the coal forwarding by the railway. At the same time, it is necessary to expand the urban area to the north-east by crossing the river course. Taking these issues into account, three alternatives can be generated as follows:

- A bypass road will be introduced to the north side of the river to ease the influx of traffic to the city centre as well as to facilitate the development of new urbanization areas on the north-eastern side of the river. The railway will be kept as it is to support locating of distribution and logistics industries by transforming the south side of the city into an industrial zone.
- A bypass road will be introduced in the same manner as in the above alternative, but the railway will be relocated to the south end of the city. By doing this, the south part can be used as a residential area, as the division of the city will be avoided.
- A bypass road will be introduced in the same manner. The junction of the railway will be relocated to the east of the city and the line toward Lichinga will be realigned along the proposed bypass. By doing this, the introduction of an agro-processing complex may be better located on the north side of the river, while the distribution industry will be located in the south part of the city.



Colour	
	Industrial Area
	Transportation Facility
	Residential Area

Source: JICA Study Team

Figure 16.4.1 Conceptual Spatial Structure of Cuamba City Development

Taking the relatively small size of the city as well as the need for momentum to create a new urban area north-east of the river, it is proposed that the following options may be the most efficient way of achieving the above two requirements:

- A road to bypass National Road No.13 will be introduced along the north-eastern side of the river
- No rerouting of the railway will be planned, but the area on the southern side of the railway will be designated as the industrial promotion zone, where construction of factories and other non-residential facilities are encouraged but new construction and/or major renovation of residential facilities is discouraged or prohibited
- The road to Marrupa will be strengthened to provide better access from the high potential agriculture area, and help form the agricultural product triangle together with Lichinga
- An agro-processing zone will be established to support the increase of the value-added portion of the agricultural products from the remote catchment area of the city. The best location may be the junction point of the roads to/from Nampula, Lichinga, and Marrupa
- A shunting yard will be constructed at the eastern end of the city along the railway to enhance the capacity for handling goods to and from Nacala

16.4.5 Issues, Objectives, Strategies and Projects for Urban Development of Cuamba City

(1) Issues on Urban Development of Cuamba City

Considering the existing conditions and the future vision for urban development of Cuamba City as the “Inland Regional Logistics and Industrial Centre”, the following issues are identified for strategy formulation for Cuamba City:

- Difficulty to manage through traffic on roads because the upgraded trunk road (National Road No.13) runs through the central area of the city
- Physical divide of urban areas by two railway lines: namely, Northern Railway (to be upgraded for coal transport) and Lichinga-Cuamba Railway Line (to be rehabilitated)
- Limited land for urban expansion due to the river running on the north side of the existing urban area
- Weak infrastructure base for future economic development including manufacturing sectors

(2) Objectives for Urban Development of Cuamba City

In order to achieve the vision for Cuamba City as the “Inland Regional Logistics and Industrial Centre”, the following objectives are set:

- **Objective 1:** To strengthen the transportation hub function for inland areas
- **Objective 2:** To improve the urban spatial structure
- **Objective 3:** To strengthen the industrial base

(3) Strategies for Urban Development of Cuamba City

In order to achieve the objectives identified above, the following strategies should be implemented:

Objective 1

- To strengthen integration of Cuamba City with surrounding agricultural-forestry areas by improving the roads
- To strengthen the cargo terminal function at Cuamba City for the Nacala Corridor

Objective 2

- To expand residential areas by constructing a bypass road for National Road No. 13
- To develop industrial and logistics areas in the southern part of the city

Objective 3

- To establish an agro-processing industrial park

(4) Projects for Urban Development of Cuamba City

In order to achieve the identified objectives and to implement the proposed strategies above, the following projects are proposed:

Short-Term (-2017)

- Road Bypass Project
- Truck Terminal Project
- Southern Area Land Use Conversion Programme (from residential area to industrial area)

Medium-Term (2018-2025)

- North-eastern Residential Area Expansion Project
- Agro-processing Industrial Park Project (pulp, agricultural products etc.)

16.4.6 Urban Water Supply for Cuamba City

(1) Future Prospects on Urban Water Supply for Cuamba City

Cuamba City is expected to become an Inland Regional Logistics and Industrial Centre taking advantage of the corridor railways and roads to Malawi, as well as important feeder roads to Lichinga and Marupa. Stable water supply to the urban population and economic activities is essential for promoting such urban centre development. To supply water for the future urban population for Cuamba City, the future demand for urban water supply is estimated as shown in Table 16.4.4.

The water demand for Cuamba City is estimated by assuming the following parameters for the future:

- In year 2017, 5% of the urban populations will use “house connections” at an average of 150 litre/day, 10% of the urban populations will use “yard taps” at an average of 90m litre/day, and 85% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2025, 10% of the urban populations will use “house connections” at an average of 150 litre/day, 15% of the urban populations will use “yard taps” at an average of 90m litre/day, and 75% of the urban population will use “public standpipes” at an average of 30 litre/day.
- In year 2035, 15% of the urban populations will use “house connections” at an average of 200 litre/day, 35% of the urban populations will use “yard taps” at an average of 90 litre/day, and 50% of the urban population will use “public standpipes” at an average of 30 litre/day.

Table 16.4.4 Summary of Urban Water Supply Demand for Cuamba City

		2013*	2017	2025	2035
Demand (m ³ /d)	Domestic and Small Business		11,713	17,213	36,474
	Industrial Area (Light Industry)		7,800	32,000	52,000
	Total	11,000	19,513	49,213	88,474

Source: JICA Study Team

Note*: Water supply volume after rehabilitation of existing source

(2) Issues on Urban Water Supply for Cuamba City

There will be a shortage of urban water against the demand generated between 2029 and 2035 even by the existing plan of water resources development and water supply expansion. To cope with this, the ASNANI (Integrated Water Supply and Sanitation Project for Niassa and Nampula Provinces) is planning to improve Mepopole Dam as a first step. Construction of Mecuca Dam and Chichemunda Dam is recommended and preparation needs to be initiated. Further study and analysis for IWRM development is also recommended.

Considering the existing conditions and the future vision for urban development of Cuamba City, the following issues are identified for strategy formulation on urban water supply for Cuamba City:

- Current shortage of water resources available for urban water supply for the present populations, as well as for the future populations
- Relatively poor service level of water supply for the present populations
- Poor level of urban water supply to attract investors for the manufacturing sectors in the future

(3) Objectives for Urban Water Supply for Cuamba City

The objective for the urban water supply for Cuamba City is as follows:

- To secure the service level of urban water supply for supporting the development of commerce-business, government administration and industry as the Inland Regional Logistics and Industrial Centre.

(4) Strategies for Urban Water Supply for Cuamba City

The following strategies are to be implemented for achieving the objectives above:

- To fully utilize existing water resource facilities and water supply facilities
- To reduce Non-Revenue Water (NRW) and to increase water volume to be supplied for achieving healthier management of the water company
- To expand the service areas for urban water supply and at the same time to conduct water demand management by restricting the increasing number of house connections
- To supply water to the central area of Cuamba City at a higher service level than for other areas, for supporting the development of the Inland Regional Logistics and Industrial Centre

(5) Projects for Urban Water Supply for Cuamba City

In order to implement the proposed strategies above, the following projects are proposed:

Short-Term (-2017)

- Project for Raising the Height of the Dam (4m)

Medium-Term (2018-2025)

- Project for Development of a Water Treatment Plant (to treat water from the new dam to supply treated water to Cuamba City) and Water Pipeline (for transmission of treated water to Cuamba City)
- Project for Strengthening of the Water Distribution System of Cuamba City (for utilizing the water from the new dam)

Long-Term (2025-2035)

- Project for Development of a Water Treatment Plant (to treat water from another new dam to supply treated water to Cuamba City) and Water Pipeline (for transmission of treated water to Cuamba City)
- Project for Strengthening of the Water Distribution System of Cuamba City (for utilizing the water from another new dam)

16.4.7 Sewerage and Drainage Systems for Cuamba City

(1) Future Prospects on Sewerage and Drainage Systems for Cuamba City

The present situations in Cuamba City of sanitation, sewerage and drainage are far behind the desirable situations. However, in order to promote the vision of Inland Regional Logistics and Industrial Centre, the development of sewerage and drainage systems should be an essential part of urban development.

(2) Issues on Sewerage and Drainage Systems for Cuamba City

Considering existing conditions and the future vision for urban development of Cuamba City, the following issues are identified for strategy formulation on sewage and drainage systems for Cuamba City:

- Currently there is no modern sewerage system in Cuamba City
- Poor management and utilisation of septic tanks due to the lack of septage treatment facilities
- Inadequate level of sanitation situation, sewerage and drainage systems to attract investment for establishing an Inland Regional Logistics and Industrial Centre

(3) Objective for Sewerage and Drainage Systems for Cuamba City

The objective to develop sewerage and drainage systems for Cuamba City is as follows:

- To create a sanitary environment and to reduce the occurrence of waterborne diseases for increasing urban population and expanding urban areas in order to make Cuamba City an Inland Regional Logistics and Industrial Centre.

(4) Strategies for Sewerage and Drainage Systems for Cuamba City

The present situations of sanitation, sewerage and drainage are far behind the desirable situations in Cuamba City. Under this circumstance, the following overall strategies for sewerage and drainage systems for Cuamba City are identified:

- To make effort at promoting the utilisation of safe sanitation facilities for the short term
- To establish treatment ponds for septage for Cuamba City for the medium term

- To establish treatment ponds for septage and sewerage systems and drainage systems for the central areas for Cuamba City in the long term

(5) Projects for Sewerage and Drainage Systems for Cuamba City

In order to achieve the identified objectives and to implement the strategies proposed above, the following projects are proposed:

- Promotion of utilisation of low-cost sanitation facilities in peri-urban areas (suburban areas)
- Preparation of the project for treatment ponds for storage and treatment of septage from septic tanks/pit-latrines

Medium-Term (2018-2025)

- Study on and implementation of collection systems and institutional frameworks for septage from septic tanks and pit-latrines
- Construction of treatment ponds for storage and treatment of septage from septic tanks/pit-latrines
- Preparation of the project for a sewerage system and drainage system for the central area and industrial zones (detailed design and bidding documents)

Long-Term (2026-2035)

- Construction of a sewerage system and drainage system for the central area (cement city) and industrial zones
- Implementation of regular maintenance of septic tanks

16.5 Urban Development Strategies for Other Major Urban Centres

16.5.1 Lichinga City

(1) Directions of Development

In its rapid population growth, Lichinga City has experienced large expansion of informal settlement area, which caused deterioration of the urban environment. Lichinga City has developed urban areas along a limited number of main roads (in the form of ribbons).

Transformation from the ribbon development to planned area development is necessary in the forming of new urban areas. To trigger such transformation of the urban structure, it is necessary to establish new industrial areas and city centre for accommodating more employments in Lichinga City. In the case of Lichinga, wood processing factories and research centres are desirable for the characters of the city in relation to high-potential sectors of tree planting. Since the Forestry Faculty of the Lurio University is located in Lichinga City, further accumulation of research functions may be possible to create an industrial base of the city.

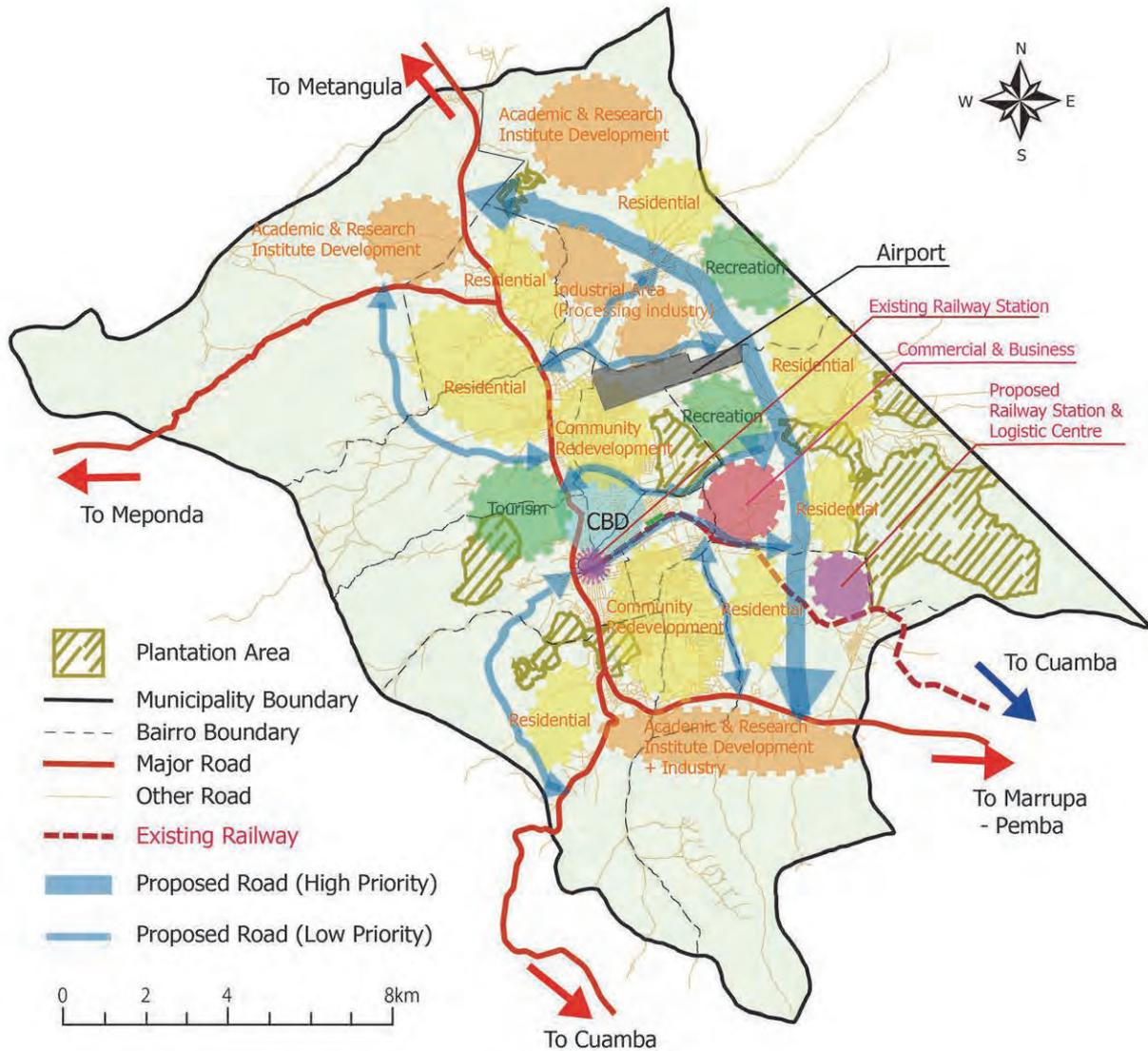
The role of Lichinga City in the Nacala Corridor Region is “Provincial Growth Pole and Service Centre with Academic-Scientific Centre and Wood Processing Base.”

(2) Conceptual Urban Structure

The urban structure for Lichinga City is proposed based on the implementation of the following interventions:

- Construction of a new major urban road in parallel with the existing north-south main road which will form new urban areas
 - This new road and the existing major roads will be connected by other new roads to form a sufficient and hierarchal road network.
 - This road network will connect the new residential and institutional areas with the existing urban centre.
- Relocation of the railway station to the outskirts of the city
 - The new railway station will become part of the new logistic centre.
- Development of a new commercial and business centre to be located between the existing CBD and the new logistic centre
- Development of industrial and academic areas in the suburban areas along the proposed major road

Figure 16.5.1 shows a concept plan for transforming the current linear urbanization into an urban space with a hierarchical road network. Establishment of working places in designated areas which are located apart from along the present major roads will be the key to start this plan.



Source: JICA Study Team

Figure 16.5.1 Conceptual Drawing to Transform Spatial Structure for Lichinga Municipality

(3) Future Population Forecast

The population of the Lichinga City in 2035 is expected to be 467,000 persons as shown in Table 16.5.1. The total population will be tripled from the population of 2007 (147,475).

Table 16.5.1 Population Forecast for Lichinga

	Population				Average Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-2017	2017-2025	2025-2035
Lichinga City	147,475	241,000	336,000	467,000	5.1%	4.2%	3.4%

Source: JICA Study Team

(4) Supporting Water Resources

Locumue Dam (or Mini Cabora Dam) is located on the Locumue River about 8 km from the city centre. The water supply capacity of this reservoir is 5,000m³/day, which is insufficient to meet the future water demand of 31,800m³/day in 2029 estimated by MCA or 64,000m³/day in 2035 estimated by the PEDEC-Nacala Study Team. No development of a groundwater aquifer can be

expected in or around Lichinga City. Development of Mbahu Dam, located on Lucheringo River, is recommended to ensure the future water source by ASNANI (Integrated Water Supply and Sanitation Project for Nampula and Niassa Province) Study (2008). However, it may satisfy only mid-term water demand of 33,000 m³/day projected by MCA. Consequently, development of new water sources will be required downstream, located 30 to 50km from Lichinga City.

16.5.2 Pemba City

(1) Directions of Development

Pemba has experienced a rapid population growth with an expansion of informal settlements. It is necessary to develop new residential areas with new road network. As one of the growing economic bases of the city, it is necessary to enhance the tourism industry and attract more visitors to the Pemba City. In addition, because it is expected that the natural gas extraction industry of Palma will start in 2018, Pemba should have the function as a support base for natural gas extraction.

Pemba City should play an important role as “Provincial Growth Pole and Service Centre with Support Base for Natural Gas Exploitation, as well as with Tourism Base” in the Nacala Corridor Region.

(2) Conceptual Urban Structure

The urban structure for Pemba City should be transformed by implementing the following interventions:

- Construction of a new major urban road in parallel with the existing major road between this existing major road and tourism areas on the eastern coast of Pemba Peninsula
- Construction of new urban roads connecting the tourism areas in the east coast of Pemba and the new major urban road as well as the new major urban road and the existing major road
- Development of new residential areas along the new road network
- Development of industrial areas along the existing major road

Figure 16.5.2 shows a concept plan for transforming the present urban structure to a well organized urban structure with a new road network.

Creation of middle and high-class accommodations is required for the natural gas industry. It is possible to promote such residential areas development along with the coastal resort areas. This has to be facilitated by the public sector investment in coastal roads connecting coastal tourism attractions/bases.

(3) Future Population Forecast

The population of the Pemba City in 2035 is expected to be 474,000 persons as presented in Table 16.5.2. The total population will be tripled from the population of 2007 (138,716).

Table 16.5.2 Population Forecast for Pemba

	Population				Average Annual Population Growth Rate (% per annum)		
	2007	2017	2025	2035	2007-2017	2017-2025	2025-2035
Pemba City	138,716	219,000	312,000	474,000	4.6%	4.6%	4.3%

Source: JICA Study Team

(4) Water Resources

The making of new wells is proposed to cope with the future water demand. The total of groundwater production volume of the existing and new wells is estimated to be 60,000m³/day. This will satisfy the future water demand of 40,500m³/day in 2029 projected by MCA. However, it is not able to meet the demand of 67,000m³/day in 2035 estimated by the PEDEC-Nacala Study. By development of Megaruma Dam (Monitoring point E152: Mean Annual Runoff (MAR) =247million m³/year, 80km from the city centre), it will be able to supply about 45,000m³/day to Pemba City. In total, Pemba City will have a water supply capacity of 105,000m³/day. This would satisfy the water demand in 2035.



Source: JICA Study Team

Figure 16.5.2 Conceptual Plan to Transform Spatial Structure for Pemba City

Chapter 17 Environmental Management Strategies

17.1 Introduction

Large-scale development projects to be implemented in the Nacala Corridor Region would inevitably cause environmental impacts to some extent. Though the PEDEC-Nacala development strategies and their priority projects are essential for promoting development and well-being of people in the Nacala Corridor Region, measures to mitigate negative environmental and social impacts need to be taken, and development strategies and projects have been formulated incorporating mitigation measures, such as bypass roads and bypass railways.

Moreover, it should be encouraged and enforced that project proponents (both government and private) should conduct environmental management by complying with the EIA law. For this purpose, capacity development of the national environmental protection agency is necessary.

These efforts would enhance positive effects of the proposed development strategies and priority projects, reduce negative effects, and contribute to sustainable development of the Nacala Corridor Region.

17.2 Future Prospects of Environmental Management

There are various types of support given for establishing environmental management systems and environmental administration in Mozambique by various development partners, including human resources development. However, the situations surrounding Mozambique has been rapidly changing and the present structure of environmental administration and management systems are not suitable for responding to the newly emerging situations.

In the Nacala Corridor Region, coal extraction in Tete and the transportation of coal from Tete to sea ports has enormously increased, resulting in not only resettlement but also many other environmental problems. Off-shore extraction of natural gas has also been expanded in Cabo Delgado Province at an unprecedented level, which increase the risk of deterioration of the sea water and coastal environments. The implementation of mega projects also require environmental monitoring to cover wide areas likely to be influenced by those mega projects.

Manufacturing operation is also expected to increase largely in Nacala and other major urban centres. Therefore, the number of Environmental Impact Assessment (EIA) applications and the needs for the monitoring of their production and operation and the implementation of their Environmental Management Plans would be greatly increased.

17.3 Issues on Environment Management

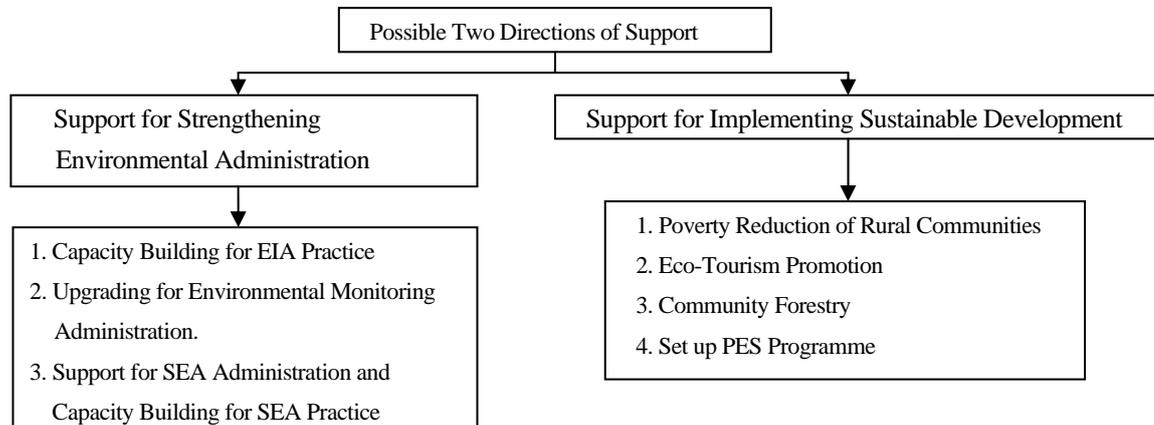
Although various laws and regulations have been established in Mozambique, actual implementation and the capacities of environmental management activities stipulated by those laws and regulation are inadequate. These capacities include not only of the number of staff members and capacity of that staff, but also equipment, buildings and motor vehicles and sufficient budgeting. Though the issues to be defined below are common to other provinces and at the national level, the situation is particularly serious in the Nacala Corridor Region.

Considering the existing conditions and future prospects in the Nacala Corridor Region, the following issues are defined for environmental management:

- Shortage of well-trained staff for administrating EIA in the MITADER (Ministry of Land, Environment and Rural Development from January 2015) and its provincial directorates, especially those for monitoring and guiding the implementation of environmental management plans
- Shortage of well-equipped facilities and well-trained technical staff for environmental monitoring and conducting laboratory tests in the MITADER (Ministry of Land, Environment and Rural Development from January 2015) and provincial governments
- High necessity of a comprehensive establishment of the Strategic Environmental Assessment (SEA) administration and preparation of appropriate environmental considerations at an earlier planning stage while establishing policies/programmes and/or project consensus among various stakeholders
- High necessity for implementing sustainable development programmes, especially for rural people

17.4 Objectives for Environmental Management

There are two basic directions of support for environmental management as shown in Figure 17.4.1. One is the support to the environmental administration for controlling and managing various development projects. The other is the support for the promotion of sustainable development.



Source: JICA Study Team

Figure 17.4.1 Two Basic Directions of Support to Environmental Management

The overall objective for the environmental management in relation to Nacala Corridor regional development is to effectively utilise the existing systems (including laws, regulations and procedures) for environmental management by strengthening the capacity of the administrative and technical organisations and their personnel. For identifying the objectives for environmental management for Nacala Corridor regional development, it is necessary to pay careful attention to environmental problems that may arise due to the characteristics of Nacala Corridor regional development, as well as the problems generally found in the government administration.

The following objectives are identified for environmental management for Nacala Corridor regional development:

- To effectively utilise EIA systems including monitoring of the implementation of environmental management plans submitted by projects
- To monitor the environmental situations and to take necessary actions in a timely manner
- To develop the capacity of the MITADER and provincial governments to examine environmental impacts
- To mainstream the concept of environmental management into the sector development plans at an earlier stage of development planning
- To pay careful attention to environmental aspects which are special to the Nacala Corridor Region

17.5 Environment Management Strategies

In order to achieve the above identified objectives, the following strategies for environmental management should be implemented:

- Capacity Development for EIA including Monitoring of the Implementation of Environmental Management Plans
- Strengthening of the Environmental Monitoring System
- Establishment of Environment Section in Agency for Nacala Corridor Development
- Establishment of Environmental Laboratories and Capacity Development of the MITADER and Provincial Staff for Laboratory Operation
- Establishment of an SEA System and Capacity Development for Administration for SEA
- Promotion of Implementation of Various Sustainable Development Programmes

In the following part of this section, the rationale behind each strategy is described.

17.5.1 Capacity Development of the EIA Departments of the Ministry of Land, Environment and Rural Development and Provincial Governments

Due to the recent increase in the number of applications for environmental approvals for many projects, created by national and foreign investments, the MICOA (currently MITADER) and provincial environmental departments have not been able to examine the environmental impact assessments in an appropriate manner due to a lack in their capacity. Moreover, it is difficult to conduct coordination in order to harmonise different projects under the long-term national and regional development strategies.

The EIA system is composed of 1) examination of EIA studies and processes and 2) monitoring and evaluation of the implementation of Environmental Management Plans (EMPs) prepared by the EIA studies. The MICOA (currently MITADER) and provincial environmental departments have been overwhelmed with the work required for the examination of the EIA studies and processes and have not been able to cope with the monitoring and evaluation of the implementation situation of EMPs. In Mozambique, since more development projects will be submitted at the stage of implementation, the MITADER and the provincial environmental departments should allocate their workforce to the monitoring of EMPs.

17.5.2 Establishment of an Environment Section in the Agency for Nacala Corridor Development

The Government of Mozambique will establish a new agency that is to take care of the promotion and coordination for the implementation of the PEDEC-Nacala, named Agency for Nacala Corridor Development (ADCN). It is recommended that an Environment Section should be established under ADCN in order to ensure environmental sustainability in the region. The Environment Section will mainly have three roles, namely:

- To support investors and developers regarding the obtaining of EIA permission
- To guide investors and developers from the viewpoint of environmental consideration
- To monitor and coordinate with other sections of ADCN and the MITADER for the promotion of environmental and social consideration

The Environment Section will need to work closely with the MITADER.

17.5.3 Development of an Environmental Monitoring System

For conduct properly environmental management, environmental monitoring is essential. The work of environmental monitoring requires the following three elements:

- Implementation system of environmental monitoring, including a range from data collection and analyses to feedback to project proponents
- Infrastructure of environmental laboratories
- Capacity of technical personnel for operating environmental laboratories

At present, the MITADER does not have an environmental monitoring system supported by laws and regulations, environmental laboratory facilities, as well as human capacity to operate the environmental monitoring system and laboratories.

As environmental monitoring is essential for environmental administration and environmental management, it is important to urgently develop an environmental monitoring system, as well as laws and operational rules. At the same time, it is necessary to develop technical facilities required for environmental monitoring.

The data on environmental monitoring will be used for the following:

- Understanding trends and patterns of environmental conditions
- Issuing of alarms and notices whenever monitoring parameters exceed the allowable standards or control values

The second part of monitoring data utilization is the most important for environmental management as it is necessary to develop environmental mechanisms in order to give feedback monitoring results to environmental policies and environmental measures. The MITADER has plans to establish three environmental laboratories as follows:

- Maputo: Reference laboratory, monitoring the southern part of Mozambique
- Nacala: Monitoring the northern part of Mozambique
- Tete: Monitoring the central part of Mozambique

However, it is difficult to establish three laboratories simultaneously due to financial and human resource constraints. Therefore, a phased development starting with Maputo laboratory is recommended.

As to the expected monitoring targets and parameters, the environmental laboratories will focus as follows:

Table 17.5.1 Monitoring Targets and Parameters

Target	Parameters
Air Quality	Basic parameters: Temperature humidity, wind direction/speed, SO ₂ , CO, SPM, NO ₂
Water Quality	Basic parameters: Water temperature, turbidity, transparency, pH, BOD, COD, SS, Coliform bacteria, NO ₂ -N, NO ₃ -N, NH ₄ -N, PO ₄ -P Harmful parameters: Heavy metals, organic compounds etc.
Soil	Heavy metals, organic compounds

Source: JICA Study Team

17.5.4 Establishment of a Strategic Environmental Assessment (SEA) System and Capacity Development for SEA Administration

Strategic Environmental Assessment (SEA) is a system of incorporating environmental considerations into policies, plans, programmes and strategies at the early planning stage. Recently, decision-making regarding large-scale development projects is increasingly being provided through strategic-level interventions aimed to make projects more effective and sustainable. SEA meets the need to ensure environmental considerations are taken into account in this new context.

The environmental legal framework of Mozambique is still in a rapid development stage, and the central and local environmental administrations are facing new challenges to meet the torrential inflow of investments.

Currently, the Ministry of Land, Environment and Rural Development (MITADER) is preparing the draft of an SEA Law, and will take more time in order to seek out a suitable SEA framework for Mozambique. SEA is a useful tool to manage and coordinate many potential development policies, strategies and projects at a very early stage of the project cycle.

In that sense, it is important to support the establishment of the SEA system including SEA law and actual SEA procedures. It is also important to support effective implementation of SEA studies and processes for long-term development efforts for the mining sectors of coal and natural gas.

Within the SEA framework, all development projects are to be examined and evaluated, and then, some of them would be required to modify partially and/or to be aborted based on those evaluation results. The establishment of a new agency and/or department responsible for SEA administration, directly belonging to the Office of President, would be one option in order to properly and effectively implement the rulings that will be derived from the SEA study results. Otherwise, from the hierarchical point of view, the MITADER would continue to be the same as the other line ministries. In other word, it may take inter-ministerial coordination efforts and would by necessity require extensive discussions to reach an agreement.

17.5.5 Support for the Promotion of Sustainable Development

(1) Poverty and the Environment

Although Mozambique was devastated during the past long civil war, it still boasts colourful terrestrial and marine biodiversity across the country, and most rural communities' lives therein highly depend on the rich natural resources such as timber and non-timber products. Forest coverage is about 50 %, and poverty reduction in the rural parts of Mozambique is one of the urgent tasks to be achieved.

In this sense, Poverty-Environmental Initiative (PEI) activities are suitable for Mozambique's situation. In fact, recently, several poverty reduction pilot programmes such as PEI were initiated, and proved that comprehensive measures focusing on the interaction between poverty and the environment across rural parts of Mozambique such as PEI are useful tools to improve sustainable development. It is necessary to promote the PEI projects in the Nacala Corridor Region.

(2) Promotion of More REDD+ and/or PES-based Projects

Reducing Emissions from Deforestation and Forest Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, thus offering incentives for developing countries to reduce emissions from forested lands and invest in low-carbon paths to sustainable development. “REDD+” goes beyond the deforestation and the forest degradation, and includes the role of conservation, sustainable management of forests and the enhancement of forest carbon stocks.

As mentioned earlier, about 80% of Mozambique’s population live in rural areas and depend on wood for their daily lives. Nation-wide forest cover is almost 50 %, but is being reduced gradually. This indicates that the REDD+ and/or PES-based community support programmes would play vital roles to improve their incomes under certain conditions. In general, REDD+ and/or PES-based community support projects contain concepts similar to PEI.

Payments for ecosystem services (PES), also known as payments for environmental services, is the practice of offering incentives to farmers and/or landowners in exchange for managing their land to provide some sort of ecological service including the carbon sequestration. There are many small-scale farmers across the northern part of Mozambique and most of them use traditional agricultural methods. Therefore, some kinds of PES programmes would have the potential to lead to poverty reduction as well as regional ecosystem conservation, although the successful implementation of those programmes needs concerted efforts using multi-sector approaches.

A variety of PES mechanisms exist, but significant challenges remain to upscale PES so that substantial resources can be raised for protected areas. New approaches to mapping “natural capital” and valuing ecosystem services have been applied in Mozambique. However, in the absence of accurate and comprehensive data, it is likely that conservation areas’ contribution to Mozambique’s natural capital is being undervalued. Although economic valuation tools can show potential values of ecosystem services provided by different land uses, the analysis of the legal framework and the market for a particular ecosystem service is needed to determine whether it is feasible for protected area financing. Also, it is important that the design, implementation and priorities of those programmes shall be right. Otherwise, it could cause severe negative natural and social impacts.

17.6 Programmes and Projects for Environmental Management

For the purpose of implementing the above strategies on environmental management, the implementation of the following projects is required:

- (1) Projects for Capacity Development for EIA including Monitoring of Implementation of Environmental Management Plans**
 - Capacity Development for EIA (including an increase in the number of staff and the capacity of the staff)
 - Capacity Development for Monitoring of the Implementation of Environmental Management Plans (including improvement of laws, regulations and procedures for environmental inspection, increase in the number of inspection officers, and improvement of staff capacity)

- (2) Projects for the Strengthening of the Environmental Monitoring System**
 - Establishment of Environment Section in Agency for Nacala Corridor Development
 - Development of an Inspection System covering Factories and Large-scale Development Projects
 - Development of fixed observation or sampling points for environmental monitoring

- (3) Projects for the Establishment of Environmental Laboratories and Capacity Development of Ministry of Land, Environment and Rural Development and Provincial Staff for Laboratory Operation**
 - Establishment of Environmental Laboratories in Maputo, Nacala and Tete
 - Capacity Development of Technical Staff

- (4) Projects for the Establishment of a SEA System and Capacity Development for the Administration for SEA**
 - Establishment of Operational Procedures for SEA
 - Capacity Development for SEA (increase in the number of staff, improvement of staff capacity and implementation of activities for promoting SEAs)

- (5) Projects for Sustainable Development**
 - Rural Development Projects for a Sustainable Environment
 - Community Forestry Projects
 - PES Programme
 - Eco-Tourism Projects

Chapter 18 Social Capacity Development Strategies

18.1 Introduction

Although the core part of the PEDEC-Nacala development strategies is primarily intended to promote “dynamic development” in the Nacala Corridor Region emphasizing development of economic sectors, infrastructures, urban centres and manufacturing industries, other strategies to pursue “inclusive development” are also very important for responding to a wide range of concerns regarding education, health, human resources development, institutional and organizational development, environmental and land management, social development and social problems.

It is important to expand social services, such as basic education and health, widely in the region, in order to cope with expected population growth and to reduce disparity between corridor areas and less accessible areas. People should be educated for a better life and trained to prepare for economic sectors’ growing demand for trained industrial human resources. Meanwhile, vulnerable groups of people and communities in less accessible areas should not be left behind from development of the Nacala Corridor Region. PEDEC-Nacala recognises the importance of measures to pay attention to these issues. Furthermore, PEDEC-Nacala has specific concerns about institutional coordination for promoting balanced and sustainable development.

18.2 Development Strategies for Education Sector

18.2.1 Issues on Education Sector

Education issues in the Nacala Corridor Region are classified into five categories; 1) access to primary/ secondary education, 2) quality of primary/ secondary education, 3) limitation of the government's budget and the necessity of community participation, 4) disadvantages in less accessible areas¹, and 5) gender inequality.

(1) Access to Primary/ Secondary Education

The number of primary schools in the Nacala Corridor Region steadily increased from 2004 to 2006 in response to need. However, around 50 students are in each class on average and the number of schools is not yet sufficient. In addition, necessary furniture, such as desks and chairs, is also in short supply. Moreover, in the Nacala Corridor Region, a large portion of schools are not located in or near the communities; therefore, students have to walk a long distance. This is one of the reasons they drop out of school. Furthermore, low motivation of parents, teachers and communities for education discourages children from going to school.

In addition, the shortage of secondary schools is a more serious problem. Construction of schools and allocation of teachers have not caught up with the increasing demand for secondary education.

(2) Quality of Primary/ Secondary Education

The result of the 2007 SACMEQ² study shows that students' academic performance is lower than that of the regional average. Moreover, most students in 6th grade have not acquired the necessary basic skills. This fact indicates that the quality of education is inadequate. There are three reasons for low quality of education, namely, lack of teachers, lack of motivation for teachers due to the school location far from cities or district centres and an ineffective monitoring system, and the deteriorating educational environment with crowded classes and damaged infrastructure.

(3) Limitation of the Government Budget and Necessity of Community Participation

The government of Mozambique has substantially expanded its budgets and effort at educational development quantitatively by construction of school buildings, hiring of teachers and training of teachers. More efforts have been devoted to the improvement of quantity in the education sector than to improvement of the quality of education. However, the government efforts have not solved all the problems in the education sector. In response to this situation, community participation is expected to complement government's efforts including budget. It is necessary to further encourage community participation and contribution for school management.

(4) Disadvantages in Less Accessible Areas

Investors tend to start businesses near provincial capital cities where better infrastructures are available. Economic development would create or widen the gap of educational opportunities between the rich and poor, urban areas and rural areas, and furthermore the gap between areas near corridors and those in less accessible areas.

¹ Less accessible areas are defined by PEDEC-Nacala as those areas which are 30 km away or farther from the main corridors, sub-corridors and feeder links of the proposed long-term spatial structure of the Nacala Corridor Region.

² The Southern and Eastern Africa Consortium for Monitoring Educational Quality. It conducts studies on conditions of schooling and quality of education in the member countries.

In general when investors have come and started their businesses, they have relocated villagers to other places in order to acquire sites for their business. In return, investors would construct public facilities, such as schools and hospitals, for Corporate Social Responsibility (CSR). Although these kinds of businesses create job opportunities and transfer technology/knowledge to local community members, people who live in rural areas cannot benefit much from this type of economic development in most cases.

(5) Gender Inequality

There is still gender inequality in the education sector as seen in enrolment rate and completion rate, despite the improvement of overall educational indicators. This is because the value of education for girls is not well recognized, for they are often expected by their family members to stay home to assist in house work as well as farming.

18.2.2 Goals for Education Sector

On the basis of the current situation and issues, the goal of the education sector is as follows:

“To enhance the education for the people to achieve an enlightened life and better economic situation, as well as to expand the basis of human resources, which will lead to an increase in the number of educated people and trained specialists who could contribute to industrial development.”

18.2.3 Objectives for Education Sector

Objectives for the education sector can be classified into five categories as follows.

(1) Quality Improvement of Primary Education

- To functionalise educational activities at the school level in the Nacala Corridor Region, especially in the less accessible areas
- To improve the current quality of education activities in other areas around the transportation corridor
- To improve the education environment through providing necessary education related infrastructure in the Nacala Corridor Region, such as class rooms, facilities and equipment

(2) Improvement of School Access for Primary Education

- To expand the access to educational opportunities in the Nacala Corridor Region with special focus on the less accessible areas in order to reduce the regional disparity

(3) Enhancement of Access to Secondary School

- To increase the number of students going on to secondary schools so that they become ready to get non-agricultural jobs, as well as for further school education

(4) Enhancement of the Quality of Secondary School

- To strengthen the education system of secondary education through prioritizing given subjects as well as improving the teacher training system, to contribute to the human resource development for the domestic economy

(5) Alleviation of Gender Inequality in Access to Education

- To expand the girls’ access to primary and secondary education both in terms of enrolment rate and completion rate, and to widen girls’ opportunities in their social and economic life

18.2.4 Strategies for Education Sector

Strategies are proposed to achieve the above objectives in this section. The proposed strategies have two major policies; firstly, special consideration for the less accessible areas; and secondly, role allocation between the government and the communities where the government plays a role in implementation of larger projects, such as new construction and rehabilitation of school buildings, while the communities deal with small-scale building construction or rehabilitation, purchase of necessary small equipment etc. However, the role of the communities is important, especially in less accessible areas where the government intervention is limited, in terms of resource provision and monitoring schools.

(1) Quality Improvement of Primary Education

- To improve the monitoring system and capacity for school performance by the public sector at the local level. This can be partially achieved by community-based school management projects through building regional coordination committees to monitor school activities
- To raise the awareness of parents and teachers for the importance of education as well as motivate teachers by conducting school management through community participation (dormitory construction for teachers, school monitoring by parents and the community)
- To reform and rebuild the old and/or insufficient classes through a scheme of public sector and community collaboration
- To improve the school environment through community-based school management by upgrading and improving school facilities such as water points and toilets, and by providing desks, chairs, textbooks and materials

(2) Improvement of School Access for Primary Education

- To construct schools and classes in the area, through a collaboration scheme between the public sector and the community where there is a shortage of primary schools, especially the less accessible areas
- To implement community-based school management to increase schools and classes, and to raise the awareness of parents and teachers regarding the importance of education
- To introduce school mapping in order to assess school allocation and to prepare plans to effectively construct more schools

(3) Enhancement of Access to Secondary School

- To increase the number of secondary schools using government budget
- To introduce school mapping in order to assess school allocation and to prepare plans for effective school construction

(4) Enhancement of the Quality of Secondary School

- To strengthen the secondary education by focusing on science and mathematics education, through strengthening of teacher training systems and teaching manuals

(5) Alleviation of Gender Inequality in Access to Education

- To implement community-based school management to raise awareness in parents and teachers regarding the importance of girls education

18.2.5 Programmes and Projects for Education Sector

The following ideas on programmes and projects, as well as measures are proposed for the education sector, which correspond to the strategies mentioned above.

(1) Measures to be taken by Government

- Strengthening of government's system and capacity to monitor school activities (partially achieved by community-based school management projects through building regional coordination committees to monitor school activities)
- Secondary school construction and rehabilitation projects using the government's budget
- Strengthening of Secondary Education with Focus on Science and Mathematics Education Programme
- Programme for education planning by utilizing school mapping (both for primary schools and secondary schools)

(2) Measures with Collaboration between the Government and the Communities

- The project for construction and rehabilitation of schools and classes through collaboration between the public sector and the communities

(3) Measures to be taken by Promoting Community Participation

- Community-based school management projects in order to mobilize community resources for improving communities' primary schools, to transform parents' minds toward children's education and to encourage primary school teachers in their educational activities

18.3 Development Strategies for Health Sector

18.3.1 Future Prospect for Health Sector

In order to meet the demand of current and future population growth, the health sector needs to be reinforced in the following two aspects: 1) the number and service level of health facilities; and 2) the number of doctors. In Chapter 8, the numbers of health facilities by district are shown.

In order to cope with the expected population growth by 2035, it is important to apply the following general policies (general principles) to increase the allocation and the capacity of health facilities, based on analysis at the district, municipality, or lower level. This should be practiced by the hospital mapping project which is described in 18.3.6.

- Health service facilities should be developed in response to rapid population increase by the following measures:
 - In provincial capital cities, by establishing General Hospitals in addition to a Provincial Hospital
 - In major cities with population of 150,000-900,000, by establishing a General Hospital
 - In urban areas of provincial capital cities, major cities and district capitals, by increasing the number of Urban Health Centres A to C (especially Urban Health Centre A) in order to strengthen the primary health care (PHC) system
- Accessibility to health services in rural areas should be improved by the following measures:
 - By establishing a District Hospital for each district
 - By establishing Rural Hospitals in order to cover a few to several districts, whose total populations are 150,000-900,000
 - By increasing the number of Rural Health Centres I and II (especially Rural Health Centres I, which could take care of delivery of children)
- The Primary Health Care (PHC) System in less accessible areas should be strengthened by the following measure:
 - By considering access of people to the health facilities and by strategically establishing Rural Health Centres I and II

18.3.2 Issues on Health Sector

The issues for the health sector are identified as follows:

(1) Human Resources for Health Sector

The lack of human resource capacity has been recognized as a major constraint to overall health service delivery. This is due to low pre-service training and recruitment and personnel cuts, as well as due to changing health needs. Health workers, especially in rural areas, cannot maintain their motivation due to inadequate salary, limited care prospects, heavy workload and the difficult working environment. Mozambique does not have enough medical faculties to train medical doctors, and therefore, only 20 graduates become medical doctors annually. Mozambique depends heavily on medical services provided by doctors from foreign countries, such as Cuba, North Korea and Nigeria.

(2) Capacity of Hospitals

The population per primary health unit is 15,800, still far above the (WHO recommended) international standard of 10,000. Many health facilities are in need of renovation and maintenance. In rural areas, people have to walk very long distances to hospitals. This is the case for not only general patients, but also for pregnant women.

Because of the unavailability of hospitals in rural areas, people tend to primarily depend on traditional doctors and medicine to treat diseases and other health related problems. Most of the hospitals, especially in the provinces, do not have adequate, well-maintained facilities such as running water, electricity, transport or communication means. Hospitals cannot treat everyone due to the excessive number of patients and lack of health workers. The shortage of beds is also a critical problem.

(3) Urban Growth

In the meantime, in urban areas, the number of health facilities does not keep pace with the population increase and urban expansion.

(4) Communication Deficiency

Communication between rural hospitals, the provincial departments of health, and central hospitals is also a critical issue. Rural hospitals do not have the means for communication with urban areas. Communication by mobile phone is often disrupted due to weak or absent radio waves.

(5) Limited Knowledge regarding Health

Some people in rural areas have limited knowledge regarding diseases and sanitation.

(6) Negative Aspect of Economic Development

Some of the areas, such as Tete and Nampula, have the problem of a rising HIV infection rate. These areas are transit points to other cities. Roads in these areas were constructed recently. These good roads and developed towns have led to an increase in traffic volume. People from other cities, such as long distance drivers, bring HIV to local communities.

(7) Lack of Accurate Information of Health Conditions and Needs in Rural Areas

Directorates of Health of provincial governments are not able to monitor the conditions in their provinces since they do not have the means of transportation to visit rural areas. Thus, it is difficult for MISAU to collect accurate information on the health conditions in the provinces, creating difficulty in preparing development plans reflecting the situations in rural areas.

(8) Vulnerability of Women

Women are more vulnerable to health risks when it comes to maternal health. Many pregnant women are not attended by skilled personnel, and the maternal mortality rate is still high.

18.3.3 Goals for Health Sector

The goal of the health sector is defined as follows:

“To raise the health level of the people in the Nacala Corridor Region by enhancing the capacity of primary health care, especially in less accessible areas, as well as by meeting the growing demand in urban areas.”

18.3.4 Objectives for Health Sector

The objectives of the health sector are defined as follows:

- To enhance the implementation capacity for primary health care (PHC) in the Nacala Corridor Region with a focus on prevention rather than treatment
- To improve the service level of, as well as access to, PHC in the less accessible areas where there is a shortage of health facilities and personnel
- To formulate effective development plans in order to eliminate the regional disparity of health services in less accessible areas
- To formulate effective development plans in order to construct health facilities in the urban areas in response to the expected population growth due to the Nacala Corridor development
- To improve access to institutional birth for women, as well as prevention against HIV/AIDS, in order to protect women and their children from health risks

18.3.5 Strategies for Health Sector

The strategies to achieve the above objectives are listed as follows.

- (1) **To enhance the implementation capacity for primary health care (PHC) in the Nacala Corridor Region with a focus on prevention rather than treatment**
 - To promote health education, especially in rural areas, through collaboration with school education
 - To provide health training to community health workers (health volunteers)
 - To establish committees in the communities for gathering mortality data on cause of death
- (2) **To improve the service level of, as well as access to, PHC in less accessible areas where there is a shortage of health facilities and personnel**
 - To allocate health posts and health workers at the administrative post level to places where there are currently no health posts/ facilities allocated
 - To train health workers in the Nacala Corridor Region where there is a shortage of health workers
 - To train and allocate community health workers (volunteers) where there is a shortage of health workers. At the same time, a revolving drug fund system will be introduced for health volunteers to obtain medicines
- (3) **To formulate effective development plans in order to eliminate the regional disparity of health services in the less accessible areas**
 - To formulate effective development plans for hospitals and health facilities by utilizing hospital and health facilities mapping

- (4) **To formulate effective development plans in order to construct health facilities in the urban areas in response to the expected population growth due to the Nacala Corridor development**
 - To formulate effective development plans for hospitals and health facilities by utilizing hospital and health facilities mapping
- (5) **To improve access to institutional birth for women as well as prevention against HIV/AIDS, in order to protect women and their children from health risks**
 - To expand PHC through above mentioned strategies of (1) and (2), so that a majority of pregnant women can be covered for giving birth
 - To conduct health education on HIV/AIDS for both men and women

18.3.6 Programmes and Projects for Health Sector

The following projects and measures are proposed for the health sector. The proposed projects are summarized by each of objectives.

- (1) **To enhance the implementation capacity for primary health care (PHC) in the Nacala Corridor Region with a focus on prevention rather than treatment**
 - The project for strengthening of health workers (volunteers) and health committees in the level of community
 - The project for promotion of health education in collaboration with schools and communities
- (2) **To improve the service level of, as well as access to, PHC in the less accessible areas where there is a shortage of health facilities**
 - Expansion and improvement of health posts and health workers at the administrative post level
 - The project for capacity development of health workers in the health posts
 - The project for capacity development of community health workers (volunteers)
- (3) **To formulate effective development plans in order to eliminate the regional disparity of health services in less accessible areas**
 - The project for the health infrastructure development planning by utilizing hospital and health facility mapping
- (4) **To formulate effective development plans in order to construct health facilities in the urban areas in response to the expected population growth due to the Nacala Corridor development**
 - The project for the health infrastructure development planning by utilizing hospital and health facility mapping

18.4 Human Resources Development Strategies for Economic Sectors

18.4.1 Future Prospects of Human Resource Development for Economic Sectors

Supply of human resources to large-scale economic activities, including mining projects in Tete and natural gas projects in Palma, and industries in Nacala to be located in/around the SEZ, the Port and the Airport, is one of the important national agendas. The government will continue to put the highest priority on it. The effort at human resources development for the economic sectors is required not only at the local level but also at the national level.

Since large-scale projects require skilled staff, strengthening of specific sectors' higher education and intermediate level TVET should be focused on. Development of higher technical level human resources is targeted. In the short term, as the government has already been doing, TVET should develop partnerships with private companies to quickly develop the human resources required. At the same time, in view of the medium term vision, school development, curriculum development and training of trainers should be conducted. Especially superior and intermediate level education should be strengthened in each province according to the strategy of economic development of the province.

Large-scale projects and foreign invested industries should be utilized as opportunities for Mozambicans to gain new and good experience. It is recommended that such industries should not be operated in an isolated manner, but rather by forging linkage with domestic companies to improve their capacity and skills.

Large-scale projects will not employ the majority of the labour force in the Nacala Corridor Region. It is expected that domestic small and medium enterprises (SMEs) will be developed and provide the local labour force with more employment opportunities in the formal sector. This will encourage the development of human resources in the study area. Foreign invested projects and companies will increase the need for services such as retailing, food and beverage, automobile maintenance, electricity, mechanics, hotels and restaurants. Training of entrepreneurship and business related subjects as well as industrial subjects targeting enterprises such as local service industry development, should be strengthened.

Upgrading the technical level of farmers and agriculture related human resources are important. Not only production techniques but also commercialisation and agro-processing skills and knowledge are to be improved. It is expected that food demand will increase due to the emerging and growing foreign-invested industries. More and more efforts should be made to provide local products including vegetables and livestock products instead of importing foods from foreign countries. There is no good basic level agricultural school or intermediate level agricultural school in Tete Province. Conditions to provide formal TVE opportunities in the agricultural sector should be developed to at least the minimum level in each Province: at least one intermediate level school in each province. At the same time, more training should be provided to farmers and farmers' associations by promoting partnerships with NGOs and donors, as well as by strengthening the capacity of SDAE (District Service of Economic Activities) and extension workers.

18.4.2 Issues on Human Resources Development for Economic Sectors

The issues on human resources development considering economic sectors are defined as follows:

(1) High and Increasing Demand for Human Resources in Economic Sectors

Because of the emerging and growing large-scale mining projects of recent years, the need for human resources development are significantly and rapidly increasing. Although the government initiated a comprehensive TVET reform programme for the period of 2006–2020, and started implementation of the pilot phase (PIREP), the increase in demand for human resources was far higher than expected.

(2) Large Gap in Demand and Supply Especially in Terms of Quality of Human Resources

There is a large gap between the quality of human resources demanded by investors and those locally supplied. The gap is filled by technicians and personnel from areas outside the Nacala Corridor Region including other parts of Mozambique, India, South Africa and Brazil.

(3) Insufficient Supply of Skilled Workers through TVET Systems

General education and the TVET systems have not created a sufficient number of skilled and qualified workers in the past, not only for the large-scale projects, but also for general industries and services in the central and northern provinces of Mozambique.

(4) Less Involvement of Local People in Training Provided by Large-Scale Projects

Large-scale foreign companies provide training for Mozambican employees by mobilising their own resources, and by applying their own curriculum. These companies require highly skilled staff; therefore, they select better-educated Mozambicans from across the country, and pay them salaries during the training. It seems that very few locals are involved in these projects.

(5) Lack of Development of Human Resources due to Poor Development of Domestic Companies

One of the reasons that the local human resources are not developed well is the poor development of domestic enterprises. A total of 78% of the workforce is involved in the informal sector in Mozambique. These conditions could hinder the development of skills of the local labour force.

(6) Insufficient Skills in Agriculture and Marketing of Agricultural Products

Farmers' knowledge and skills in agriculture and marketing are also very poor in general in the Study Area. They mostly do not have opportunities to develop their skills to improve the quality of the products and productivity in view of market requirements.

(7) Training Needed for Local Industries and Farmers

The government recognizes the importance of providing training to the local labour force to support local industries as well as investment projects. Training for farmers at the district level is also recognized as an important task.

(8) Shortage in Funding

Under the PIREP framework, the two key organisations in the TVET system, DINET and INEFP, have been working on TVET reform through building partnerships with the private sector³.

³ The description here is based on the governmental structure before the reorganisation of the central ministries in January 2015.

However, the requirements for human resources development in the current conditions are huge. The available funding is not sufficient to fulfil the requirements.

18.4.3 Objectives for Human Resources Development for Economic Sectors

Considering the existing conditions and future prospects of human resources for the economic sectors, the following objectives are identified:

- To strengthen the mechanism to improve TVET to meet the increasing demands for qualified or skilled labour by large-scale projects as well as domestic industries
- To expand the coverage of intermediate and superior-level technical education
- To develop domestic industries which will be the major base of people's employment

18.4.4 Strategies for Human Resources Development for Economic Sectors

In consideration of the issues and objectives mentioned above, the following strategies are formulated for human resources development for the economic sectors:

- To develop or upgrade intermediate TVE schools and superior level technical education in consideration of the existing and future large-scale projects and industries in Tete, northern Cabo Delgado and Nacala, as well as future SEZ and industrial parks
- To collaborate with large-scale projects/industries for improving the contents of TVE in curriculum development, training of trainers and internship
- To generate employment opportunities by creating linkage between TVE schools/superior polytechnics and large-scale projects/industries (Tete, northern Cabo Delgado and Nacala)
- To generate employment opportunities by creating linkage between local SMEs and large-scale projects/industries (Tete, northern Cabo Delgado and Nacala)
- To strengthen training on entrepreneurship and other business related training to be provided by INEFP and the Entrepreneur Orientation Centre (COre) of IPEME
- To strengthen TVE in the agricultural sector on agricultural techniques, agricultural marketing and agro-processing
- To improve the quality of general education at primary and secondary levels

18.4.5 Programmes and Projects for Human Resource Development for Economic Sectors

The following projects and measures are proposed for human resources development for economic sectors:

- Escola Industrial Medio de Geologia de Matundo Upgrading Project (Tete Province)
- Instituto Medio de Geologia e Minas Upgrading Project (Tete Province)
- Nacala Intermediate TVE School Project (Nampula Province)
- Palma Intermediate TVE School Project (Cabo Delgado Province)
- INFEP Vocational Training Centre Project (Cabo Delgado Province)
- Cabo Delgado Polytechnics Project
- Niassa Polytechnics Project
- Nampula Polytechnics Project
- Tete Polytechnics Upgrading Project
- Zambezia Polytechnics Upgrading Project

- Environmental Monitoring Capacity Development Project
- MPD-GAZEDA Programme Management Capacity Development Project

The following projects are proposed for capacity development

- Agricultural Academy (Agricultural Development Centre) Project
- Project for Improvement of Irrigation Technology and Construction Quality
- Project for Formulation and Development of Modern Agricultural Cooperatives
- Project for Establishment of a Support Organisation for Agricultural Investment and Value Chain Development
- Project for Capacity Development of Business Development Services

18.5 Institutional and Organisational Development Strategies

18.5.1 Issues on Institutional and Organisational Development

Nacala Corridor Region's development will become a large scale and multi-sector initiative involving all kinds of stakeholders such as the private sector, central government ministries and organisations, provincial and district governments, communities and neighbouring countries such as Malawi and Zambia. Therefore, effective and efficient coordination is essential to promote integrated development across the wide areas. The issues on institutional and organisational mechanisms are defined as follows:

- The existing coordination mechanisms are limited to the following types:
 - Coordination mechanisms are among central organisations only
 - Coordination mechanisms are within and among provinces only
 - Coordination mechanisms are country-to-country initiatives, such as the Zambia-Malawi-Mozambique Growth Triangle (ZMM-GT)
- There are some opportunities where the private sector is involved, but they are not permanent arrangements.
- There is no mechanism in place at present to monitor and coordinate activities by all these stakeholders.
- There is no mechanism to promote community participation in the Nacala Corridor regional development. Such a mechanism becomes more important especially when it comes to the implementation stage.
- No substantial impact of the gender mainstreaming policy in the Nacala Corridor Region has been yet felt in individual sectors.
- Concerning the state budget, the proportion of internal resources in investment at the central level budget is limited, with large dependence on external investment.
- At the provincial and district levels, the total amount as well as the proportion of investment in their budget is limited, leaving little allocation for the new investment.
- There is a need for a mechanism in which tax and royalty revenues from economic activities are given back largely enough for social and environmental needs of the region.

18.5.2 Objectives for Institutional and Organisational Development

The objective for institutional and organisational development is defined as:

- To create and operationalise an effective institutional and organisational mechanism that would promote and coordinate the integrated development for the Nacala Corridor Region

18.5.3 Strategies for Institutional and Organisational Development

The strategies for institutional and organisational development are as follows:

- For the Government of Mozambique, to position the integrated effort aiming at Nacala Corridor Region's development as a National Programme (PEDEC-Nacala as a National Programme)
- For the National Development Strategies (ENDE), to take into account the strategies and projects that are proposed by PEDEC-Nacala as an operational tool for promoting and coordinating the integrated development in the Nacala Corridor Region

- To establish and activate an institutional mechanism for promoting and coordinating integrated development in the Nacala Corridor Region
- To establish and strengthen a special organisation to support and manage the institutional mechanism for promoting and coordinating the integrated development in the Nacala Corridor Region
- To promote community participation at the implementation stage in the Nacala Corridor Region by giving roles of sharing information with civil societies and promoting community participation at the implementation stage to the special organisation for Nacala Corridor Regional Development
- To monitor activities and impact of the national policy for gender mainstreaming by the new special organisation for Nacala Corridor Regional Development, and to give feedback on the implementation of individual sector strategies
- To allocate more budgets for implementing measures to cope with social and environmental problems, as well as increasing demands for social services in a balanced manner, by appropriately collecting royalties and taxes from different economic activities operated in the Nacala Corridor Region
- To strengthen the ZMM-GT initiative to make it function as the effective coordinating body at the decision-making level and technical level

The Nacala Corridor development would have a significant impact on Mozambique once it is successfully implemented. In this sense, it could be regarded as a national project. Positioning a project like the Nacala Corridor development as a national project, however, should be undertaken carefully based on a set of standards so that similar decisions in the future could be made in a transparent and logical manner. The proposals by PEDEC-Nacala could provide a realistic guideline for the government to transfer the national goals and strategies developed in the National Development Strategies into programmes and projects in a regional context. In this sense, similar endeavours like PEDEC-Nacala can be replicated in other regions.

Experiences of other countries could provide valuable lessons to the Mozambican government in establishing an effective coordination mechanism. The experiences of the Eastern Seaboard Development in Thailand and the Rural Development Agency in Malaysia are good examples. The Mozambican government also needs to carefully consider the unique conditions in which the country is currently placed. The best arrangement for the Nacala Corridor development should be found based on an analysis of various factors such as decision making patterns, institutional arrangement of a new mechanism, extent and area of responsibilities, employment pattern of experts and organisational status.

Not only the overall coordination mechanism, but also better performance of individual key organisations should be ensured through capacity development. In this regard, strengthening of the organisational capacity of the Ministry of Planning and Development (currently known as the Ministry of Economy and Finance), GAZEDA and provincial governments are important.

In the implementation of PEDEC-Nacala Strategies, it is important to share development information with civil societies and to encourage community participation in the development process. It is necessary for the new special organisation for implementing the Nacala Corridor regional development to fulfil these roles.

Without a proper infrastructure development and development framework which promotes the

development of an extended transport corridors network, hierarchical urban centres, and electricity and water supply, it would be difficult to achieve the further development of communities. Under the macro development framework to be established by PEDEC-Nacala, community-level development would become effective and efficient to push up the standards of living and the level of economic activities.

18.5.4 Programmes and Projects for Institutional and Organisational Development

The following programmes, projects and measures are proposed:

- Establishment of Agency for Nacala Corridor Development (tentative name, ADCN)
- Nacala Corridor Regional Development Management Reinforcement Project (Capacity Development for ADCN)
- MPD-GAZEDA Organisational Reinforcement Project
- Provincial Governments Capacity Development Programme

Establishment of an organisation called “Agência de Desenvolvimento do Corredor de Nacala” (tentative name), Agency for Nacala Corridor Development (ADCN) in English, is proposed as a specific measure to realise the “Regional Cooperation Acceleration Initiative”. The function of ADCN will be to provide technical information on the progress, status and actions required to be taken to realise the Nacala Corridor Region’s development, not only to the existing decision making mechanism at the political level, but also to concerned stakeholders such as civil society organisations, business entities, academic groups, and communities. In addition, ADCN will closely monitor the progress of all kinds of development activities in the Nacala Corridor Region in cooperation with relevant ministries, provincial and district governments, and the above mentioned stakeholders as well as communities; coordinate plans at the technical level; and propose plans for new actions to the existing decision making bodies. In addition, gender mainstreaming in the process of project implementation should be monitored by ADCN, in the framework of national gender mainstreaming represented by CNAM (National Council for the Advancement of Women). Furthermore, it is important for ADCN to have roles and capacity for environmental management including environmental and social consideration for proposed programmes and projects, supporting IEE and EIA studies for proposed programmes and projects, reviewing and checking of IEE and EIA study reports and monitoring of implementation of programmes and projects.

It will be established under the Ministry of Planning and Development (currently known as the Ministry of Economy and Finance). The management and technical staff of the ADCN will be gathered by transferring personnel from relevant ministries and organisations and their representatives to the ADCN. Necessary capacities for ADCN are as below:

- Coordination skill and capability between:
 - Sectors
 - National level and provincial level
 - Countries
 - Development partners
 - Private Sectors
 - Civil Societies
 - Academic groups
 - Communities

- Monitoring and evaluation on:
 - Spatial Analysis by using GIS database
 - Maintenance of PEDEC-Nacala GIS database
 - Environmental and social consideration for proposed programmes and projects
- Adjustment of Strategies
 - Adjusting and revising of PEDEC Strategies
- Communication and sharing information with stakeholders
 - Communication with civil societies
 - Communication with private sectors
 - Communication with academic groups
 - Communication with communities
 - Publication/sharing of information on development and investment
- Promotion of community participation
- Monitoring on:
 - Gender mainstreaming in implementation of proposed projects together with CNAM

18.6 Social Development Strategies

18.6.1 Issues on Social Development

In section 8.5, the impacts of private investment as well as development projects are examined. The following issues are identified that could emerge from the impacts of Nacala Corridor development.

(1) Conflicts over Land Transfer and Resettlement

Dispute on land transfer may occur between the original residents and the newly arriving investors when investors try to identify the land plot for their activities. Its causes are, firstly, local farmers lands are usually not registered and investors could come in to find these occupied but un-registered lands as available, and secondly, participatory consultation is not sufficient and fails to reach full agreement with residents in the target area. In addition, conflicts will occur when the conditions for resettlement turn out to be not reasonable after agreement, or when investors do not follow the terms of compensation which were agreed between the communities (or residents) and the investors.

(2) Food Security of Small-scale Farmers

Because of new employment opportunities in urban industries as well as in large scale agricultural companies producing commercial crops, land and labour force allocation within a household for food crop production for self-consumption may decrease, which can cause food insecurity of these small-scale farmers.

(3) Support for Small-scale Farmers' Agriculture

While the number of small-scale farmers trying to move to settled intensive agriculture will increase, the majority of farmers will remain with extensive agriculture, producing food crops for self-consumption. Measures have to be taken so that these small-scale farmers will not be left behind.

(4) Employment Creation and Industrial Promotion in Urban Areas

As a result of industrial growth in urban areas, job opportunities will increase. However, it is reported that job creation in industrial areas does not sufficiently benefit local residents due to the lack of human resources which can meet the company's demand. In addition, since the number of employees to be hired in large-scale projects is limited, local industries will be the broad base of employment. Measures to link these employment opportunities with the local community, as well as to promote local industry are required.

(5) Regional Disparity of the Less Accessible Areas

Though development along the Nacala Corridor will be promoted through the variety of measures, less accessible areas far from the Corridor, especially in the provinces of Niassa and Cabo Delgado, would be left behind without receiving much benefit from the development. Transport or logistics do not reach these people, assistance for agriculture will not be provided, people will continue subsistence agriculture, and education and health services have to be limited or unavailable due to budget limitations. In addition, investment projects may come into these areas to find vast available land, where governmental intervention for protecting people's land rights and to regulate the

economic activities may be limited. Measures to secure the level of people's livelihood as well as to avoid enlargement of the regional disparity must be taken.

(6) Women's Poverty, Employment and Food Security

In rural areas, women are predominantly engaged in manual work of agriculture, and their labour proportion in this sector is much higher than that of men. There are limited employment opportunities for women outside their villages in rural areas. Women's access to DUAT is still limited although the Land Law ensures women rights equal to those of the men. In the case of female-headed households, their living standard are significantly low. If women are to be left behind from the development and being kept in rural agriculture, their economic and social status will not be raised.

18.6.2 Objectives for Social Development

Based on the issues identified above, the following objectives are set:

- To empower communities not only in the areas along the transport corridors but also in the less accessible areas away from the transport corridors
 - To ensure local people's land rights in an environment with a prospective inflow of increasing private investments
 - To strengthen the government's implementation system and capacity for protecting local people's land rights and capacity to keep their food security, as well as for ensuring smooth process in land transfer and resettlement for private investments and government projects, in an environment with a prospective inflow of increasing investments
- To secure local people's capacity for growing food crops in the face of increase of commercial crop production and non-agricultural employment due to incoming agricultural and other investments
 - To support to small-scale farmers in technically improving their family agricultural production
- To improve basic education at the local level
 - By promoting community participation for basic education
 - By improving primary school buildings and monitoring activities of primary school education
- To promote primary health care at the local level
 - By promoting community participation for primary health care
 - By improving health centres in terms of buildings, equipment and medicine and monitoring activities at health centres and in the communities
- To create employment opportunities as well as to promote local industries in urban areas, so that economic growth and industrial development in the county will benefit the regional economy as well as regional people
- To provide special attention to less accessible areas away from the transport corridors (major corridor, sub-corridors and feeder lines) and major urban centres, in the strengthening of community initiatives and government's selected intervention for securing farmers land rights and improving quality and access of primary education and primary health care
- To diversify the livelihood of women in order to secure their living standards as well as social and economic status

18.6.3 Strategies for Social Development

In order to attain the above objectives, the following strategies for social development are formulated:

(1) Strategies in Rural Areas

- To raise the awareness and understanding of the communities and local people regarding their land rights, land values and compensation conditions and participatory consultation processes.
- To promote and support local people's acquisition of DUAT (land use rights) in preparing applications for land registration
- To strengthen the governments' implementation system at the local level for encouraging and accepting local people's application for getting DUAT in their villages
- To strengthen the government's implementation system and capacity to support and monitor participatory consultation processes concerning land transfer and resettlement between private investors and communities and between government projects and communities
- To provide financial support or supporting packages to small-scale farmers practicing family farming (in an arrangement for out growers) for utilizing purchased chemical inputs for implementing modern intensive agriculture
- To provide technical support to small-scale farmers who are not changing to intensive settled farming, but who are practicing traditional family agriculture

(2) Strategies in Urban Communities

- To promote the creation of linkage with private companies for job creation for local people, especially for the youth
- To empower urban communities by supporting local people, especially the youth, in starting businesses, as well as getting jobs

(3) Strategies for the Less Accessible Areas

- To provide government support in less accessible areas for assisting local people's acquisition of DUAT, when large investment projects come to particular areas or communities
- To improve the primary education services and primary health care services in less accessible areas by mobilizing both government and community resources and initiatives

(4) Strategies for the Livelihood of Women

- To increase women's access to technical and financial support in agriculture through the above mentioned strategies concerning agriculture
- To promote women's acquisition of DUAT by raising awareness on gender equity in land and natural resource management, as well as through the above mentioned strategies concerning land rights
- To increase women's access to vocational training especially in artisanal mining activities

18.6.4 Programmes and Projects for Social Development

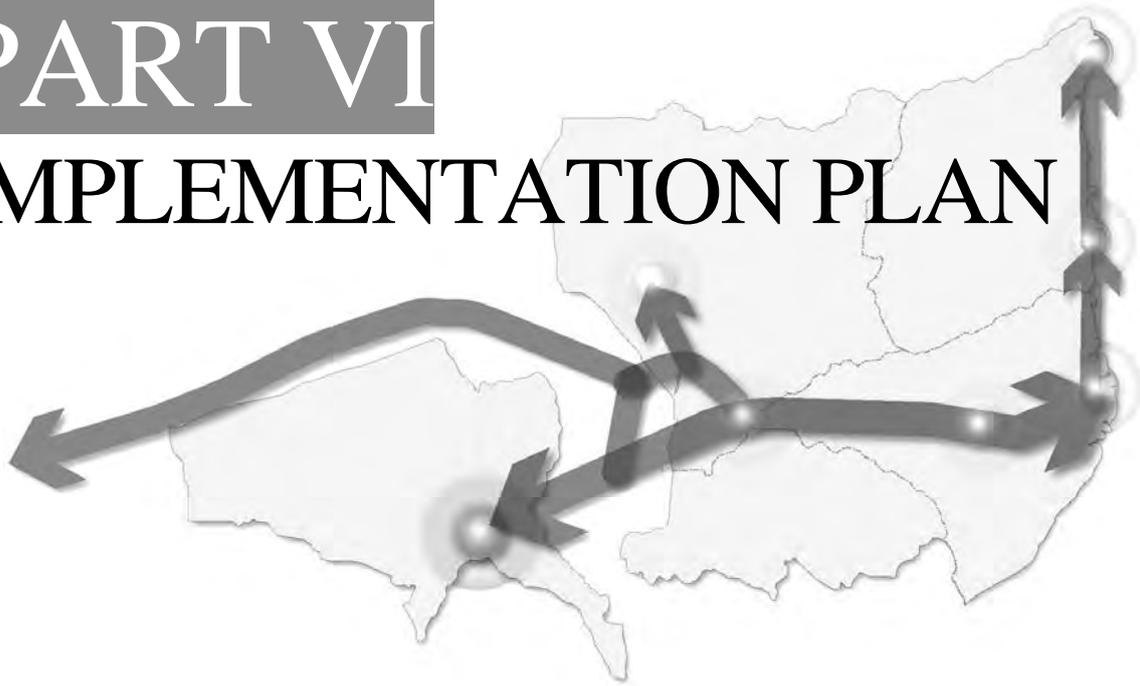
The following programmes and projects are proposed:

- Project for Incorporation of rai Principles in Legal Structure and Administrative System of Government Institutions
- Project for Strengthening of Supervision Mechanism on Land and Environment Law Enforcement

- Project for Capacity Development on Resettlement Process (MICOA, currently known as the Ministry of Land, Environment and Rural Development)
- Project for Strengthening on DUAT Acquisition Process (MINAG, currently known as the Ministry of Agriculture and Food Security)
- Programme for Promotion of Land Registration for Communities and Small-Scale Farmers
- Support Programme for DUAT Acquisition for Small-Scale Farmers in Less Accessible Areas (Niassa and Cabo Delgado) (MINAG)
- Programmes and projects proposed in Education and Health sector of PEDEC-Nacala (MINED, currently known as the Ministry of Education and Human Development, and MISAU)
- Measures and strategies for financial support for improved access to the agricultural inputs
 - Project for Establishment of Financial Support System for Small and Medium Sized Agribusiness Enterprises, Farmers Organisations and Individual Farmers
 - Project for Establishment of Proper Operational Management Framework for the Out-grower Scheme
- Measures and strategies to provide agricultural technical support
 - Project for Strengthening of Agricultural Extension Service
 - Project for Model Development of Leading Farmers in the Community
 - Project to Support Female Farmers
 - Project to Support Community Development Activities
- Project for Improvement of Access Roads for Agricultural Activities

PART VI

IMPLEMENTATION PLAN



Chapter 19 Priority Programmes, Projects and Measures to be Implemented until 2035

19.1 General

“PART VI IMPLEMENTATION PLAN” presents specific projects and measures as the means to realize the strategies prepared in PART V. Chapter 19 presents the projects and measures proposed for the entire planning period until 2035. The projects with higher priority were selected according to a set of criteria.

Chapter 20 focuses on the projects and measures to be undertaken initially in the short term and medium term. Those with especially high priority were selected as “short-medium term high priority projects”.

19.2 Programmes, Projects and Measures for Nacala Corridor Region’s Development until 2035

A set of programmes, projects and measures required to implement the strategies in each sector until year 2035 were prepared based on analyses in each sector. A total of over 230 programmes, projects and measures were prepared. Please see the proposed programmes, projects and measures in Chapters 14 through 18. These are ideas on programmes, projects and measures to be implemented until 2035 for achieving the objectives identified for each sector.

19.3 Priority Programmes, Projects and Measures for Nacala Corridor Region's Development until 2035

19.3.1 Criteria for Selecting Priority Programmes, Projects and Measures

A set of priority programmes, projects and measures to be implemented until 2035 are proposed for promoting the integrated development for the Nacala Corridor Region. They are keys to the realization of the development goals and future vision for the Nacala Corridor Region.

The following steps were taken in preparing these priority programmes, projects and measures:

- Formulation of programmes, projects and measures in each sector from a regional development perspective
- Listing of all programmes, projects and measures proposed by sector
- Establishment of a set of criteria for priority assessment
- Selection of programmes, projects and measures of priority
- Grouping of programmes, projects and measures into sector programmes or area programmes

The most important criteria for selecting priority programmes, projects and measures were established from the following two perspectives:

- 1) To initiate development in the Nacala Corridor Region's development successfully. The programmes, projects and measures which satisfy this perspective include the following types of programmes, projects and measures:
 - a. Those programmes, projects and measures that are crucial in making the on-going railway and major road projects start operating as the regional and international corridor for general cargoes, containers and passengers in a sustainable and efficient manner instead of the corridor used only for coal transport
 - b. Those programmes, projects and measures that could prevent or minimize adverse impacts on the social and natural environments and safety that might be caused by the on-going or planned transport infrastructure projects
- 2) The other perspective is as follows:
 - a. To identify those projects and measures that would link the transport infrastructure development with regional economic growth and social development. Actually, these measures hold the key to realizing the future vision and development goals for integrated development for the Nacala Corridor Region. These programmes, projects and measures consist of three types: 1) those programmes, projects and measures to support activities of economic sector, such as agriculture, processing industries, mining, tourism and logistics industries, 2) those to support social development and 3) those in various infrastructure sectors to support both economic and social activities. All these programmes, projects and measures were formulated and proposed based on the five pillar goals presented in Chapter 9, which are capacity development, environmental management, social development, economic development and spatial development.

The specific factors were applied in selecting priority programmes, projects and measures to be implemented until 2035, in addition to the basic factors mentioned in the preceding paragraphs. Priorities are given to programmes and projects with the criteria below.

- Related to the Nacala-Nampula-Cuamba-Malawi main corridor

- Synergy effects of combining different sectors and resources, such as water resources for agriculture and urban development, road development in combination with agriculture development, combination of waste disposal for energy production
- Urban centre which has a higher urban hierarchical position in the event of similar projects proposed
- Possibility of supporting and taking advantage of large-scale mining projects
- Possibility of increased interaction with the neighbouring countries, such as Malawi and Zambia
- Maturity in terms of recognition in the government and level of information collected on the programmes, projects and measures
- Higher level of potential to be developed by the programme, project or measure
- Urgent needs
- Capacity development to support the programmes, projects and measures selected based on the criteria above

19.3.2 Priority Programmes, Projects and Measures for Development of the Nacala Corridor Region until 2035

A set of candidate priority programmes were formulated by grouping the selected long-term priority projects into groups as shown in this section. The priority projects until 2035 were grouped into “Area Programmes” and “Sector Programmes”. The area programmes are formulated for the most important three urban areas in the Nacala Corridor Region: namely, Nacala Bay Area, Greater Nampula and Cuamba City. The sector programmes are proposed for the sectors of “agriculture”, “logistics modernization”, “tourism”, “road development, maintenance and safety control”, “railway operation improvement”, “port development and operation improvement”, “water resources development”, “electricity and energy”, “social and environmental management”, “urban development” and “capacity development”.

Nacala International Gateway Creation Programme

- Nacala Industrial Park Project
- Nacala Industrial Belt Area Development Project
- Nacala Business Centre Project
- Project for Support Roads for Urban Development and Tourism Development in Nacala Bay Area
- Nacala Port Access Road Project
- Nacala Multi-Modal Terminal and Railway Shunting Yard Project
- Project for Urgent Installation of Thermal Power Generator with Capacity of 30-40MW in Nacala Bay Area
- Nacala Urban Water Supply Expansion Project
- Nacala Thermal Power Plant Project
- SEZ/IFZ Management Improvement Project
- Nacala Industrial Waste Management Project

Nampula Regional Growth Centre Programme

- Nampula Railway Bypass Project (for securing safety and efficiency of urban area)
- Nampula Railway Crossings Improvement Project
- Nampula Ring Road Development Project (including Nampula Southern Road Bypass Project)

- Nampula Urban Water Supply Expansion Project
- Nampula Urban Infrastructure Development Project (Sanitation, Roads)
- Nampula Business Start-Up Support Strengthening Project (dealing with finance, incubation, legal)

Cuamba Logistic and Industrial Centre Programme

- Cuamba Road Bypass Development
- Cuamba Industrial Park Project
- Cuamba-Marrupa Road Upgrade Project

Palma Natural Gas Exploitation and Chemical Industrial Centre Programme

- Palma Port Project
- Palma Thermal Power Plant Project
- Palma Urban Water Supply Project
- Palma Urban Expansion Project
- Bridge Replacement Project for Pemba-Palma-Negomane Roads

Integrated Agriculture Development Programme

- Some ideas on agricultural projects and measures have been prepared; however, it is necessary to conduct public consultation, especially with local farmers for preparing concrete projects.

Integrated Tourism Development Programme

- Matibane-Crusse-Jamali Island Tourism Interest Zone Development Project
- Lumbo-Mozambique Island Tourist Interest Zone Development Project
- Metangula Tourist Zone Development Project
- Pemba/Pemba Bay Tourist Interest Zone Development Project

Logistics Modernization Programme

- Containerization Promotion Project (Tax Incentive, Improvement of Procedures at Nacala Port)
- Malawi Central Inland Container Depot Project (Malawi)
- Chipata Inland Container Depot Project (Zambia)
- Joint Railway Operation Negotiation between Malawi and Mozambique
- Mutuali and Nampula Multi-Modal Terminal Project
- N-13 Highway Service Stations and Truck Terminals Project (Cuamba, Malema, Ribaué, Namialo)
- Customs Improvement Programme (including Single Window, Computerized Application System)
- One Stop Border Posts Development Projects (Zobue, Mandimba, Mchinji/Chipata)
- Multi-Modal Customs Guarantee System Introduction Programme
- ICT Applied Tracking System Introduction Programme
- Logistics Improvement Project for Mocuba SEZ
 - Railway Regulator Capacity Development Project (INATTER Capacity Development)

Road Development, Maintenance and Safety Control Programme

- Strengthening of Sub-Corridor Roads Programme (including Bridge Replacement Project for Pemba-Palma-Negomane Road)
- Regional Road Improvement Programme for Agricultural, Forestry and Fishery Development
- Regional Road Improvement Programme for Tourism Development
- Ladder Roads Development Programme (Marrupa–Cuamba, Ribaué–Montepuez)
- Railway Crossings Improvement Projects
- Overloading Control Enforcement Programme

- Programme for Capacity Development for Traffic Counting and Axle Load Control for Proper Road Maintenance Planning
- Programme for Nacala International Corridor Road Maintenance Office Development
- Project for Capacity Development for Road Maintenance Planning and Budget Execution Programming

Port Facility and Operation Improvement Programme

- Programme for Customs, Immigration and Quarantine (CIQ) Systems Improvement
- Programme for Port Operation and Management Improvement
- Programme for Port Sales Capacity Development
- Nacala Shipyard (Dry Dock) Project

Railway Operation Improvement Programme

- Programme for International Railway Network Integrated Operation Promotion
- Programme for Joint Railway Operation of Coal Transport and General Cargo Transport
- Programme for Railway Traffic Control System and Railway Signalling Facility Improvement

Power and Energy Programme

- Project for Nampula-Nacala Power Substation Reinforcement (Construction of New Namialo Substation and Rehabilitation of Substations - Nampula 220, Nampula Central, Monapo, Nacala Substations)
- Chimuara-Namialo-Nacala Transmission Line Project
- Palma-Pemba-Nacala Transmission Line Project
- Tete Coal Briquette Project (utilizing coal dust, pulp wastewater and other materials)

Water Resources Development Programme

- Meteorological and Hydrometric Observation Network System and Capacity Development Project
- Training Programme for ARA-N and ARA-CN Staff
- Integrated Water Resources Management (IWRM) Study Project on Water Basins of Megaruma River, Lurio River, Mecuburi River, Monapo River, Sanhute River and Meluli River
- Sanhute Dam Project
- Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin
- Project for Desalination Plant for Nacala Bay Area
- Monte Tiza Dam Project for Greater Nampula
- Mepopole Dam Height Raising Project for Cuamba Area

Urban Development Programme

- Pemba Road Network Expansion Project for Supporting Urban Expansion and Improving Access to Tourist/Resort Areas
- Lichinga Railway Station Relocation Project

Social and Environmental Management Programme

- Environmental Management Capacity Development Project
- Project for Strengthening on DUAT Acquisition Process
- Project for Capacity Development on Resettlement Process
- Investor-Community Partnership Initiative Programme
- Programme for Rural Water Supply Spare Parts Supply Network Expansion
- Programme for Community Forestry Expansion

- Eco-Tourism Promotion Programme

Human Resources Development Programme

- Community-Based School Management Project
- Programme for Strengthening of Secondary Education with Focus on Science and Mathematics Education
- Nacala Medium-Level Technical and Vocational School Project
- Cabo Delgado Medium-Level Technical and Vocational School Project
- Nacala Superior Polytechnic Project
- Cabo Delgado Superior Polytechnic Project

Coordination and Promotion of Integrated Development Programme

- Nacala Corridor Regional Development Management Reinforcement Project
- Programme for Nacala Corridor Regional Cooperation Acceleration Initiative
- Project for Introduction of a TV Conference System Among the Local and Central Government Agencies related to the Nacala Corridor Regional Development

Investment Promotion Sector Programme

- Large-Scale Projects and Local Industry Linkage Promotion Project
- GAZEDA/CPI Investment Promotion Capacity Development

Support Programme for Less Accessible Areas

- Support Programme for DUAT Acquisition for Small-Scale Farmers in Less Accessible Areas
- Programme for Primary School Development in Less Accessible Areas
- Programme for Health Centre Development in Less Accessible Areas

“Nacala International Gateway Creation Programme” aims at development of the Nacala Bay Area consisting of Nacala Municipality (former Nacala Porto Municipality), Nacala-a-Velha District and their surrounding administrative posts to be a first-class metropolitan area for business, industry and tourism. Nacala Bay Area will have an upgraded logistics function based on Nacala Port, which is under on-going rehabilitation and upgrading projects. Furthermore, Nacala Port will be widely connected through trunk roads and upgraded railways not only to inland areas of Mozambique, but also to inland neighbouring countries, such as Malawi and Zambia. A port access road and railway shunting yard will be important logistics infrastructure for functionally and efficiently operationalizing the transport corridor. The current capacities of the roads and railway connecting to Nacala Port are insufficient; therefore, they would require not only upgrading of their transport capacities, but also multi-modal integration. It is considered that an increased amount of cargoes going through Nacala Port will provide an opportunity for processing in the hinterland. This is why Nacala industrial free zone (IFZ) is proposed. A set of infrastructures are proposed to support various manufacturing, logistics and other urban activities and tourism development in Nacala Bay Area.

“Nampula Regional Growth Centre Programme” aims to upgrade Nampula City and its surrounding urban areas not only to be a “Regional Centre” of commerce, services and administration, but also a “Regional Growth Pole”, so that various economic sectors could be developed in Greater Nampula, in response to the formation of the Nacala Transport Corridor, by functionally integrating Nampula City and its surrounding urban areas and by strengthening the existing urban functions and infrastructures. This programme also will seek to create a sound urban environment. The railway rehabilitation project undertaken by the private concessionaire and the road rehabilitation projects between Nampula and Cuamba will provide an excellent opportunity for

improving the access for the local agriculture products and agro-processed products to overseas markets. As an endeavour to realize this potential, an industrial park is proposed in Nampula. Development of small and medium scale businesses will be promoted by the Business Start-up Support Strengthening Project. A set of projects will be required as the minimum requirement, such as the railway bypass and railway crossings improvement in order to maintain the favourable urban environment of Nampula. A ring road will also prevent degradation of the urban environment that may be caused by increased road traffic on Cuamba-Nampula-Nacala road.

“Cuamba Logistics and Industrial Centre Programme” aims to develop the potential of Cuamba City in the southern part of Niassa Province, which is situated at a strategic location for logistics purposes in the Nacala Corridor Region, Malawi and the eastern part of Zambia. A road bypass is proposed as a minimum requirement to maintain the urban function as well as urban environment of Cuamba City for the purpose of diverting through traffic, which is considered to increase significantly in the near future. The “N-13 Highway Service Station” in Cuamba proposed under “Logistic Modernization “Programme” will help ensure safe and efficient traffic flow. An industrial park is proposed to take advantage of opportunities to process the increasing amount of various agro-products to be grown in its surrounding areas and to pass through Cuamba City.

“Palma Natural Gas Exploitation and Chemical Industrial Centre Programme” is intended to promote and support natural gas sector’s development including gas-based chemical industries.

A set of ideas on agriculture projects and measures are proposed in the “Integrated Agriculture Development Programme” to support small-scale farmers and utilise private sector effectively. However, it is necessary to conduct public consultation, especially with local farmers for preparing concrete projects at the stage of implementing project after this stage of strategies formulation

The “Logistics Modernization Programme” aims at ensuring smooth flow of commodities on roads and railways and through international border points. It consists of a set of projects and measures that would promote container transportation whose advantages include lower price, efficiency and safety. The proposed projects and measures to support containerization include institutional measures such as tax incentives and procedural advantages and ICT-applied tracking system development and physical projects such as inland container depots, multi-modal terminal and one-stop border post development. These are the minimum requirements to realize an efficient Nacala corridor. The capacity development of INATTER, which is in charge of ensuring road safety and supervising railway operation, is also a must.

The “Integrated Tourism Development Programme” is an endeavour to tap rich touristic resources in the Nacala Corridor Region from the areas with higher maturity. “Matibane-Crusse-Jamali Island Tourism Interest Zone Development” is the first priority ready for tourism investment. Its advantage is its proximity to Nacala and the availability of land for development. Its attractiveness would be enhanced by connecting it with the Mozambique Island by a new road under the “Road Development, Maintenance and Safety Control Programme”. Mozambique Island itself and the Lumbo area on the other side of the bay could turn into an even more attractive tourist destination by upgrading its cultural, architectural and natural assets. Tourism development in Metangula in Niassa Province could be promoted in combination with an agriculture development project in the area north of Lichinga. Tourism potential of Pemba could be developed to cope with an increasing number of foreign tourists, especially those related with Rovuma natural gas development.

The “Road Development, Maintenance and Safety Control Programme” aims mainly at ensuring efficient and safe road traffic on the improved trunk roads in a sustainable manner. An important focus of this programme is the need for road safety and proper maintenance of the roads whose rehabilitation is planned to be completed in the near future. To maintain the rehabilitated roads in a proper condition would be the minimum requirement for the Nacala Corridor to continue functioning as the corridor for transportation and regional economic growth. Improving the railway crossings would be another type of minimum requirement proposed to mitigate adverse impacts that might be caused by the railway project.

The “Railway Operation Improvement Programme” proposes projects and measures that would help successful operation of the Moatize-Nacala rehabilitated railway for transporting general cargoes, containers and passengers across the boundaries with Malawi and in coordination with coal transport.

The “Port Facility and Operation Improvement Programme” contains measures and projects that would enhance the efficiency of cargo handling at Nacala Port and capacity development in port sales. An active approach by the Mozambican authorities and private companies to attract foreign shipping companies would be needed to make full use of the expanded capacity of Nacala Port.

The “Water Resources Development Programme” aims to expand the water supply capacity to meet the increasing demand in major urban areas. It proposes both construction of water source facilities for Nacala, Nampula and Cuamba and preparatory measures to be promoted prior to water resources development. Capacity development of ARA-N and ARA-CN staff, procurement of meteorological and hydrological observation equipment and a comprehensive study on water resources development should be conducted.

An objective of “Power and Energy Programme” is to reinforce the capacity to supply electricity to Nampula, areas between Nampula and Nacala, Nacala Bay Area and the areas in Cabo Delgado Province along the existing transmission line including Pemba and Palma. The programme also proposes a coal briquette project in Tete Province, taking advantage of coal dust from coal production in Moatize.

The “Urban Development Programme” proposes key projects that would improve the urban structure of Pemba, Lichinga and Tete, including a new north-south road for Pemba, railway station relocation project for Lichinga and sewerage system establishment in Tete.

The “Social and Environmental Management Programme” aims to improve the quality of life of people by social and economic measures. It proposes projects and measures for rural water supply, community forests, eco-tourism and the social system. Establishment of a system to coordinate the interests of investors and communities is the minimum requirement for promoting investments for the benefit of the local population. A set of capacity development projects for environmental management are proposed under the “Capacity Development Programme”.

The “Human Resources Development Programme” aims 1) to upgrade primary and secondary school education and 2) to develop industrial human resources. These two aims are related to each other. Mozambique, especially the Nacala Corridor Region, requires a lot of human resources for supporting economic sectors development. However, at the same time, primary and secondary education is essential to create the foundation of the society not only for creating industrial human resources, but also for educating people for their own human development.

The “Coordination and Promotion of Integrated Development Programme” strengthens the government capacity to conduct promotion and coordination of Nacala Corridor Region’s integrated development, as well as monitoring and information sharing. On the other hand, at institutional level, a coordination mechanism among key stakeholder organizations in Mozambique, Malawi and Zambia could be established by the Nacala Corridor Regional Cooperation Acceleration Initiative.

The “Investment Promotion Sector Programme” pays attention to the capacity of CPI and GAZED for investment promotion. CPI should expand their operation of linking foreign companies and local companies/local personnel to the Nacala Corridor Region. On the other hand, GAZEDA needs to make effort at preparing physical capacity to accommodate actual investments and companies to operate their production. The latter objectives of GAZEDA can be approached by SEZ/IFZ Management Improvement Project.

The “Support Programme for Remote Areas” is a key programme for promoting a wide sense of inclusive development in the Nacala Corridor Region because wide remote areas would remain even after the establishment of proposed regional spatial structure.

Chapter 20 Action Plan for Short and Medium-Term High Priority Projects

20.1 Selection of Short and Medium-Term High Priority Projects

A total of 93 projects selected as the priority projects to be implemented between now and 2035 in Chapter 19 of the Final Study Report were further reviewed in order to select “high priority projects” to be initiated by 2017 and completed by 2025 in the short and medium terms. The following criteria were applied to identify “High Priority Projects”:

- Especially important projects in making the transport corridors effectively function as an initial driving force for development in the Nacala Corridor Region
- Especially effective projects in mitigating negative impacts of transport corridors upgrading and economic sectors development on the natural and social environments
- Especially effective projects in promotion of economic sectors by taking advantage of development opportunities to arise due to the effectively upgraded transport corridors
- Especially important projects in starting up regional development so that other important development efforts could be implemented smoothly
- Higher level of maturity of projects whose necessity and methodology have been well understood by concerned agencies and stakeholders
- Projects whose negative environmental and social impacts could be mitigated certainly by technologically established measures

As a result, a total of 48 projects were selected as the “short- and medium-term High Priority Projects” as listed below. Preparation of all these short- and medium-term high priority projects should be started immediately. Some projects will be implemented and completed in the short term until 2017, while others will be implemented and completed in the medium term of 2018-2025 because a longer time is required for survey, design and construction, as well as decision-making.

Nacala International Gateway Programme

- Nacala Industrial Park Project
- Nacala Industrial Belt Area Development Project
- Nacala Port Access Road Project
- Nacala Multi-Modal Terminal and Railway Shunting Yard Project
- Project for Urgent Installation of Thermal Power Generator with Capacity of 30-40MW in Nacala Bay Area
- Nacala Thermal Power Plant Project
- Nacala Urban Water Supply Expansion Project
- SEZ/IFZ Management Improvement Project

Nampula Regional Growth Centre Programme

- Nampula Southern Road Bypass Project
- Nampula Railway Bypass Project
- Nampula Multi-Modal Terminal and Railway Shunting Yard Relocation Project
- Railway Crossings Improvement Project

Cuamba Logistics and Industrial Centre Programme

- Cuamba Road Bypass Project
- Cuamba Industrial Park Project
- Cuamba-Marrupa Road Upgrade projects

Palma Natural Gas Exploitation and Chemical Industrial Centre Programme

- Palma Port Project
- Palma Thermal Power Plant Project
- Palma Urban Water Supply Project
- Palma Urban Expansion Project
- Bridge Replacement Project for Pemba-Palma-Negomane Roads

Logistics Modernization Sector Programme

- Malawi Central Inland Container Depot Project (Malawi)
- Chipata Inland Container Depot Project (Zambia)
- N-13 Highway Service Stations and Truck Terminals Establishment
- Mandimba One Stop Border Post Project
- Logistics Improvement Project for Mocuba SEZ
- Railway Regulator Capacity Development Project

Water Resources Development Sector Programme

- Meteorological and Hydrological Observation Network System and Capacity Development Project
- Sanhute Dam Project (for Urban Water Supply to Nacala)
- Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin
- Monte Tiza Dam Project (for Urban Water Supply to Nampula)

Power and Energy Sector Programme

- Nampula-Nacala Power Substation Reinforcement Project
- Chimuara-Namialo-Nacala Transmission Line Project
- Palma-Pemba-Nacala Transmission Line Project
- Tete Coal Briquette Project

Social and Environmental Management Sector Programme

- Environmental Management Capacity Development Project
- Project for Strengthening on the DUAT Acquisition Process
- Project for Capacity Development for the Resettlement Process

Human Resources Development Programme

- Community-Based School Management Programme
- Programme for Strengthening of Secondary Education with Focus on Science and Mathematics Education
- Nacala Medium-Level Technical and Vocational School Project
- Cabo Delgado Medium-Level Technical and Vocational School Project
- Nacala Superior Polytechnic Project
- Cabo Delgado Superior Polytechnic Project

Coordination and Promotion of Integrated Development Programme

- Nacala Corridor Regional Development Management Reinforcement Project

Investment Promotion Sector Programme

- Large-Scale Projects and Local Industry Linkage Project

Support Programme for Less Accessible Areas

- Support Programme for DUAT Acquisition for Small-Scale Farmers in Less Accessible Areas
- Programme for Primary School Development in Less Accessible Areas
- Programme for Health Centre Development in Less Accessible Areas

20.2 Outline of Short and Medium-Term High Priority Projects

The ideas on Short and Medium-Term High Priority Projects are summarised under each programme in Tables 20.2.1 through 20.2.12. In these tables, provinces, municipalities or districts of project locations, as well as executing agencies, are proposed for priority projects, if they can be specified at this stage.

Table 20.2.1 Nacala International Gateway Programme

Project	Outline	Province (Municipalities/ Districts)	Proposed Executing Agency
Nacala Industrial Park Project	An international-class industrial park with a full set of on-site and off-site infrastructures will be established in order to create a new manufacturing base capitalising on the Nacala's nodal function of being an international gateway. The IFZ status will be granted. It is located at about 5 km south of Nacala Port by the proposed port access road, utilising the land already acquired by GAZEDA. The total development area will be 500 hectares, of which the initial development of 50 hectares will be promoted as a public investment project, while the remaining 450 hectares will be developed by private developers.	Nampula (Nacala Municipality)	GAZEDA
Industrial Belt Area Development Project	A total of 100 hectares of land plots will be prepared in the industrial belt area where industries intending to locate in Nacala SEZ are guided. GAZEDA will get land use rights (DUAT) and arrange utilities for providing private investors with land plots equipped with infrastructures (access roads, electricity and water supply). This project is an immediate measure to cater to the rapidly growing demand for industrial land in Nacala SEZ until the Nacala Industrial Park comes into operation.	Nampula (Nacala Municipality)	GAZEDA
Nacala Port Access Road Project	The project will accommodate the road traffic expected to increase as a result of the expanded port capacity and urban development of Nacala Bay Area. It extends from National Road No.12 northward up to Nacala Port 13.5 km, including 0.7 km bridge section. The road will be a two-lane road initially, and expanded later to a four-lane road.	Nampula (Nacala Municipality)	ANE
Nacala Multi-Modal Terminal and Railway Shunting Yard Project	The project will have three components, namely 1) multi-modal terminal (railway and truck), 2) shunting yard and 3) locomotive depot. The project will ensure smooth transshipment of cargoes from railway to trucks and vice versa at multi-modal terminal (railway cargo station with truck terminal). The railway shunting yard in the project will enable efficient shunting of trains whose number is expected to rise as a result of larger cargo handling volume generated at Nacala Port, planned IFZ and industrial areas in the hinterland. The cargo handling capacity will be 50 to 60 thousand TEU per year. The proposed project site is about 10 km south of Nacala Port along the proposed Port Access Road route.	Nampula (Nacala Municipality)	Ministry of Transport and Communication
Project for Urgent Installation of Thermal Power Generator with Capacity of 30-40MW in Nacala Bay Area	Power supply to Nacala Bay Area and Greater Nampula heavily depends on Cahora Bassa Hydro Power Plant and a long-distance transmission line (about 1,000 km). Since the existing transmission network does not have redundancy, there is a high risk of long-time blackout in Nacala Bay Area and Greater Nampula. In order to respond to the needs for increasing power demand in Nacala Bay Area, and to reduce the risk of long-time blackout due to obsolete and deteriorated electricity distribution facilities, a thermal power generator (dual fuel turbine generator) will be urgently established in the short term in Nacala Bay Area.	Nampula (Nacala Municipality or Nacala-a-Velha District)	EDM

Nacala Thermal Power Plant Project	A thermal power plant will be established in Nacala Bay Area in order to secure stable power supply for satisfying rapidly increasing demand for electricity. The capacity will be 200 to 300 MW in the first phase and 600 MW in the second phase. Either coal or natural gas will be used as fuel.	Nampula (Nacala Municipality or Nacala-a-Velha District)	EDM
Nacala Urban Water Supply Expansion Project	The project will enhance the water supply capacity by 50,000 m3 per day (14.6 million m3 per year) to meet increasing water demand in Nacala Bay Area by year 2017. The components include enhancement of the capacity of the existing treatment plant at Muecula Dam, expansion of water distribution system in Nacala Municipality and development of a water distribution system in Nacala-a-Velha District.	Nampula (Nacala Municipality, Nacala-a-Velha District)	FIPAG
SEZ/IFZ Management Improvement Project	Mozambique, especially the Nacala Corridor Region and Maputo, requires the physical and soft capacity of accommodating incoming investments/enterprises by providing industrial parks or designated industrial areas with necessary infrastructure, as well as by providing management services for incoming and operating enterprises. The project aims at capacity development of GAZEDA for improvement of Nacala SEZ management and planning new SEZs and IFZs in Mozambique, especially for the purpose of increasing GAZEDA's physical and soft capacity for accommodating incoming enterprises and supporting operating enterprises.	Nampula (Nacala Municipality, Nacala-a-Velha District)	GAZEDA

Source: JICA Study Team

Table 20.2.2 Nampula Regional Growth Centre Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
Nampula Southern Road Bypass Project	Nampula City will continue to grow as the business, commercial and industrial centre of northern Mozambique and transportation node of national highways and inter-regional roads. The project will divert the through traffic from National Road No.13 to/from the west and National Road No.1 to/from the east avoiding concentration of traffic in the city centre. It is 32.5 km long running south of Nampula City as part of a ring road proposed for the future and will be 16-metre wide for the initial development.	Nampula (Nampula Municipality)	ANE
Nampula Multi-Modal Terminal and Railway Shunting Yard Relocation Project	The project will provide a multi-modal cargo terminal (railway and truck) so as to efficiently handle cargoes to/from Nacala and inland areas toward Malawi. The project will also relocate the existing shunting yard at the Nampula station eastward by about 30 km at the same place for the multi-modal cargo terminal. It will provide a locomotive workshop as well. The total area will be about 22 hectares. The container handling capacity will be 50 to 60 thousand TEUs per year.	Nampula (Nampula Municipality)	Ministry of Transport and Communication
Nampula Railway Bypass Project	The double track railway bypass will divert the trains transporting coal produced in Moatize, general cargoes and containers to avoid congestion and degradation of the urban environment in the central part of Nampula City. The bypass route runs in the north of Nampula City with a length of 43 km.	Nampula (Nampula Municipality, Rapale District)	Ministry of Transport and Communication
Railway Crossings Improvement Project	The project will minimize traffic accident risks and division of local community areas that might be created by the railway with increased railway traffic. The project proposes 3 two-lane flyovers on National Road No.13 and one four-lane flyover at an urbanized area within Nampula City.	Nampula (Nampula Municipality)	ANE

Source: JICA Study Team

Table 20.2.3 Cuamba Logistics and Industrial Centre Programme

Project	Outline	Province (Municipalities/ Districts)	Proposed Executing Agency
Cuamba Bypass Road Project	The project will divert the through traffic on National Road No.13 to prevent degradation of urban environment and minimize traffic accidents risk and to guide expansion of the urban area to the north of Cuamba across the river, a tributary of the Lurio River. The bypass road will be a two-lane road of about 11 km long including a 50-metre bridge over the river. The new road section of the bypass branches off from National Road No.13 at about 5 km east of Cuamba, runs west-northwest and converges with National Road No.360.	Niassa (Cuamba Municipality)	ANE
Cuamba Industrial Park Project	The project will provide an industrial park where various agricultural produce and wood from the surrounding areas will be processed, taking advantage of Cuamba's geographical location. Agro-produce to be processed will include maize, cassava, haricot beans, pigeon pea, soybean, sesame, cotton and tobacco. The 25 hectare industrial park will be located in a triangular area surrounded by National Road 360 (N-360), National Road 13 (N-13) and the railway track to Lichinga at the N-360-N-13 junction.	Niassa (Cuamba Municipality)	GAZEDA
Cuamba-Marrupa Road Project	The project will provide an all-weather road from Cuamba to Marrupa to secure access to an all-season all-weather passable road for the population along the route and improved access to market for the farmers in the surrounding areas with high agriculture potential. The road will be a two-lane road, 236 km long.	Niassa (Cuamba Municipality, Metarica District, Maua District, Marrupa District)	ANE

Source: JICA Study Team

Table 20.2.4 Palma Natural Gas Exploitation and Chemical Industrial Centre Programme

Project	Outline	Province (Municipalities/ Districts)	Proposed Executing Agency
Palma Port Project	In Palma, LNG plants are expected to be established using natural gas from off-shore gas fields by 2018. At the same time, chemical industries for producing methanol and ammonia using natural gas are expected to be developed in Palma around 2020. To accommodate these natural gas-related industries in Palma and to smoothly develop supporting sectors for these natural gas-related industries, it is essential for Palma to have a public port. Currently the construction of LNG plants is planned without proper consideration of land use and infrastructure for the chemical industries and further development in Palma. It is urgent to prepare an integrated plan for land use and infrastructure supporting not only LNG production, but also chemical industries and further development in Palma.	Cabo Delgado (Pemba Municipality)	CFM
Palma Thermal Power Plant Project	Taking advantage of the presence of natural gas to be exploited at offshore gas fields, a thermal power plant will be constructed with an initial generation capacity of 75MW or so for supplying not only to Palma's urban areas and supporting sectors for LNG production and other chemical industries using natural gas, but also to other areas including Pemba and Nacala Bay Area.	Cabo Delgado (Palma District)	EDM
Palma Urban Water Supply Project	Urban water supply will be expanded in order to cope with the increasing water demand due to increasing urban populations and development of supporting sectors for natural gas exploitation and prospective chemical industries.	Cabo Delgado (Palma District)	FIPAG

Palma Urban Expansion Project	Palma needs to accommodate an increasing number of influx of migrants and a large expansion of urban areas. Urban roads, drains, electricity lines and water lines will be provided for expanded urban areas. This urban expansion project will also provide sites for a variety of social services, hospitals, health centres and schools.	Cabo Delgado (Palma District)	To be Determined
Bridge Replacement Project for Pemba-Palma-Negomane Roads	Eight existing bridges will be replaced in the eastern part of Cabo Delgado Province to achieve two objectives. The first objective is to improve the road connection between Palma and Pemba to better serve Palma, which is a support base for natural gas extraction and a chemical industrial base utilizing extracted natural gas. For the first objective, 6 bridges between Mcomia and Oasse are identified for replacement. The second objective is to improve the road connection between the Tanzania side and Palma/Pemba. At Negomane, the border between Tanzania and Mozambique, there is a bridge called "Unity Bridge". However, the Mozambican side does not have good road access to Unity Bridge from Palma. For the second objective, 2 bridges between Negomane and Mueda are identified for replacement.	Cabo Delgado (Macomia District, Mocimboa da Praia District, Muidumbe District, Mueda District)	ANE

Source: JICA Study Team

Table 20.2.5 Logistic Modernization Sector Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
- Malawi Central Inland Container Depot Project (Malawi) - Chipata Inland Container Depot Project (Zambia)	Inland container depots (ICDs) will be established at two locations in Malawi (Liwonde and Chipoka) and at one location in Zambia (Chipata) in order to ensure efficient export and import of railway cargoes through Nacala Port (time and cost saving), thus enhancing the attractiveness of the railway transport among Mozambique, Malawi and Zambia. Each ICD will be 1.2 hectares with railway yard, bonded warehouses, container freight station and container yard.	Malawi and Zambia	To be Determined
N-13 Highway Service Stations and Truck Terminals Development Programme	Highway service stations with truck terminals will be established at four locations along National Road No.1 (N-1) and National Road No.12 (N-12): Namialo, Ribaua and Malema in Nampula Province and Cuamba in Niassa Province. They will offer rest areas for truck drivers, parking spaces, vehicle maintenance service, emergency response service, markets for local products and logistic services (storage, breaking bulk and distribution to smaller distribution trucks). Each area will be 250 to 400 metres long and 100 to 200 metres wide.	Nampula and Niassa	ANE
Mandimba One Stop Border Post Project	The project will ensure smoother movements of goods, services and people across the Mozambique-Malawi border at Mandimba. The project will include construction of facilities (building, parking lot and approach road), procurement of equipment (weigh bridge and X-ray scanner), development of a legal framework and streamlined procedure and training of immigration and customs officers. Coordination among relevant government organisations will be crucial. The project period will be 6 years including, design, formulation of legal framework, construction and training.	Niassa (Mandimba District), Malawi	Revenue Authority
Logistics Improvement Project for Mocuba SEZ	GAZEDA plans to develop a special economic zone (SEZ) of 10,727 km ² in the area covering Mocuba District and Munhande Administrative Post in Zambezia Province, taking advantage of its strategic location. Two private initiatives for developing railway systems, one from Tete province to Nacala and the other to Macuse Port, will significantly enhance the viability of Mocuba SEZ. The project components include development of infrastructure, multi-modal transportation terminal, industrial park (19ha), new hotels and upgrading of the existing airport.	Zambezia	GAZEDA

Railway Regulator Capacity Development Project	The roles of INATTER (Instituto Nacional dos Transportes de Terrestre), responsible for regulation and supervision of the railway and road sectors, will become important when the private concessionaire for the Nacala Corridor Railway (Northern Railway and new sections) comes into operation soon. The capacity of INATTER will be strengthened in the areas of monitoring and guidance of private operators and enforcement of regulations, as well as transport statistics data collection, transport policy and programme formulation, international standardization and transport safety development. The project period will be three years.	Maputo	INATTER
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Source: JICA Study Team

Table 20.2.6 Water Resources Development Sector Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
Meteorological and Hydrological Observation Network System and Capacity Development Project	The deteriorated meteorological and hydrological observation network system in the three regional management authorities (ARA-Central North, ARA-North and ARA-Zambezi), will be rehabilitated and upgraded by procurement of equipment and training of ARA officers. Hydrometric equipment and meteorological equipment to be procured will be 68 and 138 respectively. A total of 15 ARA officers will be trained on site for 6 months. DNA officers will be trained for data analysis.	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	DNA, ARA North, ARA Central North and ARA Zambeze
Sanhute Dam Project	The Sanhute Dam will be constructed about 39 km southwest of Nacala City along N-12. The water of about 40,000 m ³ per day will be conveyed to the existing Maecula Dam, about 9 km from the Sanhute Dam, and further transferred to Nacala area through the existing water pipeline. An FS has been completed already.	Nampula (Monapo District)	DNA, ARA Central North
Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin	<p>For growing urban areas and economic activities in Nacala Bay Area, utilization of water resources of river basins near Nacala Bay Area, including the construction of Sanhute Dam is a short-term solution, but it is also essential to utilize water resources based on a study on integrated water resources management not only of small river basins surrounding Nacala Bay Area, but also of the Lurio River Basin.</p> <p>However, as described in Section 15.5 (Development Strategies for Water Resource), the strengthening of meteorological and hydrological observation network system is of immediate need. Based on the improved data collection system, it is necessary to establish an integrated water resources management system. Then it becomes possible to formulate more concrete, technically feasible and environmentally considered solutions for meeting rapidly growing water demand in Nacala Bay Area.</p> <p>It is wise to start with considering various measures including this proposed project (Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin). In this study project, it is strongly recommended to pay careful attention to the water-related environment of river basins in consideration of water resources development.</p> <p>In addition, considering the case that the water volume (both surface water and ground water) usable from the small river basis surrounding the Nacala Bay Area and Lurio River Basin might not be sufficient enough to fully satisfy the increasing water demand in Nacala Bay Area, other measures including desalination plants should be considered in this study project.</p>	Districts covered by River Basins surrounding the Nacala Bay Area of Nampula Province, and Districts of Nampula Province, Cabo Delgado Province and Niassa Province covered by the Lurio River Basin	DNA, ARA Central North

Monte Tiza Dam Project	The Monte Tiza Dam will be constructed about 50 km south of Nampula City to supply water of about 259,000 m ³ per day or 95,000,000 m ³ per year. A raw water transmission pipeline system of about 60 km will also be installed.	Nampula (Mogovolas District, Meconta District, Nampula Municipality)	DNA, ARA Central North
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Source: JICA Study Team

Table 20.2.7 Power and Energy Sector Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
Nampula- Nacala Power Substation Reinforcement Project	Phase 1 of the project aims to stabilize the power supply to Nampula City, Nacala City and the areas in between by establishing a new power substation in Namialo in Nampula Province and introducing substation control systems and other equipment at the existing Nampula 220 Substation and Nampula Central Substation. In Phase 2, the transformers of the four power substations will be repaired.	Nampula (Nampula Municipality, Meconta District, Monapo District, Nacala-a-Velha District)	EDM
Chimuara-Namialo-Nacala Transmission Line Project	New transmission lines (635km for 400kV, 190km for 220kV and 21km for 110kV) will be installed between Chimuara in Zambeze Province with Nacala through Nicuadala, Mocuba and Alto Morocue in Zambeze Province and Nampula, Namialo and Monapo in Nampula Province to ensure stable power supply to these areas. The project also includes construction of two new power substations and instalment of transmission-related equipment at the six existing substations.	Nampula	EDM
Palma-Pemba-Nacala Transmission Line Project	A new transmission line (over 450 km long) and 3 substations will be installed between Palma, a prospective natural gas exploitation and chemical industrial centre, and Nacala Bay Area through Pemba. This transmission line will be necessary when a new Thermal Power Plant using natural gas is constructed in Palma for supplying power to the power grid. The 3 substations will be installed in Palma, Pemba and Nacala.	Cabo Delgado and Nampula	EDM
Tete Coal Briquette Project	Dissemination of the use of bio-briquette as a new domestic energy source replacing firewood will be promoted by the project, taking advantage of massive middling from coal production in Moatize and bio-mass available in the province. The project will contribute to decelerating deforestation and creating jobs. Corporate Social Responsibility (CSR) activities are expected to support the project. The project period will be 3 years minimum including research and survey and mobilization of SMEs.	Tete	FUNAE, Private Sectors

Source: JICA Study Team

Table 20.2.8 Social and Environmental Management Sector Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
Environmental Management Capacity Development Project	In the existing EIA system, project proponents should prepare and submit environmental management plans. However, MITADER has not developed enough capacity to monitor and guide their implementation of environment management plans. Firstly, an implementation system for monitoring and guiding of project proponents will be established. Secondly, accordance to the implementation system to be established, the capacity development will be conducted for implementing monitoring and guidance of project proponents' activities for environmental management plans. Furthermore, environmental laboratories will be established in Maputo, Tete and Nacala, which will be provided with a set of environmental monitoring equipment required for collecting fundamental environmental information. Capacity development will be also undertaken for MITADER officers on the usage of equipment, preparation of monitoring programme, periodical inspection, maintenance of equipment and preparation of environmental audit programme. The environmental legal framework will be improved as well.	Maputo, Tete and Nampula	National Agency for Environmental Quality and Control, Ministry of Land, Environment and Rural Development
Project for Strengthening on DUAT Acquisition Process	<ul style="list-style-type: none"> • The following operation of provincial and district level cadastre offices is strengthened to avoid land conflicts between investors and communities. <ul style="list-style-type: none"> ➢ Management of land use information database and the administrative/ technical procedure of land registration (land identification and GIS mapping) ➢ Monitoring of the participatory consultation process ➢ Awareness raising of the communities on their land rights or land value • An approach combining “community DUATs” and “small-scale farmers’ individual DUATs” is to be pursued for securing local farmers’ land. • MINAG, DNTF and SPCG are the relevant administration units. 	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	Ministry of Agriculture and Food Security
Project for Capacity Development on Resettlement Process	<ul style="list-style-type: none"> • The following operation of provincial and district level territorial planning department (under MITADER) is strengthened to avoid conflicts between investors and communities regarding resettlement <ul style="list-style-type: none"> ➢ Monitoring of the participatory consultation process, as well as monitoring of implementation process of resettlement and compensation ➢ Awareness raising of the communities on their land rights, land value and compensation value • MITADER, DINAPOT and DPOT* are the relevant administration units. The project will be for two years. 	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	Ministry of Land, Environment and Rural Development

Source: JICA Study Team

Table 20.2.9 Human Resources Development Programme

Project	Outline	Province (Municipalities/Districts)	Proposed Executing Agency
Community-Based School Management Project	The project aims to improve the quality of education by promoting community participation in primary school management. Utilising existing organisation called “school council”, school management activities, such as rehabilitation of school buildings will be implemented by mobilizing community resources under the supervision of district and provincial administrations. The project period will be two years.	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	Ministry of Education and Human Development

Strengthening of Secondary Education with Focus on Science and Mathematics Education Programme	The project aims to improve the quality of secondary education by focusing on science and mathematics education, so that human capitals which will contribute to country's economic growth will be developed. Cascade training system will be developed from the central level, provincial level toward school district. Teaching manuals will be prepared as well. The project will be for three years.	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	Ministry of Education and Human Development
Nacala Medium-Level Technical and Vocational School Project	A medium-level technical and vocational school will be established in Nacala Bay Area, which will provide technical and vocational education for transport, logistics, manufacturing and service industries. Demand for skilled labours by foreign investors locating in Nacala will be fulfilled locally. The project period will include concept planning, FS, DD, construction, procurement of equipment, development of educational programmes and curriculum, training of teachers and institutional development.	Nampula (Nacala Municipality)	Ministry of Education and Human Development
Cabo Delgado Medium-Level Technical and Vocational School Project	A medium-level technical and vocational school will be established in Palma, which will provide technical and vocational education on the technologies for natural gas and related industries. The project will be a development of the existing Macomia Professional School. Demand for skilled labours by foreign investors locating in Palma will be fulfilled locally. The project period will include concept planning, FS, DD, construction, procurement of equipment, development of educational programme and curriculum, training of teachers and institutional development.	Cabo Delgado (Palma District)	Ministry of Education and Human Development
Nacala Superior Polytechnic Project	Nacala Superior Polytechnic will be established in Nacala Bay Area, which will provide higher-level and practical technical education on transport, logistics, manufacturing, and service industries including tourism. Demand for engineers and technicians by foreign investors locating in Nacala SEZ will be fulfilled locally. The project period will include concept planning, FS, DD, construction, procurement of equipment, development of educational programme and curriculum, training of teachers and institutional development.	Nampula (Nacala Municipality)	Ministry of Science, Technology and High Technical and Professional Education
Cabo Delgado Superior Polytechnic Project	Cabo Delgado Superior Polytechnic will be established in Pemba or Palma, which will provide higher-level and practical technical education for natural gas and related industries. Demand for engineers and technicians by foreign investors locating in Palma will be fulfilled locally. The project will include concept planning, FS, DD, construction, procurement of equipment, development of educational programme and curriculum, training of teachers and institutional development.	Cabo Delgado (Pemba Municipality)	Ministry of Science, Technology and High Technical and Professional Education

Source: JICA Study Team

Table 20.2.10 Coordination and Promotion of Integrated Development Programme

Project	Outline	Province	Proposed Executing Agency
Nacala Corridor Regional Development Management Reinforcement Project	A new organisation "Agency for Nacala Corridor Development" (ADCN) will be created under Ministry of Planning and Development. Its main responsibility will be to make coordination of planning and development across all the sectors and different government levels in the Nacala Corridor Region. Its function is mainly technical. It submits reports to the existing decision-making bodies at the political level. Capacity development for this agency (to be established newly) will be conducted to cover monitoring, evaluation, coordination and promoting for integrated development.	Nampula, Niassa, Cabo Delgado, Tete and Zambezia	Ministry of Economy and Finance, ADCN (a new Agency)

Source: JICA Study Team

Table 20.2.11 Investment Promotion Sector Programme

Project	Outline	Province	Proposed Executing Agency
Large-Scale Projects and Local Industry Linkage Project	The objective of this project is to promote linkages between large-scale incoming investment projects and local industries. For this purpose, company directory of both large scale companies and local SMEs is introduced, and matching of both parties will be done. CPI is currently working with UNIDO for creating company database, whose output will be utilised for this proposed project. This project period will be for two years.	Tete, Cabo Delgado and Nampula	CPI

Source: JICA Study Team

Table 20.2.12 Support Programme for Less Accessible Areas

Project	Outline	Province	Proposed Executing Agency
Support Programme for DUAT Acquisition for Small-Scale Farmers in Less Accessible Areas	In the areas along the main corridors and the areas near Tete's coal mining and Palma's natural gas exploitation, "Project for Strengthening on DUAT Acquisition Process," which is listed in Table 20.2.8, will be implemented. On the other hand, less accessible areas away from the transport corridor and major mining sites also require special actions for supporting small-scale farmers, especially when private investments and infrastructure projects are determined to come to such less accessible areas. This project targets less accessible areas in Niassa and Cabo Delgado Provinces.	Niassa and Cabo Delgado	Ministry of Agriculture and Food Security
Programme for Primary School Development in Less Accessible Areas	In less accessible areas away from the transport corridors, the situation of primary schools will be improved in school buildings, furniture and teachers' houses, as well as in school management. In this programme, firstly, government effort and resources including budget will be mobilized for improving the situation of primary schools in less accessible areas. Secondly, community initiatives will be promoted in participation in school management at the community level.	Niassa and Cabo Delgado	Ministry of Education and Human Development
Programme for Health Centre Development in Less Accessible Areas	In less accessible areas away from the transport corridors, the situation of health centres will be improved in buildings, equipment, health staff's houses, as well as in health centre management. In this programme, firstly, government effort and resources including budget will be mobilized for improving the situation of health centres in less accessible areas. Secondly, community initiatives will be promoted in participation in Primary Health Care activities at the community level.	Niassa and Cabo Delgado	Ministry of Health

Source: JICA Study Team

PART VII

STRATEGIC ENVIRONMENTAL ASSESSMENT



Chapter 21 Strategic Environmental Assessment

21.1 Objectives and Targets of SEA Study

21.1.1 Objectives

The Strategic Environmental Assessment (SEA) is a tool used to assess possible impacts which the implementing a plan, policy or programme might cause on the existing and future environmental conditions. It also assesses socio-economic effects. The SEA is intended to influence the plan, policy or programme so as to improve environmental outcomes. This function makes the SEA an integral part of the planning process. However, the SEA system has not been legally established in Mozambique so that official process and approval systems do not currently exist.

The SEA is designed at the conceptualisation stage in the preparation of strategies, plans and programmes for the PEDEC-Nacala as an attempt to influence the way in which priorities are determined, and key decisions that are made and also to influence the range of issues that are factored into the decision-making. The objectives of the SEA study are the following:

- To contribute to the early integration of environmental issues into the formulation of development strategies for the Nacala Corridor Region
- To assess development scenarios and essential strategies in respect of their environmental impact
- To indicate, where necessary, how improvements can be incorporated into the development strategies to improve their environmental performance
- To provide a level of environmental protection and facilitate sustainable development outcomes for PEDEC-Nacala

21.1.2 Targets of SEA Study

The targets of SEA study are development scenarios and essential strategies, whose summary is presented below, while their detailed discussions are contained in other chapters of this Main Report.

(1) Development Scenarios

There are the following two factors by which to prepare different development scenarios under PEDEC-Nacala namely:

- Major Industries
- Spatial Pattern

The major industries considered are of two types while the spatial use patterns are of three types. Table 21.1.1 shows the description of each pattern.

Table 21.1.1 Two Factors and Patterns for Development Scenarios in PEDEC-Nacala

Major Industries	Spatial Patterns
A: Mining sectors as a major sector B: Diversified economic sectors including urban-based manufacturing sectors	1: Three enclaves of Tete, Palma and Nacala 2. Tete-Nacala single corridor and Nacala Port based commercial and production centre 3. A region-wide corridor network and hierarchical urban centres

The characteristics of each major economic sector and spatial pattern are described in Table 21.1.2.

Table 21.1.2 Alternatives for Major Industry Patterns and Spatial Patterns

Scenario Code	Scenario Name	Factors to Differentiate Scenarios	
		Major Industries	Spatial Pattern
A-1	Strong Mining Sector Orientation and Three Enclaves of Tete, Palma and Nacala	A: Mining Sector-Oriented Regional Development	1: Three Enclaves of Tete, Palma and Nacala
B-2	Diversified Economic Sector Development based on Tete-Nacala Single Corridor	B: Regional Development based on Diversified Economic Sectors	2: Tete-Nacala Single Corridor Development
B-3	Diversified Economic Sector Development based on a Region-Wide Corridor Network	B: Regional Development based on Diversified Economic Sectors	3: Development based on a Region-Wide Corridor Network

By combining two major industries and three spatial patterns, six combinations can be made. However, there are only three possible scenarios out of the six combinations as follows and as shown in Table 21.1.3:

- Scenario A-1
- Scenario B-2
- Scenario B-3

Table 21.1.3 Targets for Alternatives of Development Scenarios by Combination of Major Industries and Spatial Patterns

Spatial Patterns	Major Industries	
	A	B
1	A-1	-
2	-	B-2
3	-	B-3

Conceptual maps of these three development scenarios are shown in Figure 21.1.1.

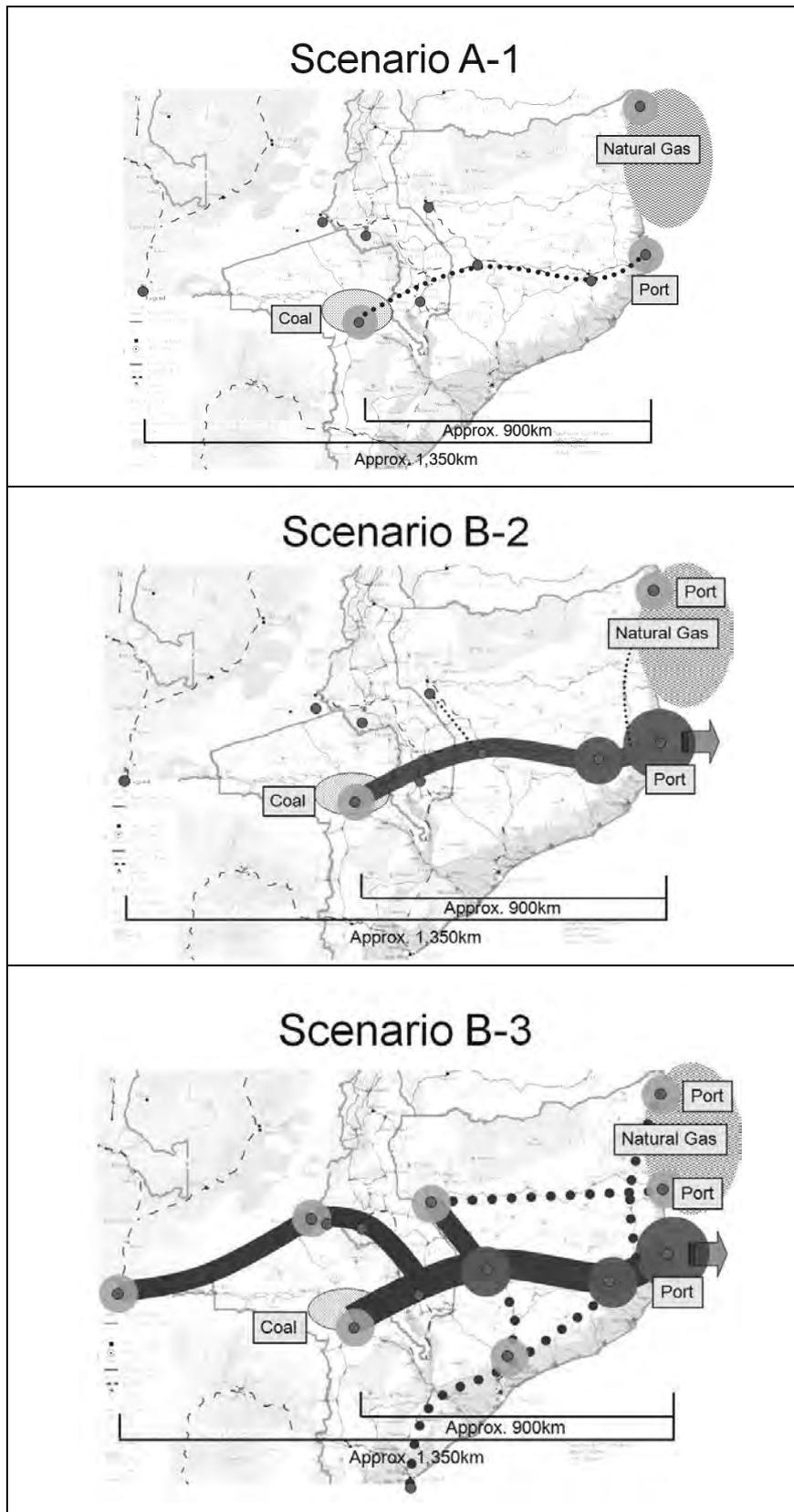


Figure 21.1.1 Targets of SEA: Three Alternative Development Scenarios

(2) Essential Development Strategies

Under the PEDEC-Nacala, the following seven essential development strategies are proposed which are considered to be essential development strategies for implementing the integrated development for the Nacala Corridor Region:

- Strategy-1: Securing of the transport function of the Nacala Corridor
- Strategy-2: Development of a foundation for the Nacala Bay Area and Greater Nampula
- Strategy-3: Promoting agricultural development by supporting small-scale farmers and effective utilisation of private sectors
- Strategy-4: Strengthening of environmental and land management
- Strategy-5: Capacity development of an institutional framework for coordinating and promoting Integrated Regional Development
- Strategy-6: Strengthening of basic education and industrial human resources
- Strategy-7: Taking care of emerging social problems, vulnerable people and less accessible areas

21.2 Methodology of SEA Study

21.2.1 SEA Process

The SEA study proceeded in parallel with the formulation of Development Strategies. 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 chart below.

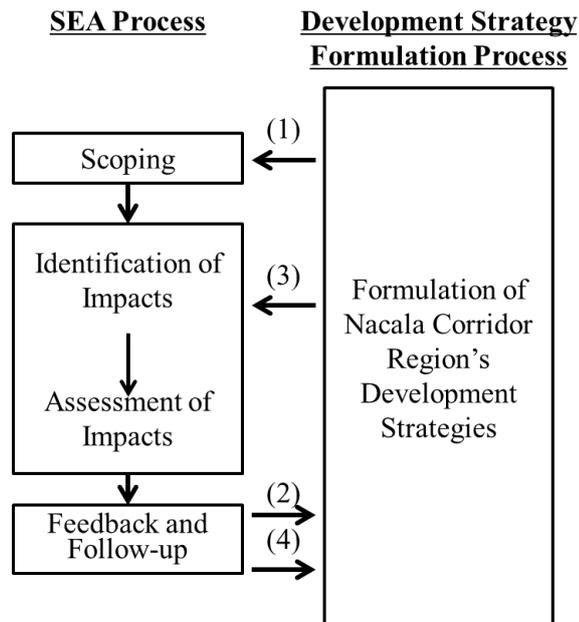


Figure 21.2.1 Process of Development Strategies Formulation and SEA Study

(1) Stages of SEA Study

The SEA study is comprised of the following four stages, which are described below:

1) First Stage: Scoping

The first stage of the SEA is to define the scope of the object/target of the assessment. Activities at the scoping stage include:

- Field reconnaissance in order to understand the geography and potential impact in the proposed locations
- To collect and review baseline and secondary data in relation to the environmental and social issues and economic activities in the affected areas of the Nacala Corridor Region as well as to check conformity with existing government policies and regulations
- Preparation of the SEA framework

2) Second Stage: Identification of Impacts

The objectives of impact identification are as follows:

- To identify positive and negative impacts, in relation to the different development scenarios (strategic options)

- To define SEA criteria
- To identify strategic indicators for assessment and monitoring

The key activities during this stage are as follows:

- To analyse baseline information
- To describe the current situation in a way that is relevant for impact identification
- To support the planning team in scenario interpretation
- To support the planning team in defining planning options considering the adopted scenarios
- To define criteria for SEA considering several viewpoints from stakeholders

3) Third Stage: Assessment of Impacts

The objective of this stage is to analyse and assess impacts of the planning options and to contribute to the selection of the best planning options that would ensure consideration and integration of environmental sustainability issues and perspectives in a coherent form. The key activities during this stage are:

- To re-analyse the perspectives and viewpoints using public participation and consultations with relevant agencies
- To establish the framework for assessment based on development scenarios and proposed strategies
- To identify mitigation measures

4) Fourth Stage: Feedback and Follow up

The fourth stage is essentially to follow up the efficiency and efficacy of the implementation of the planned solutions, in terms of environmental and sustainability criteria, ensuring monitoring and systematic evaluation of major changes that may occur in the environment. Key activities include the following:

- To monitor impacts of planned solutions (strategies) by using selected indicators
- To develop and prepare reports

21.2.2 Targets and Tools for Assessment

In the SEA study for PEDEC-Nacala, the following three points are targets for the SEA study:

- Development Scenarios
- Essential Development Strategies
- Short and Medium-Term High Priority Programmes

For each of these targets, a variety of assessment tools are used as explained in the sections below.

(1) Assessment for Alternative Development Scenarios

The alternative development scenarios are evaluated by using risk identification (analysis) and sustainability tests. The risk identification is to analyse the probability of risks associated with the economic, spatial, social, and environmental aspects. While the sustainability tests are to subject each activity to a simple test of the overall sustainability of the scenarios, the overall sustainability is analysed by three aspects such as natural resources, social and cultural conditions and economy.

(2) Assessment of Essential Development Strategies

The essential development strategies are assessed by using compatibility analysis. A compatibility analysis is undertaken to compare different strategies in order to check if they are mutually supportive or conflictive.

(3) Assessment of Short and Medium Term High Priority Programmes

Under PEDEC Development Strategies, twelve programmes are recommended as high priority according to its period of implementation as either short and medium term, including a human resource development programme, investment promotion sector programmes and others.

There are six programmes, out of the twelve programmes which were designed as infrastructure and physical development programmes. Therefore, the following six programmes with corresponding 24 projects are being assessed:

- Nacala International Gateway Programme (8 projects)
- Nampula Regional Growth Centre Programme (4 project)
- Cuamba Logistics and Industrial Centre Programme (3 project)
- Palma Natural Gas Exploitation and Chemical Industrial Centre Programme (4 Projects)
- Water Resources Development Sector Programme (1 Projects)
- Power and Energy Sector Programme (4 Projects)

According to the Guidelines for Cumulative Effects Assessment in SEA of Plans (Imperial Collage London, 2004), cumulative effects are the combined impacts of a single activity or multiple activities. The individual impacts from a single development may not be significant on their own but when combined with other impacts, those effects could become significant. Therefore, cumulative effect analysis is used for assessment in each programme to determine probable effects.

21.2.3 Engagement of Stakeholders in the SEA Study for PEDEC-Nacala

(1) Meetings for Involving Stakeholders

A variety of meetings were organised for PEDEC-Nacala in order to involve a wide range of people in the course of strategy formulation. In the early and middle phases, mostly government officers were involved in order to discuss the purpose of development concepts and strategies. In the latter phases, non-governmental stakeholders including civil society organisations and private business groups and universities were involved in the process. Each type of meetings is described in the sections below.

(2) Steering Committee Meetings and Working Group Meetings

Steering Committee (S/C) and Working Group (W/G) were officially established for the purpose of guiding and assisting the JICA Study Team as shown in Table 21.2.1.

Table 21.2.1 Members and Roles of Steering Committee and Working Group

Project Management Structure	Proposed Members	Roles, Timing and Place of Meetings
Steering Committee (S/C) for the Nacala Corridor Project	MPD (as Secretary for SC) GAZEDA MTC MIC Permanent Secretariat of Five provinces	<ul style="list-style-type: none"> To discuss and define main items of the Project to guide the Project, and take necessary actions required for smooth implementation of the Project. To hold a meeting as every main report of the Project becomes ready to discuss (The venue will be the city of Maputo)
Working Group (W/G)	MPD (as the Secretary for WG) GAZEDA Five provinces of the target area MTC CENACARTA Ministry of Energy Ministry of Agriculture Ministry of Mineral Resources Ministry of Trade and Industry Ministry of Tourism Public Company of Ports and Railway (CFM) Public Road Company (ANE) National Directorate of Water (DNA)	<ul style="list-style-type: none"> To discuss technical aspects of the Project properly and provide the necessary data and information for the Project. To hold a meeting as every main report of the Project becomes ready to discuss the report although the topic and the timings will be set based on necessity.

The following table shows a list of Steering Committee Meetings and Working Group Meetings held for PEDEC-Nacala. For sharing information regarding PEDEC-Nacala, these meetings are to present and discuss study results with line ministries and provincial governments periodically, and to get feedback to the PEDEC-Nacala study. The process of presentation and discussion in these meetings is a part of the SEA process.

Table 21.2.2 List of Steering Committee Meetings and Working Group Meetings held for PEDEC-Nacala

No.	Date	Main Objectives	Venue	No. Participants*
Steering Committee (SC)				
SC1	04 May 2012	To explain and discuss ICR and to launch the Project	Maputo	32
SC2	27 Nov. 2012	To explain and discuss PR	Maputo	19
SC3	30 Aug. 2013	To explain and discuss ITR	Maputo	15
SC4	26 May. 2014	To explain Draft Strategies Report (Summary)	Maputo	38
SC5	09 Dec 2014	To explain DFR	Maputo	25
Working Group (WG)				
WG1	24 Aug. 2012	To share the study progress of each sector	Maputo	6
WG2	06 Sep. 2012	To share the study progress of each sector To conduct a Project Vision Workshop	Maputo	7
WG3	21 Sep. 2012	To share the study progress of each sector To conduct a Project Vision Workshop	Maputo	8
WG4	28 Sep. 2012	To share study progress of different sectors To hold a Project Vision Workshop	Nampula	16
WG5	02 Oct. 2012	To share study progress of different sectors	Maputo	5
WG6	28 Mar. 2013	To share study progress of different sectors	Maputo	5
WG7	16 May 2013	To share the study progress of different sectors	Maputo	12
WG8	10 Jun. 2013	To explain and discuss ITR and priority projects (ideas)	Nampula	11
WG9	12 Jun. 2013	To explain and discuss ITR and priority projects (ideas)	Maputo	19

WG10**	09-10 Dec. 2013	To conduct an SEA workshop	Nampula	21
WG11	13 Dec. 2013	To share the result of the SEA workshop held in Nampula	Maputo	19
Integrated Working Group				
IWG1	26 Nov. 2012	To explain and discuss PR	Maputo	23
IWG2	29 Aug. 2013	To explain and discuss ITR	Maputo	28
IWG3	08 Dec 2014	To explain DFR	Maputo	20

Note: * Participants from the Japanese side are not included

**Representatives from municipalities and districts (mayors and district administrators) also attended the 10th Working Group Meeting in Nampula

(3) Discussion Group Meetings, Presentation Sessions for the Provincial Governments, International Seminars

In addition to the Steering Committee Meetings and Working Group Meetings, presentation sessions for the Provincial Governments, Discussion Group Meetings and International Seminars were held to involve a wider range of government organisations and to share information on the PEDEC-Nacala study with them.

The objectives in organising series of Discussion Group Meetings were to discuss specific issues and concerns as well strategies of the PEDEC-Nacala study. Those with special concerns on the selected issues were invited to the Discussion Group Meetings.

The objectives to conduct series of presentation session for the Provincial Governments were to share PEDEC-Nacala study results to the provincial governments and to generate feedback and perceptions about the study results.

The objectives to conduct International Seminars were to involve the neighbouring countries particularly Malawi and Zambia and to inform study results of the PEDEC-Nacala.

Table 21.2.3 List of Discussion Group Meetings, Presentation Sessions in Provinces and International Seminars

No.	Date	Main Objectives	Venue	No. Participants*
Discussion Group Meeting (DGM) **				
DGM	30 Sep. 2013	To discuss issues and strategies on Nacala Bay Area and Greater Nampula and railway cargo operation	Maputo	30
Presentation Sessions at Provincial Government				
PS1	07 Dec. 2012	To explain and discuss PR	Lichinga	20
PS2	10 Dec. 2012	To explain and discuss PR	Nampula	23
PS3	11 Dec. 2012	To explain and discuss PR	Pemba	29
PS4	14 Dec. 2012	To explain and discuss PR	Quilimane	25
PS5	17 Dec. 2012	To explain and discuss PR	Tete	25
International Seminar (IS)				
IS1	15 Mar. 2013	To share information and strengthen cooperation between Neighbouring countries	Maputo	93
IS2 **	20-21 Mar. 2014	To share information and strengthen cooperation between Neighbouring countries as well as the private sector	Nampula	129

Note: * Participants from the Japanese side are not included.

** Representatives from municipalities and districts (mayors and district administrators) attended the Discussion Group Meeting and the 2nd International Seminar to discuss the Project.

(4) Stakeholder Meetings

Stakeholder meetings at the provincial level were held in August 2014, as described in Table 21.2.4. The stakeholder meetings were organised by provincial governments, in support of GAZEDA and

MPD. Those from provincial governments, other governments' officers, NGOs, private business groups, university researchers participated in the stakeholder meetings.

Most stakeholders' comments or views were expressed during discussion sessions of the stakeholder meetings. Some comments were delivered in the written form in response to questionnaires distributed in the stakeholder meetings and also sent by e-mails after the stakeholder meetings. More than 200 comments were collected in total.

PEDEC-Nacala Team reviewed and examined these comments to consider how to understand and respond to them. According to the results of the examination, a memo "Understanding of Comments from the Stakeholder Meetings and Responses to Stakeholders' Comments" was prepared and included as Appendix E in this Final Study Report.

Table 21.2.4 Outlines of Stakeholder Meetings in the Five Provinces for PEDEC-Nacala

(1) Nampula Province Stakeholder Meeting

Date & Time	Monday, 11 th August 2014 9:20-15:45
Place	Conference Room, Copa Cabana, Nampula City
Chairman	Mr. Elias Paulo, GAZEDA
Participants	Provincial government officer and municipal mayor: 4 people Other government officer: 4 people Government company: 1 person Private company: 22 people NGO: 18 people University and institution: 6 people Other: 12 people Total 67 people
No. of Questionnaires Collected	13 sheets (12 sheets during the meeting and 1 sheet after the meeting by E-mail)

(2) Cabo Delgado Province Stakeholder Meeting

Date & Time	Thursday, 14th August 2014 09:15-12:00
Place	Conference Room, Kauri Resort, Pemba City
Chairman	Permanent Secretary
Participants	Provincial government officer: 9 people (including Permanent Secretary) Other government officer: 5 people Government company: 5 people Private company: 6 people NGO: 37 people University and institution: 8 people Other: 22 people Total 92 people
No. of Questionnaires Collected	14 sheets (14 sheets collected during the meeting)

(3) Niassa Provincie Government Meeting

Date & Time	Monday 18th August 2014 9:50-12:00
Place	Provincial Government Conference Room, Lichinga City
Chairman	Niassa Province Governor
Participants	Provincial Government Officers: 30 people Total 30 people

(4) Niassa Province Stakeholder Meeting

Date & Time	Monday 18th August 2014 14:10-17:00
Place	Conference Room, IFAPA, Lichinga City
Chairman	Permanent Secretary
Participants	Provincial government officer: 1 person (Permanent Secretary) Other government officer : 4 people Government company 2 people Private company: 10 people NGO: 27 people University and institution: 3 people Other: 5 people Total 52 people
No. of Questionnaires Collected	3 sheets (3 sheets collected during the meeting)

(5) Zambezia Province Stakeholder Meeting

Date & Time	Wednesday 20th August 2014 8:10-11:25
Place	Conference Room, Hotel Chuabo, Quelimane City
Chairman	First half: Permanent Secretary /Second half: Planning & Finance Department Director
Participants	Provincial government officer and district mayor: 30 people (including Permanent Secretary) Other government officer: 4 people Government Company: 2 people Private company: 7 people NGO: 5 people Other: 1 person Total 49 people
No. of Questionnaires Collected	7 sheets (1 sheet collected during the meeting and 6 sheets after the meeting at the provincial government office)

(6) Tete Province Government Meeting

Date & Time	Friday, 22nd August 2014 8:40-9:20
Place	Conference Room, Provincial Government Office, Tete City
Chairman	Tete Province Governor
Participants	Provincial government officer: 19 people Total 19 people

(7) Tete Province Stakeholder Meeting

Date & Time	Friday, 22nd August 2014 14:10-17:15
Place	Conference Room, Paraiso Misterioso, Tete City
Chairman	Mr. Elias Paulo, GAZEDA
Participants	Provincial government officer and municipal mayor: 4 people Other government officer: 7 people Government company: 1 person Private company: 5 people NGO: 35 people University and institution: 1 person Others: 4 people Total 57 people
No. of Questionnaires Collected	1 sheet (1 sheet after the meeting by E-mail)

21.3 Assessment for Alternative Development Scenarios

21.3.1 General

As mentioned in the preceding section, the assessments of the proposed 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 development scenarios and their impacts on the economic, environmental and social conditions. The following proposed development scenarios are discussed in this section:

A-1	Strong Mining Sector Orientation and the Three Enclaves of Tete, Palma and Nacala
B-2	Diversified Economic Sector Development based on Tete-Nacala Single Corridor
B-3	Diversified Economic Sector Development based on a Region- Wide Corridor Network

21.3.2 Risk Identification Analysis for Alternative Development Scenarios

Three development scenarios are assessed from the viewpoints of the economic and spatial, social and environmental aspects. Table 21.3.1 shows the results of the analysis. Based on the results, the following impacts should be noted:

1) Scenario A-1: Strong Mining Sector Orientation and the Three Enclaves of Tete, Palma and Nacala

The implications of this scenario suggest that the mining sector will continue to lead the economic development in the region with coal mining as a major industry. As discussed in the other chapters of this Main Report, Mozambique has relatively large volume and high quality of coal deposits situated in Tete Province. Mozambique plays a very important role in coal supply not only in its own country and neighbouring countries, but also in the world. In terms of economic benefits, this scenario will provide a strong backing for investors in intensive coal exploration and maximise to the fullest of the coal resources in the country not only for domestic use but most importantly for enhancing its coal exports to neighbouring countries, hence it will provide a big boost to the regional and national economies. However, this scenario will only contribute to limited areas.

From the social perspective, this scenario supports local communities and seen to play a role in employment creation as activities are seen to enhance in the coal related industry. Environmental impact area will also smaller affecting only those areas along railways as affected by coal transportation as compared to other scenarios. However, from the environmental point of view, this development scenario, although depending on natural resource-based industries, may not be sustainable in the long run. There are several potential risks associated with this scenario that may be caused natural disasters incidents and extreme national conditions. From the safety and hazards point of view, this scenario will need to be supported by strong environmental policies, and institutional mechanisms to monitor compliance of environmental standards and guidelines. The associated pollution control issues with this scenario are also important consideration particularly in terms of the life cycle of coal mining, including the air and water quality considerations.

2) Scenario B-2: Diversified Economic Sector Development based on Tete-Nacala Single Corridor

Under this development scenario, the diversification of the economic sectors will minimise the risks due to the geographic concentration in Tete and Palma and sectoral concentrations to the development of coal and natural resources. In this proposed scenario, the interconnection and linkages between Tete and Nacala Port, will be strongly integrated by the railway and transportation network, which can transport non-coal products long distances. In the upgraded corridor, the development potentials will emerge and the possibility of promoting other economic sectors not only in the commercial and logistics sectors, but also in manufacturing, especially in major urban centres, such as Nacala Bay Area and Greater Nampula. This scenario will enhance major economic development and will concentrate development in the major urban centres and the areas along the main corridors. As a result, the intensity of such economic development will increase significantly compared to Scenario A-1. Moreover, under this scenario, social and environmental implications will centre on increased migration and movement of people around Tete and Nacala, which will result in an increase in demand for social services and related urban problems, such as solid waste, and demand for housing and electricity.

3) Scenario B-3: Diversified Economic Sector Development based on a Region-wide Corridor Network

Scenario B-3 promotes various economic sectors over wide areas. This scenario will provide business opportunities to a wide range of economic sectors and peoples. As a result, economic growth is shared more and dispersed across wider areas. From the viewpoint of economic stability, the score for Scenario B-3 is higher than that for Scenario A-1. However, there will be risks and proliferation of various types of urban environmental problems to be associated with this development scenario if infrastructures are not developed properly such as water supply, sewage treatment facilities and solid waste management facilities. There will be more complex environmental problems that might occur under Scenario B-3 compared to Scenario A-1 and B-2, because development opportunities are more contributed to various sectors in wider areas.

Table 21.3.1 Evaluation of Alternative Development Scenarios

Scenario Code	Scenario Name	Factors to Differentiate Scenarios		Characteristics of Benefits/Impacts		
		Major Industries	Spatial Pattern	Economic and Spatial Benefits/Impacts	Social Impacts	Environmental Impacts
A-1	Strong Mining Sector Orientation and Three Enclaves of Tete, Palma and Nacala (Zero Option)	A. Mining-Sector-Oriented Regional Development	1: Three Enclaves of Tete, Palma and Nacala	<ul style="list-style-type: none"> • Significant Positive Effect: Concentrated investments to mining sectors, including supporting sectors, infrastructure and urban facilities, will take place in Tete and Palma. The efficiency of invested capital for such mining-related development will be relatively high. • Negative Effect: However, since those supporting sectors, infrastructure and urban functions will be developed closely related to mining sectors, it will be difficult for other economic sectors to utilize them for their further development. As a result, not so wide a range of economic sectors will be able to develop based on the infrastructure and urban functions to be developed in relation to mining sectors in Tete and Palma. • Negative Effect: Since mineral resource development is influenced by world price fluctuation and other external shocks, Nacala Corridor Region's economy will not be very sustainable in the long run. • Negative Effect: The possibility of the improvement of value-chains for agriculture in the Nacala Corridor Region is very limited to the enclave areas. Difficulties for small-scale farmers to get access to chemical inputs and transport services will continue. 	<ul style="list-style-type: none"> • Negative Effect: A large influx of migrant managers, engineers and other workers from outside the enclaves may occur, causing various social problems. • Negative Effect: On the other hand, the employment of local human resources for mineral resources development will be limited. The supporting sectors for mining development include machine spare parts supply and maintenance services for excavation, and transport will also be operated by foreign-related enterprises. Therefore, benefits from this development scenario will not reach a wide area, but concentrate to the three enclave areas. • Slight Positive Effect: The social impacts caused by the development will also be limited to the three enclaves. 	<ul style="list-style-type: none"> • Negative Effect: Coal mining will change land features, which is likely to affect landscape, vegetation, habitats of wild animals, air quality and water quality. • Significant Positive Effect: Since the development will be limited mainly to three enclave areas, the environmental impact will also be limited geographically. This situation will make it relatively easier to implement environmental mitigation measures, environmental control and monitoring. • Slight Positive Effect: Large mining companies conduct environmental management relatively well. However, if an accident occurs, a large negative environmental impact will be caused in Tete and off-shore of Palma in Cabo Delgado. • Negative Effect: There may be an increase in negative impact on the living environment and inhabitants' health due to dust pollution caused by coal transport, as well as by coal loading & unloading. • Negative Effect: If the above negative impact is extremely large, there is a possibility of decline or suspension of mining operation, as well as closure of mines. In such a case, the impact on the regional economy will be serious.
B-2	Diversified Economic Sectors Development Based on Tete-Nacala Single Corridor	B. Regional Development Based on Diversified Economic Sectors	2: Tete-Nacala Single Corridor Development	<ul style="list-style-type: none"> • Slight Positive Effect: The risks caused by geographical concentration of economic development will be eased compared to Scenario 1 due to diverse economic sectors in wide areas. • Slight Positive Effect: Tete and Nacala Port will be connected strongly by railway and trunk road, which can transport non-coal cargoes in a long distance. With this upgraded corridor, development potentials will emerge. It will become possible to promote development of not only commercial and logistics sectors, but also manufacturing sectors, especially in major urban centres, such as Nacala and Nampula. Since the upgraded transport corridor is only one from Tete to Nacala Port, major economic development will tend to concentrate in the major urban centres and the areas along the main corridor. • Slight Positive Effect: With this upgraded transport corridor, transport costs will be reduced greatly along the corridor. Moreover, with the upgraded urban centres on the corridor, private sectors will be able to create a value chain for agricultural sectors. • Negative Effect: However, Palma and Pemba will not be strongly connected with the main corridor of Tete-Nacala Port. As a result, manufacturing sectors around Nacala Port will not have synergetic effect with natural gas exploitation and chemical industries in Palma. • Negative Effect: Improvement of value-chains for agriculture will be limited to the areas along the corridor of Nacala-Nampula-Cuamba-Mandimba-Lichinga. A majority of small-scale farmers will continue to feel it difficult in getting access to chemical inputs and transport services. 	<ul style="list-style-type: none"> • Negative Effect: Since the transport corridor will be upgraded mainly from Tete to Nacala Port, the scale and extent of development benefits will be limited to the areas along the main corridor (Tete-Nacala Port). • Slight Positive Effect: As a result, the price decline of consumer goods and construction material due to the decrease in transport costs will not be enjoyed very widely in the region. The improvement of market access will also be limited to the corridor areas. • Slight Positive Effect: Increase of selling prices of small-farmers' agricultural products will take place only along the upgraded corridors. • Negative Effect: With a less extensive transport corridor network, a huge size of less accessible areas will remain in the region. 	<ul style="list-style-type: none"> • Slight Positive Effect: The environmental impact including reduction of forest areas will be limited to the areas along Tete-Nacala Corridor. • Negative Effect: In major urban centres at important nodal points, such as Nacala and Nampula, the environmental impact will increase due to the concentration in population increase and economic development.

B-3	Diversified Economic Sectors Development Based on a Region-Wide Corridor Network	B. Regional Development Based on Diversified Economic Sectors	3: Development Based on a Region-Wide Corridor Network	<ul style="list-style-type: none"> • Significant Positive Effect: Economic sectors will become more diverse and the risk caused by market demand fluctuation of mineral resources will be much eased compared with Scenarios 1 and 2. • Significant Positive Effect: Under the extensive upgraded transport corridor network, not only large enterprises but also small & medium enterprises (SMEs) will be able to participate in development opportunities to arise due to the upgrading of transport corridors. At the same time, a variety of economic sectors will be able to grow by utilizing various potentials scattering over a wide region. This will also benefit the national economy as a whole. • Negative Effect: On the other hand, the improvement of such a region-wide corridor network will be costly. It will be necessary for economic sectors of the region to make continuous effort at promoting diversified and geographically wide economic development in order to generate a large enough volume of cargo to sustain the extensive corridor network. • Significant Positive Effect: Improved value-chains for agriculture will be available in wide areas of the Nacala Corridor Region. As a result, small-scale farmers will be able to get access to chemical inputs and transport services. 	<ul style="list-style-type: none"> • Significant Positive Effect: With the upgraded extensive corridor network, accessibility to infrastructure and services will be largely improved and time costs borne by people and businesses will be reduced in wide areas in the region. • Significant Positive Effect: This type of extensive corridor network has a positive effect on reducing the prices of daily commodities and construction materials. • Significant Positive Effect: Small-scale farmers will have opportunities to expand their markets due to better access. Selling prices of small-scale farmers' agricultural products will be increased in relatively wide areas, due to the decrease of transport costs. • Negative Effect: While the extended corridor network will bring commercial agricultural investments and public construction projects, and expand business opportunities in the region, land acquisition and unspontaneous resettlement would increase. Consequently, risks of loss of income sources or means of livelihood, which affects the inhabitants, especially small-scale farmers of the region might increase even with recommended land management effort. • Slight Positive Effect: Business opportunities will expand due to the geographical expansion of development areas. On the other hand, there is a risk of widening the gap between the rich and the poor. • Negative Effect: The risks of crime and prevalence of infectious diseases may increase in wide areas due to a large volume of migration. 	<ul style="list-style-type: none"> • Negative Effect: The environmental impact including reduction of forest areas will be larger than the other development scenarios. • Negative Effect: If the provision of infrastructure is delayed, the negative impact on the living environment may become larger in Nacala Bay Area, because of its rapid population increase, causing rapid expansion of urban sprawl, heavy traffic congestion, increase of solid waste and sewage. • Negative Effect: In the case of Nacala Bay Area, development of manufacturing sectors and increase of commercial and logistics activities will take place along Nacala Bay. It is likely to bring about environmental impacts in a compounding manner. • Negative Effect: Nampula will also continue to increase its population and expand economic development. As a result, the environmental impact will become larger. The rail transport for massive coal through the central part of Nampula City might cause serious negative impacts. Moreover, the road traffic on National Road No. 13 on the main corridor will also go through the central area of Nampula City. These compounding impacts might cause serious negative impacts. Furthermore, such serious impacts might hinder economic development for Greater Nampula.
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Source: JICA Study Team

21.3.3 Sustainable Tests

The sustainability of each scenario is assessed from the view point of natural resources, social and cultural conditions and economic aspects. The results are shown in Table 21.3.2, and description of scoring is shown in Table 21.3.3.

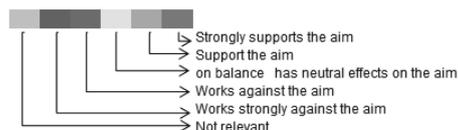
For the assessment of three alternative development scenarios, six scales of score (0 to 5) are created. The high score will show if three development scenarios support or are against the sustainability aims. The six scales of score are as follows:

- Scale 0: The scenario is not relevant
- 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 21.3.2 Result of Sustainable Tests for Development Scenarios

Criteria-Basic Aims and Objectives	Indicators	Performance Assure		
		Scenario A-1	Scenario B-2	Scenario B-3
Effect on Natural Resources				
Protected Areas and Wildlife: should be conserved, and these resources should be enhanced where practical	Community split, culture	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Degraded Land: Areas vulnerable to degradation should be avoided, and already degraded land should be enhanced.	Vulnerable areas shown on maps	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Energy: The Activity should encourage efficient energy use, and maximize use of renewable rather than fossil fuels.	Quantity and type of fuel/energy to be identified	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Pollution: Discharges of pollutants and waste products to the atmosphere, water and land should be avoided or minimized	Quantity /type of pollutants and waste to be identified	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Use of Raw Materials: All raw materials should be used with maximum efficiency, and recycled where practical.	Quantity and type of materials	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Rivers and Water bodies: should retain their natural character.	Minimum flows/ water levels to be set	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Effect on Social and Cultural Conditions				
Local Character: and cohesion of local communities should be and enhanced where practical.	Vulnerability of local communities	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 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.	Number of People exposed to water borne disease, or lacking adequate food and shelter to be assessed	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Gender: The Activity should empower women.	Opportunity of women' participation to society	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Job Creation: The activity should create jobs for local people particularly women and young people.	Number of people given employment	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Participation: Active participation and involvement of local communities should be encouraged (especially vulnerable and excluded sections).	Level of participation	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Access to Land: Activity should improve access to land.	Opportunity for land acquisition by disadvantage group	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Access to Water: Activity should improve access to water.	Accessibility to water	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Access to Transport: Activity should improve access to transport.	Accessibility to transportation services	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Sanitation: Activity should improve sanitation.	Number of facility	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 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.	Number of poor people receiving benefit on equitable terms	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Vulnerability and Risk: of drought, bushfire, floods crises and conflicts and epidemics should be reduced.	Disaster occurrence	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Effect on Economy				
Growth: Economic development should be strong and stable.	Economic output	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Use of local materials and services: The use of raw materials and services from local industries where possible.	Use of local materials and services	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5
Local Investment of Capital: Development should encourage the local retention of capital and the development of downstream industries, utilizing local raw materials, products and labour.	Description of investment strategy	(0) 1 2 3 4 5	(0) 1 2 3 4 5	(0) 1 2 3 4 5

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1) Effects of the Project on Natural Resources

Although economic activities of Scenario A-1 are limited to areas of Tete, Palma and Nacala and their surrounding areas, the economic activities of Scenario B-2 are widely located along the corridor from Tete to Nacala, and furthermore, the economic activities of Scenario B-3 are planned to extend to wider areas of the Nacala Corridor Region. As a result, the locations or zones where forests and bushes exist could be altered by the introduction of these economic activities.

The railway in Scenario A-1 will be used only for coal transport, and the energy consumption for railway transport of Scenarios B-2 and B-3 is more efficient than that of Scenario A-1 since the upgraded railway is to transport not only coal but also other cargo,

The diversified economic activities under Scenarios B-2 and B-3 are expected to utilise a variety of resources available in the region. The major economic sectors under Scenario A-1 is coal mining and natural gas extraction and natural gas-based chemical industries, hence the mining of coal and natural gas is expected to be continuously dominant and the regional economic activities under Scenario A-1 will depend on the extraction of coal and natural gas and their related industries. From the viewpoint of sustainable resources use, Scenario B-3 is more sustainable compared to A-1 and B-2.

2) Effects of the Project on Society and Culture

From viewpoint of job creation, including job opportunity for women, more people can easily participate in opportunities of economic development under Scenario B-3. Job opportunities for women are expected to increase under Scenario B-3, with a more diversified economy.

Scenario A-1 in terms of accessibility to land, water and transportation is expected to improve with the railway connections between Tete, Palm and Nacala, whereas the accessibility under Scenario B-3 will be improved widely in the region. The sanitary conditions, including solid waste and sewage, are expected to deteriorate due to foreseen increase of load from the projected population growth.

3) Effects of the Project on Economy

Scenario A-1 suggests that the coal industry is to contribute more to economic development. More people can reap the benefits of development under Scenario B-3. In terms of equity, wider distribution of benefits created from economic development is expected by Scenario B-3 than either Scenario B-2 and Scenario A-1.

The diversification and extended economic development are expected to be larger and stable in Scenario B-3 compared to the economic sectors which are heavily dependent on mining sectors. Since the utilisation of resources and investment are more diversified and more sustainable, Scenario B-3 is expected to generate higher benefits than the other scenarios.

Table 21.3.3 Description of Scoring for Sustainable Tests of Development Scenarios

Category of Sustainability	Scenario A-1	Scenario B-2	Scenario B-3
Effect on Natural Resources	1) The effects of economic activities under this Scenario is considered to be well balanced and has a neutral impact on wildlife habitats and forests as the current impact. Therefore, the score is "3" as neutral.	1) The effects of economic activities under this Scenario is considered to be well balanced and has a neutral impact on wildlife habitats and forests as the current impact. Therefore, the score is "3".	1) Under this scenario, the railway network will be expanded to wider areas so that economic activities and infrastructure development will influence and affect the existing wildlife habitat and forests as well as bushes more than A-1 and B-2. Therefore the score is lower than A-1 and B-2.
	2) There is no plan to develop in degraded land	2) There is no plan to develop in degraded land	2) There is no plan to develop in degraded land
	3) Energy consumption is limited and economic sectors are not well diversified under this scenario. Therefore, energy efficiency is lower than B-2 and B-3.	3) More various cargoes are transported by railway. Economic activities are projected to be implemented under this scenario, hence energy consumption is estimated to be high. The concern about efficiency in high energy consumption of these economic activities is unknown so that the evaluation under this scenario is lower than A-1	3) Energy efficiency under this scenario is the same as B-2 except that the energy consumption is higher than B-2 because there are various energy sources can be developed such as natural gas, hydropower. However, it is still not known how to determine the sustainability aspect.
	4) Level of pollution load will not change drastically under this scenario so that the score is "3" as neutral.	4) Pollution load and solid waste generation are expected to increase due to the increased population and economic activities so that sustainability aspects under this scenario are in question, therefore, the score is negative.	4) Pollution load and solid waste generation will increase with population and increasing economic activities so that sustainability under this scenario is negative.
	5) The present economic enterprises are considered mostly based on small and medium enterprises (selling low materials and small products from wholesale dealers). The market of recycling industry is also small-scale but has potential to absorb the amount of generated recyclable wastes, and improvement in terms of quality and collection system. Therefore, this scenario is strongly against sustainability.	5) The industry sector will be developed but the most of them are processing industries of raw material. Therefore, the score is negative as "1".	5) Various economic activities will be developed so that the high value-added products will also be produced. It is expected that the recycling market will be larger than A-1 and B-2.
	6) A-1 will not impact on river and other water bodies at the current conditions.	6) Water resource development projects are expected to be implemented. Therefore B-2 will have an affect on the existing rivers and water bodies.	6) Water resource development projects are expected to be implemented. Therefore B-2 will have an affect on the existing rivers and water bodies
Effect on Social and Cultural Conditions	1) 2) Local character of communities, health and well-being will not be changed	1) 2) For vulnerable communities can be influenced by migrant people	1) 2) For vulnerable communities can be influenced by migrant people
	3) Gender issues will not be well treated under A-1 so that the score is "3" as the same as the current conditions.	3) B-2 provides opportunities for women in terms of participation and access in society, and economic opportunities so that the score is higher than A-1.	3) B-3 provides more opportunities for women as manifested in more diversified economic opportunities so that the score is more than B-2.
	4) The regional economy is heavily dependent on the coal industry and natural gas does provide a very limited	4) Coal and natural gas related industries and other manufacturing industries can provide job	4) Economic diversity is higher than other scenarios. There will be more chances for job creation for young

	number of job opportunities for women. Therefore, the score is negative.	opportunities to women. However, it will not be so diverse. Therefore, the score is "4".	people. Women also can have many chances to work in various economic sectors and have opportunities to establish their own businesses.
	5) It is difficult to participate in development activities mainly due to a less diversified economy, with limited beneficiaries as the same as the status quo. Therefore, the score is "3" as the same as the current conditions.	5) Participation level of local community to development interventions is higher than A-1. However, the influence area is extended to the planned railway network, so that the score is "4" as positive.	5) More people can receive benefits from development interventions because of wider influence area. The score is "5" as positive.
	6) Water availability and accessibility will not be drastically changed under this scenario. Therefore, the score is "3".	6) B-2 provides water resource development and water supply system. It is higher accessibility than A-1, but the water supply system still will cover limited areas. Therefore, the score is "4" but not so high.	6) B-3 provides higher accessibility to water for wider areas than B-2. Therefore, the score is higher than B-2.
	7) Access to transportation will not be drastically improved under this scenario. Therefore, the score is "3".	7) B-2 provides new railway line and new road development, hence, higher accessibility than A-1, but only in limited areas. Therefore, the score is "4", but not so high.	7) B-3 provides higher accessibility to transportation for wider areas than B-2. Therefore, the score is higher than B-2.
	8) Sanitary conditions will not drastically change under this scenario. Therefore, the score is "3".	8) B-2 provides sewage treatment systems, drainage systems and appropriate waste disposal sites. Higher sanitary level than A-1, but only in limited areas. Therefore, the score is "4", but not so high.	8) B-3 provides more facilities for improvement of sanitary conditions than B-2. Therefore, the score is higher than B-2.
	9) Only limited people will receive development opportunities in less diversified economy and only in limited development interventions. Therefore, the score is negative from viewpoint of equity in development.	9) B-2 promotes diversified economic sectors, and influence areas will be wider so that people will have more opportunities from development interventions. Therefore, the score is "4" as positive.	9) B-3 promotes more diversified economic sectors and influence wider areas. Therefore, the score is higher than B-2 as "5".
	10) A-1 would not increase risks to generate drought, bushfire and flood, so that the score is "3" as the same as the current conditions.	10) B-2 will not increase risks to generate drought, bushfire and flood. However, potential epidemic risks would increase because of more mobility of people between provinces.	10) B-2 will not increase risks to generate drought, bushfire and flood. However, potential epidemic risks would increase because of more mobility of people between provinces.
Effect on Economy	1) Coal based industry is a resource industry and once depleted it will have a negative impact on the economy. Coal products are normally exported with the price depending on the global market. Therefore, the score is negative because of its price instability.	1) B-2 creates diversified economic sectors in wider areas so that the regional economy is considered to become stronger and more stable than A-1. However, under this scenario the influence areas are limited.	1) B-3 creates more diversified economic sectors in wider areas. Such a diversified economy could become stronger and more stable. Therefore, the score is "5".
	2) No drastic change as same as the current situations.	2) Economy is diversified so that various local materials can be used.	2) Economy is more diversified so that the existing businesses can be expanded and new businesses can be created. Therefore, various local materials can be used.
	3) In A-1, besides large-scale mining projects, investment opportunities are limited. Therefore, the score is negative because it would provide a limited number of opportunities for investment for local SMEs and people.	3) Various economic sectors can be created so that local investors and local SMEs will have more opportunities to participate. Therefore, the score is positive.	3) Local investors and SMEs will have more opportunities for participation in various and wider areas.

21.4 Assessment of Essential Development Strategies

21.4.1 Targets of Compatibility Analysis

The essential development strategies proposed under the PEDEC-Nacala are evaluated on the basis of their compatibility and how they support and complement other strategies within PEDEC-Nacala. The following are the proposed essential development strategies, of which detailed discussions are contained in Chapter 13:

- Strategy-1: Securing of the transport function of Nacala Corridor
- Strategy-2: Development of the foundation for Nacala Bay Area and Greater Nampula
- Strategy-3: Promoting agricultural development by supporting small-scale farmers and effective utilisation of private sector
- Strategy-4: Strengthening of environmental and land management
- Strategy-5: Capacity development of the institutional framework for coordinating and promoting integrated regional development
- Strategy-6: Strengthening of basic education and industrial human resources
- Strategy-7: Taking care of emerging social problems, vulnerable groups and less accessible areas

21.4.2 Results of Compatibility Analysis

Table 21.4.1 illustrates the results of the compatibility analysis. As shown in the table, it is noted that “Strategy-7 Taking Care of emerging social problems, vulnerable groups and less accessible areas” has no relation to other strategies and suggests no significant conflicts with the other six strategies. Strategies 1 to 6 are observed to be complementing each other, which promotes a more integrated approach in achieving the desired vision and goal of PEDEC-Nacala. The “Strategy-4 Strengthening of environmental management and land management” supports other development strategies and ensure sustainability of Nacala Corridor Development.

Table 21.4.1 Compatible Matrix of Essential Strategies

Essential Strategies for PEDEC							
	1. Securing of Transport Function of Nacala Corridor	2. Development of Foundation for Nacala Bay Area and Greater Nampula	3. Promoting of Agricultural Development by Supporting Small-Scale Farmers and Effective Utilisation of Private Sector	4. Strengthening of Environmental and Land Management	5. Strengthening of Basic Education and Industrial Human Resources	6. Capacity Development of Institutional Framework for Coordinating and Promoting Integrated Regional Development	7. Taking Care of Emerging Social Problems, Vulnerable People and Less Accessible Areas
1 Securing of Transport Function of Nacala Corridor		+	+	0	0	+	0
2 Development of Foundation for Nacala Bay Area and Greater Nampula			+	+	+	0	0
3 Promoting of Agricultural Development by Supporting Small-Scale Farmers and Effective Utilisation of Private Sector				+	0	0	0
4 Strengthening of Environmental and Land Management					0	+	0
5 Strengthening of Basic Education and Industrial Human Resources						+	0
6 Capacity Development of Institutional Framework for Coordinating and Promoting Integrated Regional Development							0
7 Taking Care of Emerging Social Problems, Vulnerable People and Less Accessible Areas							

+: Mutually supportive with each strategy
X: Potential to conflict with each strategy
0: no significant interaction

21.5 Assessment of Short and Medium-Term High Priority Programmes

21.5.1 Targets of Assessment for Cumulative Effect Analysis

For this assessment, the targets of cumulative effect analysis are six programmes including 23 projects. The titles of the programmes and projects are shown in Table 21.5.1.

Table 21.5.1 Target Programmes and Projects for Cumulative Analysis

Nacala International Gateway Programme
Nacala Industrial Park Project
Industrial Belt Area Development Project
Nacala Port Access Road Project
Nacala Multi-Modal Terminal and Railway Shunting Yard Project
Project for Urgent Installation of Thermal Power Generator with Capacity of 30-40MW in Nacala Bay Area
Nacala Thermal Power Plant Project
Nacala Urban Water Supply Expansion Project
SEZ/IFZ Management Improvement Project
Nampula Regional Growth Centre Programme
Nampula Southern Road Bypass Project
Nampula Multi-Modal Terminal and Railway Shunting Yard Relocation Project
Nampula Railway Bypass Project
Railway Crossings Improvement Project
Cuamba Logistics and Industrial Centre Programme
Cuamba Bypass Road Project
Cuamba Industrial Park Project
Cuamba-Marrupa Road Project
Palma Natural Gas Exploitation and Chemical Industrial Centre Programme
Palma Port Project
Palma Thermal Power Plant Project
Palma Urban Water Supply Project
Palma Urban Expansion Project
Water Resources Development Sector Programme
Project for Study on Integrated Water Resources Management of River Basins surrounding Nacala Bay Area and Lurio River Basin
Power and Energy Sector Programme
Nampula- Nacala Power Substation Reinforcement Project
Chimuara- Namialo-Nacala Transmission Line Project
Palma-Pemba-Nacala Transmission Line Project
Tete Coal Briquette Project

21.5.2 Results of Cumulative Effect Analysis

The results of the cumulative effect analysis are shown in Tables 21.5.2 to 7. It should be noted that there are constraints in undertaking the cumulative analysis at the regional strategy level. For

example, although recommended programmes cover large areas, cumulative effects might appear in smaller areas. Recommended programmes and projects have no details including size, boundaries, activities, physical facilities and operation schedule, at the regional strategy level, the effect analysis is conducted and presented only in a qualitative manner.

Table 21.5.2 Cumulative Effect Analysis for Nacala International Gateway Programme

Cumulative Effect Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> • Increase of transport movement and commuting • Increase of noise accumulation of vehicles
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> • Increase of air pollutants by increased traffic volume • Increase of air pollutants by increased number of ships • Increase of generation of dust by coal transport
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> • Increase of water pollution load in Nacala Bay by increased activities of factories, business enterprises, household, and increased ships • Increase of suspended solid in Nacala Bay from coal terminal port
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> • Increase of water consumption due to economic development and population growth
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> • No protected areas in surrounding programme areas
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> • Conversion of land to commercial, industrial area from bush, grassland and other natural land covers because of industrial development projects and others
Loss of historic heritage through developments	<ul style="list-style-type: none"> • Unknown
Loss of open countryside or green spaces	<ul style="list-style-type: none"> • Conversion of land to commercial, industrial area from bush, grassland and other natural land covers because of industrial development projects and others
Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> • Changes in hydrological conditions in coastal water due to construction of sea reclamation, dikes and other facilities on the shoreline
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> • Changes in land use and environmental conditions due to road construction and conversion of land use to commercial area and industrial area from bush, grassland and other areas
Habitat degradation	<ul style="list-style-type: none"> • Loss of habitat caused by large development projects such as industrial parks, industrial Belt Development • Loss of natural shorelines due to sea reclamation and construction of dikes, etc • Changes in coastal environment caused by the discharge of cooling water from power station and factories
Loss of biological diversity	<ul style="list-style-type: none"> • Decrease of biological diversity on coastal zone because of the development of ports, coal terminals, factories and other facilities
Loss of amenity	<ul style="list-style-type: none"> • Decrease of natural shoreline due to sea reclamation and construction of port facility

Table 21.5.3 Cumulative Effect Analysis for Nampula Regional Growth Centre Programme

Cumulative Effect Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> • Decrease of traffic congestion because the existing traffic volume in urban areas will be diverted, width of road will be wider and railway crossing project
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> • Improvement in air quality because smooth traffic in urban area • Deterioration of air quality around new bypass road and railway • Deterioration of air quality due to Nampula Multi-Modal Terminal and

	Railway Shunting Yard Project
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> Increase of probability of groundwater contamination of oil and/heavy metals by Railway Shunting Yard Increase of water consumption due to economic development and population growth
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> No protected areas in surrounding programme areas
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> Change in habitat environment by land use conversion around new bypass road
Loss of historic heritage through developments	<ul style="list-style-type: none"> Unknown
Loss of open countryside or green spaces	<ul style="list-style-type: none"> Conversion of new bypass road, multi-modal terminal and railway shunting yard from space area and bush
Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Habitat degradation	<ul style="list-style-type: none"> Changes in natural environmental conditions due to new bypass road, railway shunting yard
Loss of biological diversity	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Loss of amenity	<ul style="list-style-type: none"> Increase of amenity due to railway crossing improvement

Table 21.5.4 Cumulative Effect Analysis for Cuamba Logistics and Industrial Centre Programme

Cumulative Effect Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> Decrease of traffic congestion in urban areas because the existing traffic volume will be divert to Cuamba bypass road Decrease of traffic congestion on the existing road from Cuamba to Marrupa due to improvement for all-weather roads Increase of traffic volume on access road to Cuamba Industrial Park
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> Decrease of air pollution load by smooth traffic due to Cuamba bypass road and road improvement from Cuamba to Marrupa Increase of air pollution load by increasing of traffic volume due to Cuamba Industrial Park
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> No protected areas in surrounding programme areas
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Loss of historic heritage through developments	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Loss of open countryside or green spaces	<ul style="list-style-type: none"> Conversion of land to agro-industrial area from bush, grassland and other natural land covers because of Cuamba Industrial Park

Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Habitat degradation	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of biological diversity	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of amenity	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect

Table 21.5.5 Cumulative Effect Analysis for Palma Natural Gas Exploitation and Chemical Industrial Centre Programme

Cumulative Effect Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> • Increase of transport movement and commuting because of natural gas industry development and increasing of population by supporting sectors for natural gas industry
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> • Increase of air pollutants generated from the natural gas industry • Increase of air pollutants generated from an increased traffic volume • To increase air pollutants generated from an increased number of ships
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> • Increase of water pollution load from LNG plants, natural gas-related industries • Increase of water pollution load generated from an increased activities from factories, business enterprises, household, and increased ships
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> • Increase of water consumption due to development of natural gas industry, and by the increasing urban population and support services sectors for natural gas industry
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> • No protected areas in surrounding programme areas
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> • Conversion of land to industrial area from natural shoreline by natural gas related industrial development in coastal zone • Conversion of land to commercial, residential area and infrastructure from bush, grassland and other natural land covers because of urban expansion project
Loss of historic heritage through developments	<ul style="list-style-type: none"> • Unknown
Loss of open countryside or green spaces	<ul style="list-style-type: none"> • Conversion of land to commercial, residential area and infrastructure from open space by urban expansion project
Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> • Changes in hydrological conditions in coastal water due to construction of Palma Port, sea reclamation, facilities on the shoreline
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> • Changes in land use and environmental conditions due to road construction and conversion of land use to commercial area, industrial area and residential area from bush, grassland and other areas
Habitat degradation	<ul style="list-style-type: none"> • Loss of habitat caused by urban expansion projects • Loss of natural shorelines due to sea reclamation and construction of dikes • Changes in coastal environment by discharging cooling water from power station and factories
Loss of biological diversity	<ul style="list-style-type: none"> • To decrease biological diversity on coastal zones because development of natural gas industry including a port and off-shore gas field
Loss of amenity	<ul style="list-style-type: none"> • Loss of coastal recreational activities in some of areas because of coastal development by natural gas industry • Decrease of natural shoreline due to sea reclamation and construction of port facility

Table 21.5.6 Cumulative Effect Analysis for Water Resources Development Sector Programme

Cumulative Effects Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> Increase of air pollutants generated from the operation of heavy equipment during construction phase
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> Unknown
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> Increase of probability of impacts on aquifer caused by construction of tunnel used for water transmission
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Loss of historic heritage through developments	<ul style="list-style-type: none"> Unknown
Loss of open countryside or green spaces	<ul style="list-style-type: none"> The programme may not cause significant cumulative effect
Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> Changes in water run-off in Lurio and Mecuburi river streams Increase of probability of changes of coastal line in the surrounding area at the river mouths of Lurio river and Mecuburi rivers Changes in water run-off due to the construction of dams for hydropower, agriculture and other purposes
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> Changes in natural environmental conditions (both land areas and water areas) during construction of the intake points at the Lurio River
Habitat degradation	<ul style="list-style-type: none"> Changes in natural environmental conditions of rivers and river mouths of Lurio river and Mecuburi river due to the changes in water run-off
Loss of biological diversity	<ul style="list-style-type: none"> Changes in the type of ecosystem from land area to water area during construction of the intake point of Lurio river and outlet point of Mecuburi river
Loss of amenity	<ul style="list-style-type: none"> Unknown

Table 21.5.7 Cumulative Effect Analysis for Power and Energy Sector Programme

Cumulative Effects Issues	Causes
Increase in traffic congestion affecting urban environmental quality	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Increase in air pollution resulting in degradation of regional air quality	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Changes in quality of water bodies from increased surface water run-off and contamination	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Reduction or contamination of groundwater supplies	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Changes in ecological integrity of protected areas	<ul style="list-style-type: none"> • No protected areas in surrounding programme areas
Loss of habitats through residential, commercial and industrial development	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of historic heritage through developments	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of open countryside or green spaces	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Changes in hydrological regimes of water courses and coastal waters	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Habitat fragmentation from infrastructure construction or changes in land use	<ul style="list-style-type: none"> • Decrease of green areas under transmission lines and split green area • Increase of probability of the disturbance of migrant birds due to the installation of transmission lines
Habitat degradation	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of biological diversity	<ul style="list-style-type: none"> • The programme may not cause significant cumulative effect
Loss of amenity	<ul style="list-style-type: none"> • Generation of visual impacts caused by the installation of transmission lines

21.6 SEA Recommendations

In Mozambique, despite the rich natural resources, many of its regions have experienced slow economic progress. The formulation of the PEDEC-Nacala is a very important step to Mozambique that will laid down strategies and measures that could facilitate development and investment in the region. The proposed strategies will promote a dynamic development and inclusive development by guiding various economic sectors and infrastructure/service sectors to take advantage of potentialities as well as to tackle constraints. With this projected dynamic development, it is expected that it will stimulate development in the neighbouring regions as well as contributing to the national economy development as a whole.

While the results of the SEA study suggest an overall positive conclusion as to its environmental and social consideration, the following recommendations should be considered in the finalisation and implementation of these development strategies in order to minimise and contain environmental and social problems in the future. From environment, social and economic viewpoints, the following points are recommended.

21.6.1 SEA Recommendations for Essential Development Strategies

As a result of the compatibility analysis for Essential Development Strategies, it can be said that Strategies-1 to 6 are complementary each other. Hence the sustainability of regional development is assured. For implementing the Essential Development Strategies, an implementation system for Nacala Corridor Development should be established. Such an implementation system should include the following:

- Capacity Development for EIA
- Development of Environmental Laboratories
- Establishment of an Environmental Section in the Agency for Nacala Corridor Development (ADCN)

21.6.2 SEA Recommendations for Development Strategies

The following recommendations are made on the basis of examinations and analyses conducted above in this chapter (sustainable test, compatibility analysis, cumulative effect analysis), as well as the comments made by stakeholders during consultations:

(1) General

In order to ensure the integration of environmental and social considerations, the implementation of the proposed programmes/projects should be monitored and results of the monitoring of environmental conditions should be used to feedback to the strategy preparation and implementation. For achieving such purposes, the following are recommended:

1) Establishment of Environmental Section in Agency for Nacala Corridor Development (ADCN)

The Environmental Section in new organization named Agency for Nacala Corridor Development (ADCN) should be established to support the implementation of the proposed programmes/projects and to ensure that environmental and social considerations are integrated into the programmes/projects. The Environmental Section should have the following functions:

- To conduct environmental and social consideration for programmes/projects
- To support IEE/EIA studies for proposed programmes/projects
- To review and check IEE/EIA reports to be prepared by implementing organisations before submission to Ministry of Land, Environment and Rural Development
- To monitor the implementation of proposed programmes/projects in support with Ministry of Land, Environment and Rural Development based on IEE/EIA studies, and feed back to implementing organisations
(See Sections 17.5 and 18.5.)

2) Implementation of Environmental Management and Establishment of Environmental Laboratories

Although the infrastructure of environmental laboratories is essential for environmental administration and environmental management, especially for monitoring environmental conditions, Mozambique government has not developed enough capacity to monitor and guide the implementation of environmental management plans. First, an implementation system for monitoring and guiding of project proponents should be established. Second, capacity development of technical personnel to operate environmental laboratories is necessary.

From this viewpoint, the Ministry of Land, Environment and Rural Development (MITADER) needs to formulate an appropriate plan to establish and operate environmental laboratories in Maputo, Nacala and Tete. (See Sections 17.5 and 20.2)

(2) Economic Sector Development Strategies

1) Special Consideration for Small-Scale Farmers and Farmers Associations

The agriculture sector is the largest economic sector in Mozambique. The labour force of the agriculture sector in the Nacala Corridor Region accounts for 85% of total labour force (2007). Furthermore, small-scale farmer households are the majority, 99.3% of total farm households are small-scale. These farmers are one of the vulnerable groups as discussed in Chapter 14 having issues as follows:

- Small-scale farmers who practice family farming are dominant in the Nacala Corridor Region. Their agricultural productivity is relatively low, and their production volume per family is not substantially large although the soils and rainfall in the region are favourable for agriculture.
- The small-scale farmers' agriculture is extensive in input of land and labour, which requires shifting of cultivated lands and keeping of large fallow areas.

It is recommended that small-scale farmers and farmer associations should be considered as major stakeholders and should be encourage to be active participants in the PEDEC-Nacala, especially at the implementation stage. This consideration is reflected in Sections 14.2 and 18.6.

2) Enhancement of Local Industry by Promoting Strengthening of Linkage with Large-Scale Projects/Companies

It is expected that large-scale enterprises and foreign enterprises will increased in the Nacala Corridor Region and may influence the development of local industries, especially small and medium enterprises (SMEs). The linkage between large-scale enterprises/foreign enterprises and local SMEs should be promoted for the development of the regional economy because large-scale

enterprises have financial, technical and marketing capabilities. Therefore, programmes, as well as laws and regulations, concerning the promotion of such linkages should be developed and enforced in order to not to undermine local industries. (See Sections 14.9 and 20.2.)

(3) Infrastructure Sector Development Strategies

1) Transporting Coal from Tete to Nacala

There is a huge coal reserve in Tete Province and the mining sector is expected continue to develop in the future in order to respond to increasing demand of the world, as well as of the neighbouring countries. Transport of coal from Tete's mines to sea ports will be made by upgrading railways consisting of new lines (from Moatize through Malawi to Cuamba) and existing lines of the Nacala Corridor and a new line to Nacala-a-Velha. The transportation system of coal is pre-conditioned in the formulation of the PEDEC Development Strategies. However, it is necessary to take the following environmental countermeasures against problems due to coal mining activities and coal transport:

- Transportation of coal from mining sites to Nacala Port
 - Dust control of coal goods wagons with installation of cover and spraying water
 - Reduction of travelling speed in populated areas for reduction of noise and vibration caused by heavy goods wagons
- Coal terminal in Nacala-a-Velha
 - Installation of dust protection net at coal yards for dust control
 - Spraying of water at coal yards for dust control
 - Installation of a rainwater collection system at the coal yard and treatment facilities for water pollution control

(See Section 14.4 and Section 15.3.)

2) Enhancement of Environmental Consideration in Nacala Bay

Nacala Bay Area is a very strategic area and considered as the new international gateway to Africa with the deep seaport and Nacala Special Economic Zone, as well as with upgrading railways and trunk roads. In this situation, many development projects are planned, such as a coal terminal port, MICE and tourism complexes, industrial parks, sewage and drainage systems. The environment of Nacala Bay and its surrounding land areas might be deteriorated, if the environment of Nacala Bay is not appropriately considered when projects are planned and implemented. A deteriorated environment might decrease the attractiveness and market values of tourism resources, fishery resources and the living environment. It is strongly recommended that the remaining precious natural environment of Nacala Bay and its surrounding areas should be well conserved.

For this purpose, the establishment and improvement of environmental management system including environmental monitoring system based on the operation of environmental laboratories is recommended in Maputo, Nacala and Tete. (See Sections 17.5 and 19.2.)

(4) Urban Development Strategies

1) Immediate Development of a Solid Waste Management System and Waste Water Treatment System

The PEDEC-Nacala promotes the development of business opportunities so that the population and economic activities could be increased rapidly. It is expected that the pollution load, such as solid waste and sewage, will be increased. It is necessary to develop an appropriate solid waste management system and waste water treatment system immediately in order to conserve living and the natural environment. (See Section 16.2.8)

2) Reduction of Through Traffic Volume in Urban Areas

Traffic congestion is one of many potential urban environmental problems. In the future, traffic volume in urban areas increase because population and economic activities increase. In order to reduce through-traffic volume in urban areas, especially in the Nacala Bay Area, Greater Nampula and Cuamba, the construction of bypass roads is a potential effective solution. (See Sections 16.2 and 16.3)

(5) Social Capacity Development Strategies

1) Consideration for Women's Participation in the Society

During the Stakeholder Meeting in August 2014, the participants pointed out that women cannot participate in economic and social development due to low literacy rates. In Development Scenario B-3 which was selected by the PEDEC Development Strategies, it is expected to create various opportunities for women's participation in society. Accessibility to public health and medical services should be improved. However, it is difficult for women to find economic and social opportunities for participation in society and to get benefits from development, if the literacy rate is low and people do not understand the meaning of women's participation in the society. Hence, it is strongly recommended that:

- A provision of opportunities for women to have access to school education and adult education programmes
- The promotion of programmes for raising awareness and increasing understanding of women's participation in the society through gender seminars and trainings, as well as gender mainstreaming effort

Since gender considerations are important cross-cutting issues related to various sectors, gender issues are incorporated into the development strategies of PEDEC-Nacala emphasising its importance.

In addition, the monitoring of gender mainstreaming in each sector according to the National Plan for the Advancement of Women (PNAM) should be included in the implementation phase of development strategies of PEDEC-Nacala. (See Sections 17.2 and 18.5)

2) Role of Civil Societies

In the process of formulating the PEDEC-Nacala development strategies, civil society groups could contribute to the formulation of development strategies by participating in stakeholder meetings, as well as presenting of their comments after the stakeholder meetings.

In addition, for the implementation phase of PEDEC-Nacala strategies, it is considered necessary to create a special government body in charge of promoting and coordinating the PEDEC-Nacala development strategies. As part of its activities, it is expected for the special government body to establish and operate committees in which representatives from civil society and private business groups could participate for promoting sustainable and inclusive development. (See Section 18.5.4)

3) Promotion of Community Participation

It is recommended that that the effort at achieving greater community participation should be emphasised in the phases of preparing and implementing concrete development programmes and environmental programmes under the macro development framework recommended by PEDEC-Nacala. (See Section 18.5.3)

CONCLUSIONS AND RECOMMENDATIONS



Conclusions and Recommendations

1. Conclusions

In PEDEC-Nacala, “Integrated Development Strategies for the Nacala Corridor Region were formulated, consisting of the following elements:

- Future Vision
- Socioeconomic Framework
- Spatial Structure
- Development Scenario
- Overall Development Strategies
- Essential Development Strategies
- Sector Strategies
 - Economic Sectors Development Strategies
 - Infrastructure Sectors Development Strategies
 - Urban Development Strategies
 - Environmental Management Strategies
 - Social Sectors Development Strategies
 - Institutional and Organizational Development Strategies
- Action Plan with Short and Medium-Term High Priority Projects

This set of integrated development strategies is called “PEDEC-Nacala Development Strategies” or otherwise “PEDEC Strategies.”

PEDEC-Nacala Development Strategies were completed through technical examination by the PEDEC-Nacala Team (both JICA and Mozambican counterparts) and through guidance and supporting by a Steering Committee and a Working Group consisting of ministries and agencies at the national level as well as provincial governments.

The formulation of PEDEC-Nacala Development Strategies was done by a phased approach. In the first three phases, Draft PEDEC Strategies were formulated with inputs of mainly government officers. In the fourth phase, stakeholder meetings were conducted in five provinces of the Nacala Corridor Region for consultation with a wide range of stakeholders from civil societies and private sectors to universities for collecting their views and comments on Draft PEDEC Strategies. In Phase 5, such views and comments from stakeholders were incorporated into the integrated development strategies for the Nacala Corridor Region for finalizing PEDEC-Nacala reports.

Since PEDEC-Nacala Development Strategies are multi-sectoral covering many aspects and related to each other, they are complicated. However, it is possible to initiate development in the Nacala Corridor Region seeking dynamic and inclusive development in a wider region by effective coordination and timely implementation of four “area programmes” and eight “sector programmes” consisting of high priority projects.

Many of the high priority programmes and projects in PEDEC-Nacala Development Strategies are not proposed to be implemented in a vacuum. Those programmes/projects are formulated to make

on-going and/or planned programmes/projects contribute to establishment of more functional multi-modal transport systems and more effective promotion of regional development.

Furthermore, PEDEC-Nacala Development Strategies is a set of strategies which create strong driving forces for development by utilizing the impact and benefits of Nacala Port development, coal mining in Tete and natural gas offshore of Cabo Delgado. By implementing necessary programmes/projects according to the PEDEC Strategies, diversified economies could be realized and development benefits could be distributed widely in the region, as well as along the transport corridor.

2. Recommendation

Based on the PEDEC-Nacala study, the following are recommended for the implementation of the Strategies:

(1) Coordination for Integrated Development Strategies

PEDEC-Nacala is a set of integrated development strategies which are composed of strategies for various sectors. Therefore, it is necessary for related ministries and agencies as well as provincial governments to coordinate with each other for implementing the development strategies in an integrated manner.

(2) Monitoring and Information Sharing

In order to coordinate the promotion of integrated development, it is necessary to monitor not only the preparation for strategy implementation, but also actual implementation status. Such monitoring should cover the social, economic and environmental aspects. These monitoring results should be shared among relevant government institutions and other stakeholders for proactive and effective coordination.

(3) New Agency for Nacala Corridor Development

To pursue integrated development by coordination among different sectors and actors and to implement PEDEC-Nacala Development Strategies, a new coordination mechanism is required. Creation of a new agency that is in charge of coordination and driving integrated development forward is one of the solutions for the problems that could arise. In the case of establishing a new agency for PEDEC-Nacala, a clear authority should be given to the new agency so as to effectively coordinate and promote the implementation of PEDEC-Nacala development strategies for integrated development.

(4) Essential Development Strategies for Short-Term and Medium-Term Implementation

PEDEC-Nacala formulated Essential Development Strategies which should be primarily implemented in the short and medium-terms. PEDEC-Nacala provided ideas on high priority projects which are in line with the Essential Development Strategies. By preparing and implementing such high priority projects, regional development will start and lead to dynamic and inclusive development in the wider region.

(5) Coping with Emerging Social, Environmental and Economic Issues

Social and environmental problems that may be caused by rapid and large-scale development, as well as changes in needs for social services in the Nacala Corridor Region, should be attended to in a timely manner. Measures for solving some of these problems have already been included in the PEDEC-Nacala development strategies. However, some of them are not covered by the PEDEC-Nacala. Therefore, flexible response to emerging economic, social and environmental problems and needs is necessary through monitoring the situation of social, economic and environmental changes.

(6) Formulation and Preparation of Projects for Implementing Development Strategies

PEDEC-Nacala provided ideas regarding high priority projects in order to implement the proposed Essential Development Strategies covering various sectors. For actual implementation, it is necessary to formulate and prepare projects that are feasible technically, economically, socially and financially, for actual implementation.

(7) Participation and Involvement of Stakeholders

At the stage of project planning and implementation, a wide range of stakeholders (government agencies, civil societies, private business sectors and universities) should be involved. Their participation and contribution is essential for sustainable development.

(8) Community Participation and Gender Consideration

At the implementation stage of PEDEC-Nacala development strategies, community participation and gender mainstreaming should be promoted.

PEDEC-Nacala development strategies are intended to diversify economic activities and development opportunities by taking advantage of large-scale development of coal and natural gas, the logistics industry and manufacturing industry. However, benefits to communities and opportunities for women are not automatically secured in the rapid economic development and increasing development opportunities. Therefore, efforts at community participation and gender mainstreaming are important in order to ensure that communities can gain substantial benefits from that development and that both women and men get equal opportunities to participate in the development.

(9) Communication Strategies

Since once the PEDEC-Nacala development strategies are implemented, a large number of people, groups and businesses would be affected by changes in the economy, society and environment, PEDEC-Nacala development strategies, approaches and activities should be well and widely understood. At the stage of strategy implementation, it will also be necessary to share information on monitoring results of the status of projects and development activities. It is necessary to formulate and implement communication strategies in order to have appropriate communications with a wide range of many stakeholders.

(10) Land Use Policy and Land Use Plan for Forest Land

An overall land use policy and plan in respect of forest protection, forest development and forest utilization needs to be formulated. The expansion of agricultural land and protection of forestry should be regulated by using this kind of land use policy and plan. Mozambique currently has neither such a policy nor a land use plan, and due to this situation, land use changes have been decided by case-by-case review whenever DUATs or mineral resource concessions are requested.

(11) Allocation of Government Revenues through Royalty and Corporate Taxes from Mining Businesses

Royalties and taxes should be collected appropriately from businesses in mining and other large-scale developments in the Nacala Corridor Region. Such government revenues should be allocated in a balanced manner to measures that will solve the foreseeable social and environmental problems, as well as increase the quantity and improve the quality of social services.

APPENDICES



Appendix-A Supporting Works

A.1 Digital Topographic Mapping

A.1.1 Objectives of Digital Topographic Mapping

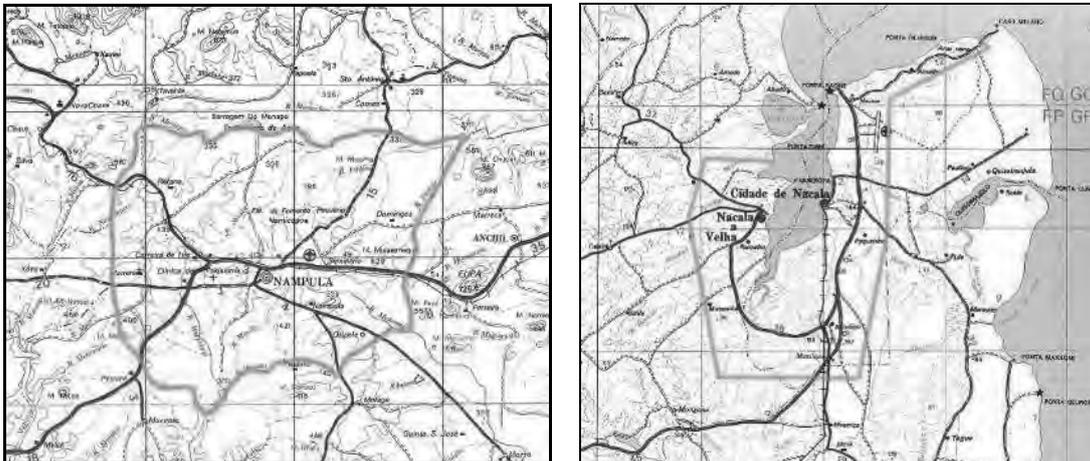
The objective of digital topographic mapping in this Study was to prepare the latest geographic information data at a scale of 1:10,000 that can be used by private investors and government agencies for their planning for two urban areas.

A.1.2 Target Areas for Digital Topographic Mapping

The target areas for the digital topographic mapping were chosen during the preparatory mission in November 2011 as the high priority areas in the Nacala Corridor Region, namely Nampula City and Nacala City and their suburbs.

After the discussions between CENACARTA and the JICA Study Team in August 2012 regarding this Study, the following areas were agreed to be the target areas of the digital topographic mapping.

- The entire area of Nampula City: approximately 330km²
- Nacala City and its suburbs: approximately 270km²



Source: JICA Study Team

Figure A.1.1 Entire Area of Nampula City (left) and Nacala City and its Suburbs (right)

A.1.3 Digital Topographic Mapping

(1) Survey Standards

The survey standards for the digital topographic maps were decided as follows based on the geographic information collected by the Study Team and the discussions with the National Remote Sensing & Cartography Centre (CENACARTA).

- Reference ellipsoid: WGS84 (a=6378137.00 f=1/298.257223563)
- Projection system: Universal Traverse Mercator
- Coordinates system: UTM Zone 37
 - Origin: East longitude 39 degrees E = 500,000.00m
 - South latitude 0 degrees N= 10,000,000.00m
- Map symbol regulation: Map symbol regulation for 1:10,000 scale and regulation of digital topographic maps are not regulated in Mozambique, and therefore these regulations are defined by the discussion between CENACRTA and the JICA Study Team.

(2) Aerial Photography

The aerial photography was carried out by the subcontractor (AZUL AERIAL WORKS cc from South Africa) based on the following specifications.

- Photo scale: 1:20,000
- Photographic film: Colour film
- Photographing quantities:
 - Entire area of Nampula City: 7 strips
 - Nacala City and its suburbs: 7 strips

The aerial photography of the entire target area was completed by 8 July 2012.

After completion of the photography, the aerial films were developed and printed, and all the aerial photos were accepted as they were of a sufficiently high quality for the purposes of this Project.

The deliverables of aerial photography are as follows

- Exposed aerial film: 1 set
- Scanned data of the exposed aerial film: 1 set
- Contact prints in colour: 1 set
- Contact prints in black and white: 1 set
- 2 times enlargement in colour: 1 set

(3) Photo Control Point Survey

The photo control point survey consisted of three kinds of works as follows, which were carried out by the subcontractor under the supervision of the Study Team.

1) Signalization

The photo signals were installed to clearly identify the photo control points on the aerial photos. The number of installed photo signals was as follows.

- Entire area of Nampula City: 25 points
- Nacala City and its suburbs: 26 points

2) GPS Survey

The GPS survey was carried out to determine the coordinates of horizontal photo control points that are needed for the digital aerial triangulation.



Source: Photo by JICA Study Team

Photo A.1.1 Signalization

The number of horizontal photo control points for which the coordinates were confirmed by GPS survey was as follows.

- Entire area of Nampula City: 21 points
- Nacala City and its suburbs: 23 points

3) Ordinary Levelling

The ordinary levelling was carried out to determine the height of vertical photo control points that is needed for the digital aerial triangulation.

The distance of the ordinary levelling was as follows.

- Entire area of Nampula City: 80.70 km
- Nacala City and its suburbs: 79.50 km

(4) Field Identification

The field identification was carried out using the aerial photos (or orthophotos) in order to collect various kinds of information on topographic features (e.g. Churches, Schools, Annotation, etc.) that is needed for digital plotting and editing under the supervision of the Study Team by the subcontractor.

- Entire area of Nampula City: approximately 330km²
- Nacala City and its suburbs: approximately 270km²

(5) Aerial Triangulation

The exterior orientation elements and the coordinates of tie points that are needed for digital plotting were calculated in the digital aerial triangulation. The digital aerial triangulation was carried out with the target area divided in two, Nampula area and Nacala area.

- Entire area of Nampula City: 9 strips 132 models
- Nacala City and its suburbs: 9 strips 121 models

The digital aerial triangulation was calculated with a “Bundle Method” using the results of the GPS survey and ordinary levelling.

The residuals of coordinates between the ground photo control points and the digital aerial triangulation results are within the limited value of Japanese standards, therefore, all calculated coordinates are deemed to satisfy a topographic map at a scale of 10,000.

(6) Digital Plotting and Editing

The topographic features that were defined in the topographic map symbol regulations were digitized with a digital plotter based on the results of the digital triangulation and the field identification. The digital editing to adjust digitized topographic features were carried out using the plotted digital data and the results of field identification, including the collected administrative boundary and name data.



Source: Photo by JICA Study Team

Photo A.1.2 GPS Survey and Ordinary Levelling

The quantities of digital editing as well as digital plotting are as follows.

Editing areas :	Entire area of Nampula City:	17 sheets	330km ²
	Nacala City and its suburbs:	17 sheets	270km ²



Source: Photo by JICA Study Team

Photo A.1.3 Digital Plotting and Editing

(7) Production of GIS Data

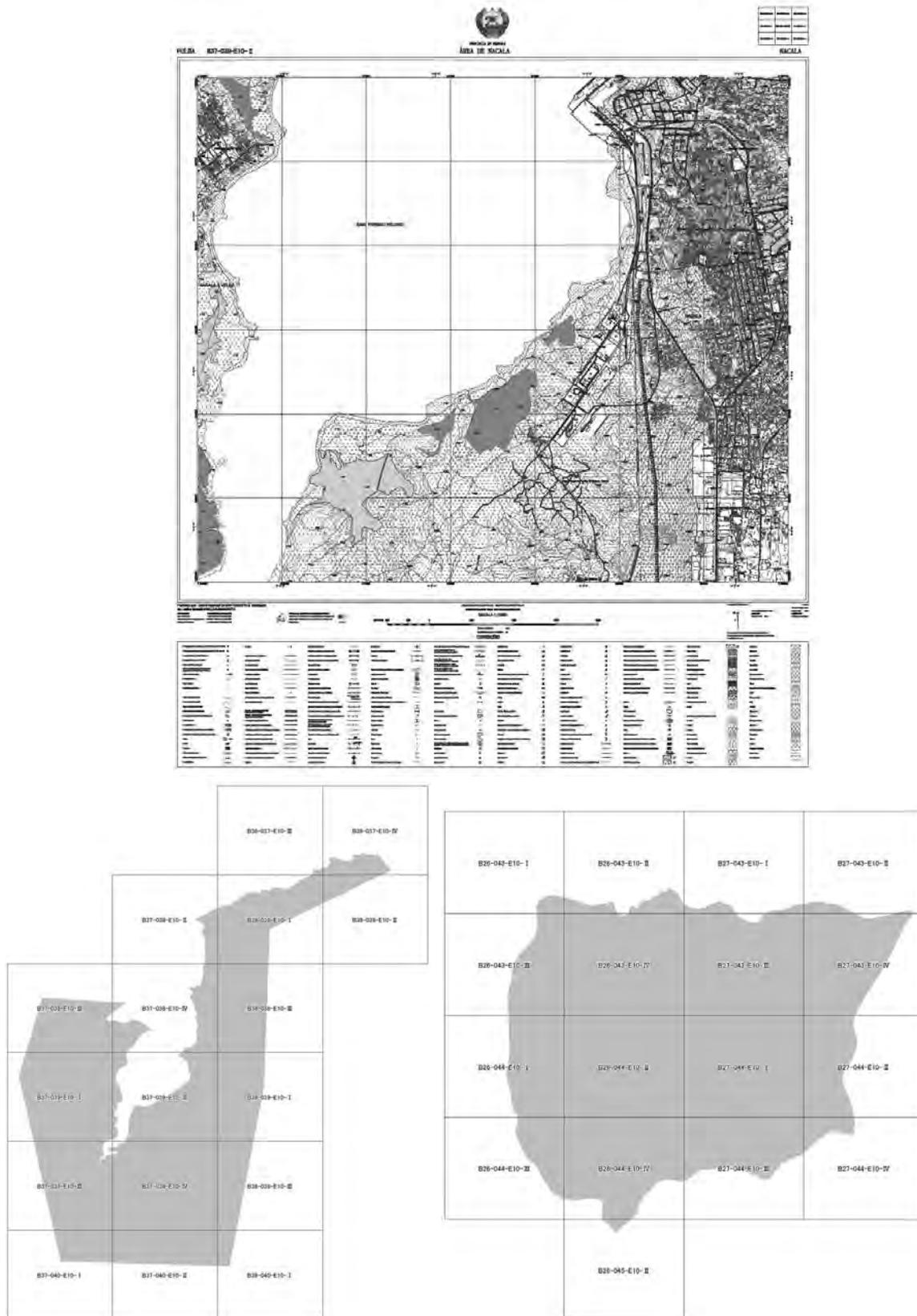
Structured editing was carried out for the edited digital data. The structured edited data was transformed to GIS data (Shapefile dataset with layers and Digital Terrain Model (DTM) data) that are compatible with GIS software.

(8) Map Symbolization

Map symbolization involved the correction of location of map symbols and the adjustment of data output order so as to output the edited digital data in analogue format, and these data were merged with the marginal information data.

(9) Proofreading by CENACARTA and Correction of Topographic Digital Data

CENACARTA carried out the proofreading for the geographical names on the topographic maps using the printed maps of the topographic digital data, for which map symbolization has been completed. The necessary corrections were made to the related topographic digital data based on the results of the proofreading, and the final topographic digital data were prepared.



Source: JICA Study Team

Figure A.1.2 Topographic Maps (Sample) and Index Map (left: Nacala, right: Nampula)

A.2 Logistics Survey

A.2.1 Objectives of the Logistics Survey

The Logistics Survey was conducted in order to determine the regional-level cargo movement, including inter-provincial and international cargo. The objectives for the Survey are as follows:

- To understand the major patterns of cargo transport in the five provinces related to the Nacala Corridor and its surrounding areas by transport mode,
- Similarly, to understand the major patterns of international cargo transport between the five provinces related to the Nacala Corridor and the neighbouring countries, and
- To determine cargo transport patterns during the rainy season in the five provinces related to the Nacala Corridor and its surrounding areas.

Each provincial government reports the statistics for cargo transportation every six months, which is limited to the amount of ton-km by road, rail and air. However, information regarding cargo movement by commodity between each province and other areas is difficult to acquire. Therefore, this survey will be able to help not only as the baseline data of current cargo movement at the inter-provincial level but also as the guideline and methodology for how to conduct this type of survey in the future. That is one additional objective in this survey in line with the regional planning context.

A.2.2 Methodology of the Logistics Survey

(1) Types of Logistics Surveys

The following five types of surveys were planned;

- Traffic Volume Survey at provincial boundaries, entrances of major cities and country borders (in total 20 points, the same locations as the road side survey described below),
- Roadside Origin-Destination (OD) Interview Survey (only for cargo transport) at provincial boundaries and entrances of major cities (in total 20 points),
- Survey for Conditions of Customs including OD interview survey at the Border (in total 6 borders),
- Goods transport record survey for the main railwaus stations in the middle and northern parts of Mozambique by interview and collection of statistics and documents from each station (7 stations), and
- Goods transport record survey for main ports in the middle and northern parts of Mozambique by interview and collection of statistics and documents from each port operator (5 ports).

(2) Survey Schedule

The entire schedule for the sub-contract surveys is shown in Table A.2.1 below.

Table A.2.1 Survey Work Schedule

		2012							
		May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Contract		■							
Dry season	Preparation		■						
	Field Work			■	■	■			
	Reporting				■	■	■		
	Supplimental survey						■		
	Reporting						■		
Rainy season	Preparation							■	
	Field Work							■	■
	Reporting								■

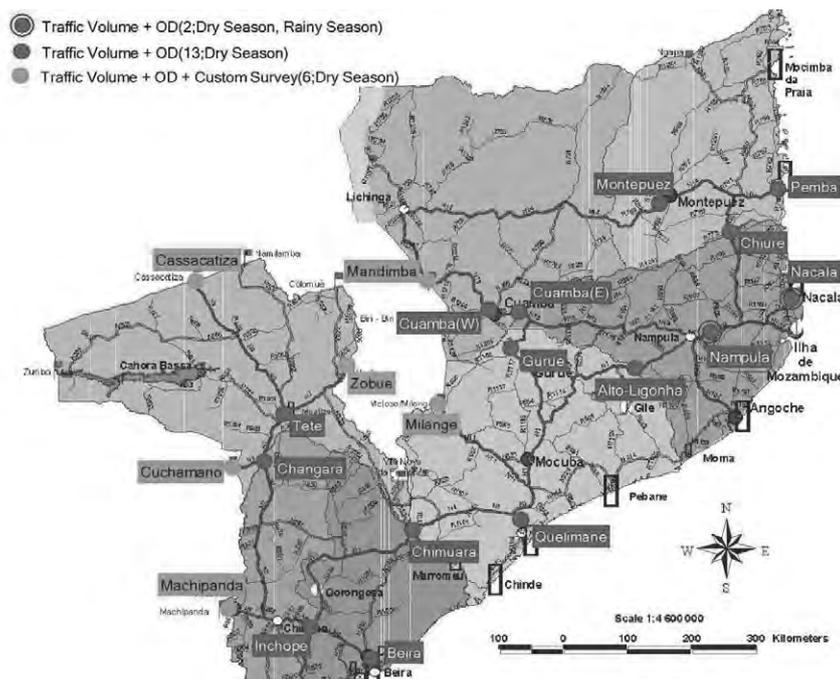
Source: JICA Study Team

(3) Survey Locations for Traffic Volume Survey and Road Side OD Interview Survey

The survey locations were identified from the viewpoint below based on the result of site visits by the Study Team.

- In order to adequately acquire information regarding accurate inter-provincial cargo volume and origin-destinations, the exact survey locations were set at the points of provincial boundaries where the traffic surveys could be conducted smoothly and safely. During the site surveys to identify the locations, the Study Team considered the availability of surveyors to work during the required hours, adequate parking for the vehicles whose drivers were being interviewed and assistance from traffic police.
- In the case of traffic surveys near major cities, traffic police stations such as control points were also identified as the survey points for the traffic volume and roadside OD interview surveys.
- Regarding the border survey, survey points were set in the Mozambican territories, due to the possibility of traffic count and road side interview activities.

Considering together the above conditions and existing traffic conditions, the traffic survey locations shown in Figure A.2.1 were chosen.



Source: JICA Study Team

Figure A.2.1 Logistics Survey Locations

Table A.2.2 Survey Location List

Type	Location Name	Location	Survey Date
Port	Beira	19°34'43.73" S, 34°43'44.60"E	6/28 – 7/2
	Quelimane	17°36'17.47"S , 36°49'10.07"E	6/28 – 7/2
	Nacala	14°36'03.15" S , 40°40'53.68"E	7/20 – 7/24 11/18 – 11/20
	Pemba	13°0'11.62"S , 40°31'51.32"E	6/27 – 7/1
Main City	Tete	16°18'21.72"S , 33°31'7.15"E	7/22 – 7/26
	Nampula	15°6'57.50" S, 39°19'32.94"E	7/13 – 7/17, 11/25 – 11/27
	Cuamba(W)	14°48'20.17" S , 36°31'36.13"E	10/21 – 10/23
Provincial Border	Inchope	19°12'26.66"S , 33°55'55.89"E	7/6 – 7/10
	Chimuara	17°47'21.36"S , 35°24'20.58"E	6/29 – 7/3
	Changara	16°50'10.36"S , 33°16'29.97"E	7/16 – 7/20
	Gurue	15°19'44.14"S , 36°45'10.30"E	7/6 – 7/10
	Alto-Ligonha	15°30'44.60"S , 38°15'24.85"E	7/11 – 7/15
	Cuamba(E)	14°47'36.29"S , 36°51'5.50"E	7/10 – 7/14
	Chiure	13°40'36.81" S , 39°50'41.23"E	7/3 – 7/7
Border	Montepuez	13°7'52.78" S, 38°59'40.44"E	7/3 – 7/7
	Machipanda	19°0'20.62"S , 32°43'12.27"E	7/10 – 7/14
	Cuchamano	16°57'49.67"S , 32°51'42.99"E	7/16 – 7/20
	Cassacatiza	14°18'53.61"S , 32°21'2.03"E	7/22 – 7/26
	Zobue	15°34'45.82" S , 34°28'43.38"E	7/22 – 7/26
	Milange	16°5'31.92"S , 35,45°19.77"E	7/2 – 7/6
Mandimba	14°21'29.36"S , 35°39'14.75"E	7/11 – 7/15	

Source: JICA Study Team.

(4) Detailed Methodologies for the Traffic Volume Survey

The Study Team developed the following conditions for this survey after reviewing previous survey experiences in Mozambique and other countries. The vehicles were categorized into 9 types (A to I) described in Table A.2.3, which are in accordance with the official vehicle type classification regulated by ANE.

Table A.2.3 Categorization of Vehicle Types

Category ID	Description
A	Passenger Car / 4 Wheel Drive Vehicle
B	Small Size Cargo Vehicle
C	Mini Bus (Taxi) (with 2 axles)
D	Large Size Bus (with 3 and over 3axles)
E	Light Goods Vehicle (LGV) (with 2 axles)
F	Medium Goods Vehicle (MGV) (with 3 or 4 axles)
G	Heavy Goods Vehicle (HGV) (with over 4 axles)
H	Agricultural Vehicle
I	Motorcycle

Source: JICA Study Team based on the ANE's Vehicle Classification

The survey hours were set as the 18 hours from 5:00AM to 11:00PM in consideration of less accessible areas and non-residential areas without any police support. The survey days were set for five consecutive days including Saturday and Sunday.

Regarding the traffic counting and recording, the Study Team decided that the surveyor will count each classified vehicle manually and record the number of vehicles by direction and by vehicle type for every 30 minutes period.

(5) Methodologies for the Roadside OD Interview Survey

In order to estimate the OD table properly, the survey points and survey duration need to be well designed, and also traffic volume had to be counted with adequate accuracy. The Study Team chose the interview items shown in Table A.2.4. The content of delivered goods was encoded in HS code which can be compared with other logistics statistics.

Table A.2.4 Interview Items

Interview Items	Format
Survey Time	Hour / Minutes
Vehicle Type	Select from 4 choices
Origin and Destination	Country/Province/District/City/Village, Port/Airport/Station
Travel Time (estimated)	Days / Hours / Minutes
Trip Frequency	Select from 8 choices
Contents and Volume of Freight	Commodity type / Volume (weight)

Source: JICA Study Team

(6) Methodologies for the Surveys at the Borders

Using the same methods as the above surveys, the traffic volume surveys and roadside OD interview surveys were conducted at six main borders with other countries. These survey sites were located in Machipanda, Cuchamano, Cassacatiza, Zobue, Milange and Mandimba. In addition, information about the customs service system was collected in order to estimate the difference in the time that it takes to complete the customs processing between the current practice and future customs service.

(7) Methodologies for the Goods Transport Record Survey for the Railway

In order to determine the railway cargo movement, an interview survey with the railway transportation service was conducted. The targets of the railway services were between main stations operated by the Corridor de Desenvolvimento do Norte (CDN) and by the Beira railway operator.

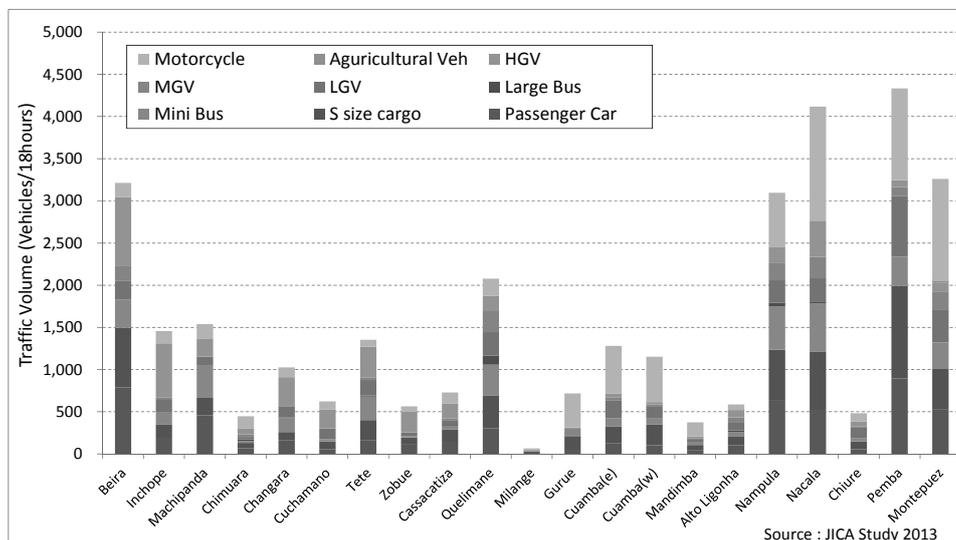
(8) Details of the Goods Transport Record Survey for Main Ports

In order to determine the shipped goods movement related to the main ports in northern Mozambique, interview surveys using the same methodology as above on the movement of goods via existing shipping services from/to the main ports in Mozambique were also conducted. These surveys were conducted at five ports: Pemba, Nacala, Quilimane, Beira and Metangula. Different from the survey of movement via railway service, the subject movement was not only movement between each other but also between target ports and other ports including foreign ports.

A.2.3 Result of the Logistics Survey

(1) Summary of Traffic Volume Survey and Road Side OD Interview Survey

The traffic volume counting survey and roadside OD interview survey were finished by the end of August for the dry season, and by the end of November for the rainy seasons.



Source: JICA Study Team

Figure A.2.2 Counted Traffic Volume (Weekday / Dry Season)



Source: Photo by JICA Study Team

Photo A.2.1 Roadside Interview Survey



Source: Photo by JICA Study Team

Photo A.2.2 Traffic Volume Survey

(2) The Result of the Survey of the Movement of Goods via Railway and Shipping Services

The target lines in this railway survey were the Nacala line and Beira line. The Nacala line is operated by the Corridor de Desenvolvimento do Norte (CDN), and Beira line is operated by CFM and Cornelder in Beira. Those operator companies were contacted by the supervisor team in order to obtain the information which describes the monthly goods movement between the main stations. Unfortunately, the information provided by those companies includes only the total tonnage by contents which moved along those lines, and the information regarding origin and destination was not recorded. Information regarding more than the monthly transportation tonnage by contents by railway line could not be collected.

Concerning the shipping movements, the authorities of those main ports were also contacted by the supervisor team as in the station survey. Although those ports function as international logistics stations, the information provided by each of those authorities has different formats. The information from Pemba port has the export/import, shipping/landing annual tonnage by kinds of commodity. The information from Nacala port also includes the annual tonnage by kinds, but those numbers represent the shipping and landing number in total. The information from Beira port includes the international/transit transportation tonnage and number of containers, but those are the totals of all kinds of commodities. Quelimane is the only port which records monthly tonnage. Tonnage of major commodities are described, but this tonnage was not separated by shipping and landing total. The information from Metangula port is only one number which describes the total annual tonnage of all types of commodities. Collecting information about shipped goods movement is still ongoing.

A.2.4 Conclusion of the Logistics Survey

(1) OD Matrix of Existing Goods Transportation

According to the OD interview and traffic volume count, the OD matrix of goods transportation was estimated and utilized for the examination of the logistics service sector.

(2) Existing Goods Transportation

According to this OD and the road network GIS data from ANE, the amount of goods transported can be estimated by road section. The result is shown in the logistics chapter in this report. The district level OD matrix should be used for the transportation network estimation.

(3) **Outline of the Border Control Conditions**

The result of this survey regarding border control is shown below. Especially, the delays to pass through the border in Cassacatiza and Cuchamano were longer than those in other ports.

Table A.2.5 Operating System

Name of the Border	Number of Workers	Operating Time		Traffic Volume*
		from	to	
Cassacatiza	5	6AM	7PM	728
Zobwe	13	6AM	9PM	565
Cuchamano	13	6AM	8PM	623
Machipanda	21	6AM	8PM	1539
Mandimba	13	6AM	6PM	375
Milange	14	6AM	6PM	66

Traffic Volume : Average Number of Counted Vehicles&Motorcycles on Weekday
(survey time : 5AM to 11PM)

Source: JICA Study Team

Table A.2.6 Time to Pass through the Border

	LGV			MGV			HGV			Total		
	TLT	N	Ave	TLT	N	Ave	TLT	N	Ave	TLT	N	Ave
Cuchamano	0.0	0	-	0.0	0	-	24.0	1	24.0	24.0	1	24.0
Machipanda	5.0	2	2.5	0.0	0	-	181.3	94	1.9	186.3	96	1.9
Cassacatiza	0.0	0	-	0.0	0	-	2760.0	148	18.6	2760.0	148	18.6
Milange	25.8	6	4.3	34.0	18	1.9	80.9	47	1.7	140.7	71	2.0
Mandimba	3.0	3	1.0	1.0	1	1.0	22.0	18	1.2	26.0	22	1.2
Zobue	0.0	0	-	0.4	1	0.4	88.4	273	0.3	88.8	274	0.3

TLT : Total Loss Time, N : Number of Samples, Ave : Average Loss Time

Source: JICA Study Team

A.3 Nacala Corridor Integrated GIS Database

A.3.1 Objectives of “Nacala Corridor Integrated GIS Database”

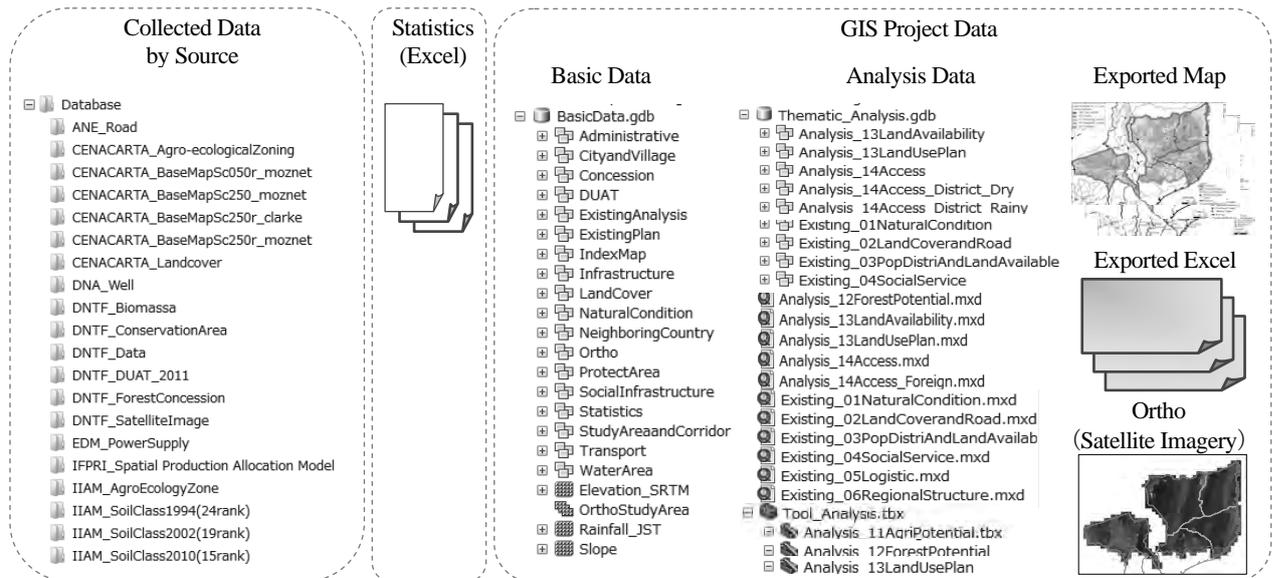
The database creation was defined as one of the main outputs of the Project. A large amount and various types of information are compiled into the sustainable and operational GIS database, named “Nacala Corridor Integrated GIS Database” (the integrated database) in order to utilize the collected information for the formulation of the development strategies rationally and effectively in the Project, and also to be used as basic information for formulation of various sector’s future planning. The collected information includes, but is not limited to, statistics and geographical information. The objectives of the integrated database comprise the following five aspects.

- Make use of ArcGIS, to centrally store and manage information and local materials underlying the development strategies.
- Enable a representative organisation that is responsible for the Nacala Corridor regional development strategies to share information across different institutions smoothly in Mozambique.
- Allow the relevant agencies to utilize the geographic information for development plans or updating those plans in the future.
- Enable monitoring and managing of the development progress.
- Provide information to domestic and foreign investors who are willing to invest in the Nacala Corridor Region.

A.3.2 Structure of Nacala Corridor Integrated GIS Database

The integrated database comprises three groups of datasets: collected data, statistics, and GIS data for thematic maps as shown in Figure A.3.1. The GIS project data consists of basic data set, analysis data set, exported files of maps and tables, and satellite imageries.

- Basic Data: Collected data were transformed into the format of filegeodatabase with the same coordinate system as the World Geographic System 1984 (WGS84). Necessary attribute data were stored in each filegeodatabase. Filegeodatabases were also categorized into groups, such as transportation facilities, social infrastructures and villages.
- Analysis Data: The basic data were combined into analysis data for spatial analysis necessary for formulating regional strategies. The analysis data includes agricultural potential, forest potential, land use plan and hospital accessibility.
- Exported Maps: Analysis data are exported into maps using a format such as png.
- Exported Excel Files: The attribute information of analysis data was exported into Excel files to analyse the data not only spatially but also statistically.
- Ortho (Satellite Imagery): Orthophoto is a satellite imagery which is geometrically corrected into a uniform scale. This orthophoto covers the whole area of the Nacala Corridor Region.



Source: JICA Study Team

Figure A.3.1 Structure of Nacala Corridor Integrated GIS Database

A.3.3 GIS Training Session and Establishment of GIS Network

The integrated database will be maintained and updated by GAZEDA, CPI in the provinces, and provincial government after the completion of the Project. The JICA Study Team carried out the GIS training session for ten officials of three authorities and Ministry of Transport and Communications in GAZEDA headquarters in Maputo four times by the end of September 2013. The GIS training session aims to achieve the institutional set-up for maintenance of the integrated database. The target level of the GIS training session is set to achieve the training programme of ArcGIS Desktop II (Standard) that is practiced by Environmental Systems Research Institute, Inc. (ESRI). The training session covers the topics to make the participants acquire basic skills capable for layout, editing, and managing the integrated database that is created in the geodatabase format in GIS. Table A.3.1 shows the schedule of the GIS training sessions and delivery of the equipment with the integrated database. Since the most practical way to learn GIS software is to use GIS, the integrated database was provided with them in advance to the completion of the Project.

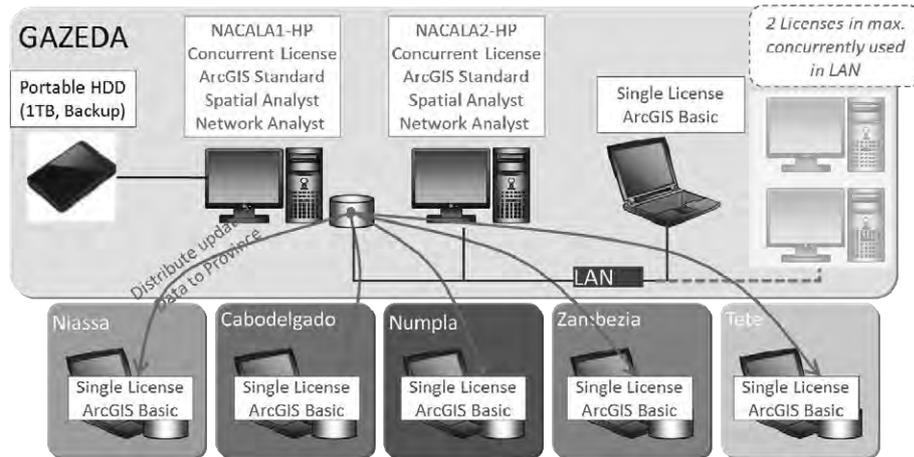
Table A.3.1 Schedule of GIS Training Sessions and Delivery of Integrated Database

Item	2012			2013									
	10	11	12	1	2	3	4	5	6	7	8	9	10
Delivery of GIS Database					(Basic Data)	▼		(Analysis Data)	▼		(Analysis Data)	▼	
Delivery of PC with GIS Software						▲							
1 st GIS Training Session (5 days)			▲										
2 nd GIS Training Session (3 days)						▲							
3 rd GIS Training Session (2 days)									▲				
4 th GIS Training Session (1 day)												▲	

Source: JICA Study Team

Note: Tentative delivery of database ▼ Full delivery of database ▲

Three sets of personal computers were lent to GAZEDA, while five laptop computers lent to five provinces in May 2013. An exclusive LAN system for GIS was established in GAZEDA as shown in Figure A.3.2. The GIS software can be simultaneously activated in a maximum of two computers in the LAN system.



Source: JICA Study Team

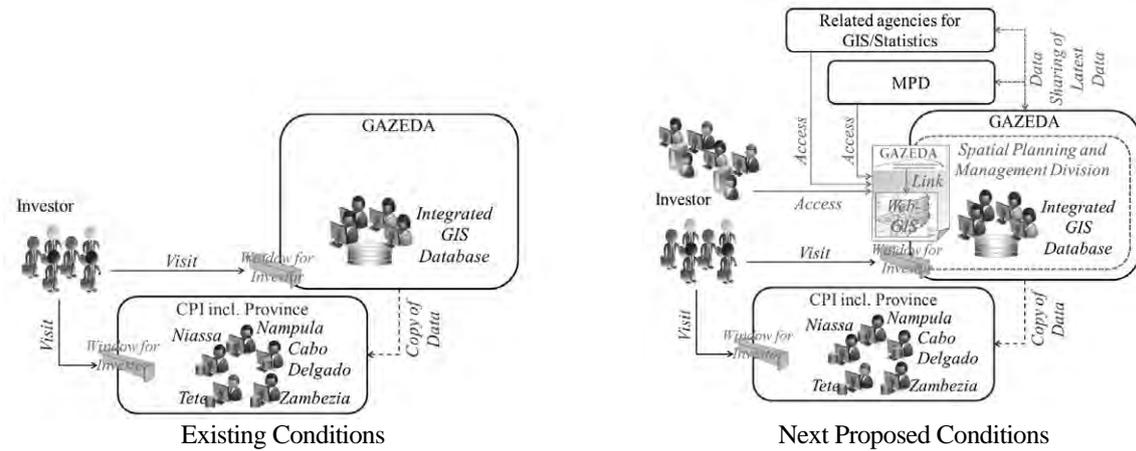
Figure A.3.2 GIS Network Established in GAZEDA and Five Provinces

A.3.4 Future Perspective for GIS Data Management

An initial system is established to manage the integrated database in GAZEDA and five provinces. The integrated database will be updated and disseminated for the related organisations, and investors. GAZEDA will specifically be a centre to take this role and share the information with the provincial governments in the Nacala Corridor Region. The Centre of Investment Promotion (CPI) will be the authorities to manage the integrated database in the province. The Web-GIS is a useful tool for data sharing and dissemination. It serves as an application system on which the geographical information can be displayed and operated by internal and external users in the internet environment. The application system can be tailored to the needs of the users who use the geographical information. The following subjects cover the necessary actions to establish GIS data management.

- GAZEDA is appointed as an official agency to formulate, manage, monitor, and evaluate a regional development plan.
- GAZEDA takes in charge of collecting, sharing, and disseminating the necessary information for the regional development.
- A new division is established in GAZEDA to be responsible for the regional development plan and its monitoring and evaluation. The new division is provisionally called the spatial planning and management division.

Figure A.3.3 shows future perspective for data management and dissemination. The Web-GIS is created and linked to the GAZEDA's website. The elaborated GIS data will be shown for officials, investors, and public. The Web-GIS can be used not only for data dissemination to the investors/public but also for data sharing among the government agencies. The integrated database is updated by sharing the latest information among the related agencies including ANE, DNA, CENACARTA, DNTF, IIAM, INE, EDM, MICOA (currently known as Ministry of Land, Environment and Rural Development), MTC, MIC, MIREM (currently known as Ministry of Mineral Resources and Energy), MITUR (currently known as Ministry of Culture and Tourism), MPD (currently known as Ministry of Economy and Finance), etc.



Source: JICA Study Team

Figure A.3.3 Future Perspective for Data Management and Dissemination

A comparative study is made for establishing the Web-GIS; the first alternative is the on-premise type in which a WWW server system with ArcGIS server is constructed in GAZEDA or government agencies; the second alternative is the off-premise type by using the cloud computing system served by Application Service Provider (ASP). The comparative study takes into account the cost, operation conditions, functionality, expandability, and maintenance. As the overall evaluation, the on-premise type is preferable in case an existing server system is available and used for GAZEDA. The off-premise type is more suitable in case there is no choice but to set up a new server system for Web-GIS.

Appendix-B Capacity Development Activities

B.1 Introduction

In PEDEC-Nacala, a study project for strategy formulation, not only a series of planning activities but also various capacity development activities were conducted. In this appendix, the following two activities are briefly described:

- Study Tour in Vietnam
- Counterpart Training (Study Visits) in Japan

B.2 Study Tour in Vietnam

(1) Background and Objectives

Both the JICA Study Team and the Counterpart organization recognized the necessity of a “Third Country Training Programme; TCTP” in Vietnam, in order to learn from the experience of industrial park development in Vietnam. Vietnam was selected because the development situation in northern Mozambique and that of Vietnam are similar to each other in the needs for industrial parks (IP), ports, railways, and coal transportation.

Under the above-mentioned background, the Vietnam Study Tour was carried out between 11 November and 17 November 2012 with assistance of the JICA Vietnam Office.

The participants included 9 officers from the Counterpart Organization of Mozambique: two officers from the Ministry of Planning and Development, three from GAZEDA (Special Economic Zones Office), one from CPI (Investment Promotion Centre), one from the Revenue Authority in Nacala branch office, one from the Ministry of Industry and Commerce, and one from the Zambeze Agency) together with four members from the JICA Study Team. They visited several Industrial Parks and relevant organizations in Vietnam and exchanged opinions.

(2) Places Visited and Schedule

- 12th Nov : JICA Hanoi Office, Mozambique Embassy in Hanoi
- 13th Nov : Hanoi People’s Committee (Hanoi City), Ministry of Planning and Investment (MPI), Ministry of Industry and Trade, Hanoi Authority for Industrial Parks and Export Processing Zones (HIZA)
- 14th Nov : Thang Long Industrial Park (TLIP), Fujikin Vietnam Factory, Noi Bai Industrial Park (NBIP), Rhythm Precision Factory (Clock Maker)
- 15th Nov : Vietnam-Singapore Industrial Park (VSIP), Hai Phong Port, Dinh Vu Industrial Park, Hai Phong Port Authority
- 16th Nov : Ha Long Port

(3) **Outcomes (Lessons Learnt)**

- Importance of political commitment (for development of industrial park/SEZ/IFZ)
- The “Key” to Success is to establish a planning process (at different levels including the central, provincial and local levels) : Pre-F/S, F/S, Basic Infrastructure, Marketing Research
- An industrial park is a tool to attract foreign investment
- Necessity of clear vision of medium and long-term industrial development
- Necessity of development of a strategic industrial park, SEZ, and IFZ (assembled labour force, technical transfer, import substitution, commercial trade, secured national sovereignty)



Top-left: Fujikin – Vietnam Factory, Top-Right: Hai Phong Port, Bottom; Wrap-up meeting

Photo B.2.1 Study Tour in Vietnam and the Wrap-up Meeting

It was also found that close communication with Vietnamese officers and Mozambican officers is necessary for future development of the SEZ/IFZ in Mozambique. A proposal was made to conduct a seminar with invited Vietnamese officers in the future.

In the Steering Committee Meeting on 27 November 2012, these lessons learned were explained to the Steering Committee members by the Mozambique counterpart personnel.

B.3 Counterpart Training in Japan

(1) Background and Objectives

Japan has a rich and long history of national and regional spatial development planning which has been led by the government, and this makes it ideally suited for Japan to assist in the planning of development strategies for the Nacala Corridor Region in conjunction with the PEDEC-Nacala.

In formulating regional development strategies for the Nacala Corridor Region, it will be of great benefit for the Mozambican counterparts to learn of the Japanese experiences in regional and industrial development based on port development and its surrounding industrial area, as well as industrial promotion in provincial areas. Moreover, the Japanese experts can provide a great opportunity for the Mozambican counterparts to listen to those who are actually engaged in these tasks. Therefore, preparing two separate occasions for governmental/ provincial high level officials and working level officials, these site visits aim to provide opportunities for the participants to visit and learn the actual situation of regional development and industrial promotion, and exchange opinions with relevant Japanese counterparts.

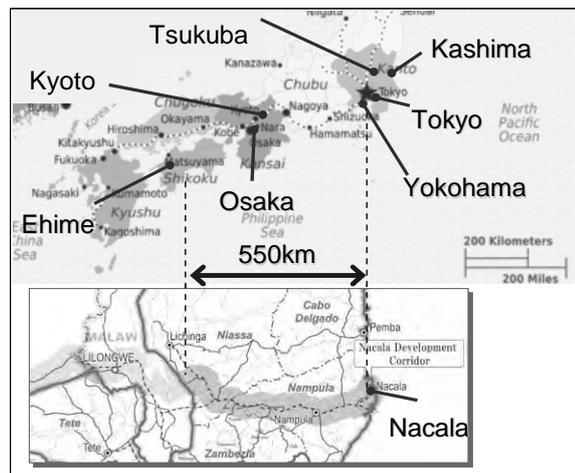


Figure B.3.1 Comparison of Visited Locations in Japan and the Nacala Corridor

Under the above-mentioned background, the first Counterpart Training in Japan was carried out from 13th to 25th April 2013. The second one was implemented from 6th to 21st July 2013.

The distance from Tokyo to Ehime, where the Mozambican officials visited, is almost the same as from Nacala to the Manndimba border at about 550km. This helps the participants to imagine the size of Japan compared to the Nacala Corridor.

The topics covered by this tour are shown below.

1) Experience in Port Development and Area Development of its Hinterland

Since the improvement of Nacala Port will be a key for the success of Nacala Corridor, case studies for port development were included in the course. Additionally, topics covered not only the lineal development along the transportation corridor, but also “area development” including the surrounding and hinterland.

For the purpose mentioned above, site visits and lectures were planned for the following places:

- **Ministry of Land, Infrastructure, Transport and Tourism (MLIT):** The participants are to learn the history of Japanese regional and national spatial planning on the axis of various industrial belts which organically consist of industries, transportation and cities.
- **Port of Yokohama:** This is the one of the biggest ports in Japan and Keihin industrial area is located near the port. The participants are to learn the history of development of the port as well as the belt shape development, which can be applied to Nacala Corridor area with similar geographical features.
- **Minato Mirai 21:** The participants are to learn about the project in the port area for commercial development to create job opportunities and urban recreation area development.
- **Osaka Bay Area:** The participants are to learn the method of special economic zone planning and enterprise attraction.
- **Kashima Port and Industrial Area:** In order to see an effective and efficient industrial port development led by the national and provincial government with a clear vision and strategy, a series of lectures and site visits to Kashima port and industrial area were planned.

2) Success of Regional Development in Provincial Areas

Not only the macro level development led by national or provincial governments, but also regional and community level developments that operate in a self-sustaining manner led by local governments were visited, since it is an essential point of view for regional development in Mozambique. In this regard, the participants visited Ehime Prefecture to see the commercial activities and agro-processing industry with the collaboration of local government, academic organizations and commercial associations.

3) Investment Seminar

In order to realize the economic development strategies of Mozambique, promotion of foreign investment is quite essential. An Investment Seminar was held on April 16th with support of UNIDO as networking opportunities between Japanese companies/ investors and the government officers of Mozambique.

(2) Places Visited and Schedule

1st Counterpart Training

- 15th Apr : JICA Briefing/Orientation, Ministry of Infrastructure, Land, Transport and Tourism (MLIT) (National Development Planning and Regional Planning)
- 16th Apr : Investment Seminar for Mozambique in Tokyo
- 17th Apr : Port of Yokohama and Minato Mirai 21 (Port Area Development)
- 18-19th Apr : Ehime Global Network (NPO) (Local level Development, Agro-processing Industry in Ehime Prefecture)
- 20th Apr : Kyoto Tourist Board (Tourism Development)
- 21st Apr : Aozora Foundation (NPO) (Pollution Experience), Osaka Bay (Port Development)
- 22th Apr : Kashima Port and Industrial Area
- 23rd Apr : Tsukuba (Academic Park), Wrap-up session at JICA

2nd Counterpart Training

- 8th July : JICA Briefing/Orientation, Ministry of Infrastructure, Land, Transport and Tourism (MLIT) (National Development Planning and Regional Planning)
- 9th July : Port of Yokohama and Minato Mirai 21 (Port Area Development)
- 10th July : Tsukuba (Academic Park) and Fujikin Co., Ltd (bulb processing company)
- 11th July : Kashima Port and Industrial Area
- 12th July : Komai Haltech Inc. (manufacturing steel structures and windmills for wind power)
- 13th July : Kyoto Tourist Board (Tourism Development)
- 16th July : Osaka Bay (Port Development)
- 17-18th July : Ehime Global Network (NPO) , Ehime University (Local level Development, Agro-processing Industry in Ehime Prefecture)
- 19th July : Wrap-up session at JICA

(3) Outcomes (Lessons Learnt)

At the wrap-up session at JICA, the following comments from participants were raised as lessons learnt.

1) Japanese National & Regional Planning

- To realize the national and regional plan and reach the targets, it is important to define the projects, organize the implementation and conduct monitoring and evaluation activities in the implementation stage. This flexible feedback method can modify the plans even during the implementation.
- The promotion of local level commercial and industrial activities is a key to realize comprehensive regional development.
- It is necessary for the government to provide good leadership as well as instituting a participatory process involving the people.
- The importance of plans with clear vision and strategies was learnt.

2) Port Development and Industrial Park Development

- It was possible to see various types of ports with different functions, for example, the export oriented ports of Yokohama and Kobe, and import oriented ports of Tokyo and Osaka. The efforts to fully utilize the ports with their characteristics were recognized.
- It was a good lesson to learn about spatial arrangement inside an industrial park such as “Kombinat” considering the process chain of petrochemical products.
- Kashima Port and its industrial park will be a good model for the development of Nacala Port and its surrounding area.

3) Investment Seminar

- An investment seminar for Mozambique was organized in Tokyo by UNIDO on 24th April 2013. The counterparts who participated in the JICA training in Japan attended the investment seminar and presented the investment situation in Mozambique. This was a good opportunity to attract many Japanese enterprises and investors.

4) Environmental Management

- The importance of mitigating the pollution from industrial development as the real issue because they had opportunities to actually listen to the victims of public pollution was recognized.

5) Autonomous Development at Provincial Level

- The initiative of local level organizations and the collaboration of academics, enterprises, and local government are necessary.



Top-left: Investment Seminar, Right: Thermal Power Plant with waste recycling (Kashima),
Bottom-left: Wind Power Plant (Kashima)

Photo B.3.1 Counterpart Training in Japan

Appendix-C International Seminars for Nacala Corridor Regional Development

C.1 Outline of International Seminars

The first International Seminar was held on 15th March 2013 in Maputo of Mozambique. A total of 107 participants from Malawi, Zambia, and Mozambique along with the Minister of Planning and Development of Mozambique, the Ambassador of Japan, Permanent Secretaries from five provinces, JICA and other assistant organizations attended.

The second international seminar was organized on 20th-21st March 2014 in Nampula, Mozambique. The seminar had 107 participants for the first day and 156 participants for the second day with representation from the Ministry of Planning and Development, Ministry of Transport and Communication, Ministry for the Coordination of Environmental Affairs, Ministry of Agriculture¹, Government representatives of the project intervention five provinces, Government Delegations of Malawi and Zambia, and also the representatives of international organizations as follows: JICA, World Bank, African Development Bank (AfDB), UN-HABITAT and UNIDO. In addition, the second day was open for different private international and national companies, which about 50 companies in total attended.

C.2 Objectives of International Seminars

(1) Objectives of the First International Seminar

The first International Seminar aimed to achieve the following objectives:

- To share the information on the progress, on-going initiatives and future prospects of Nacala Corridor development among the neighboring countries (this time, Malawi and Zambia) and institutions (including development partners) concerned with Nacala Corridor
- To share and exchange information on government initiatives of Malawi and Zambia which are related to the Nacala Corridor
- To analyse, in a joint and coordinated manner, the opportunities brought by the implementation of on-going projects in the Nacala Corridor
- To create an opportunity to strengthen cooperative relations among countries and institutions concerned with Nacala Corridor

(2) Objectives of the Second International Seminar

The second International Seminar aimed to achieve the following objectives:

¹ The names of ministries listed here is based on the governmental structure before the reorganisation of the central ministries in January 2015.

- To promote understanding of Mozambique's development strategies and programs/projects for the Nacala Corridor Region among government officials in both Mozambique and neighboring countries
- To share and exchange information on government initiatives of Malawi and Zambia which are related to the Nacala Corridor
- To share the future image of international corridor development with private investors in order to encourage their investments in the Nacala Corridor Region
- To consider implementation strategies for promoting development of the Nacala Corridor Region

C.3 Conclusion/ Outcomes of International Seminars

(1) Outcomes of First International Seminar

The first seminar increased momentum among the countries toward working together on Nacala Corridor development.

- The Nacala Corridor was confirmed to be a vehicle for promoting economic growth and regional integration.
- Sustainability of different types of development of the Corridor should be ensured.
- The following goals should be achieved:
 - Promotion of international cooperation between neighbouring countries that are pursuing different interests,
 - Provision of a good environment to attract and retain private investment in the region,
 - Assurance by the Government that the private sectors meet their social and economic responsibilities.

(2) Outcomes of Second International Seminar

The following outcomes are observed in the second seminar:

- During the seminar, a Joint Statement was prepared by the members of the delegation from the Governments of Mozambique, Malawi and Zambia.
- At the end of the meeting, a Joint Statement was agreed and released by the members of the delegation from the Governments of Mozambique, Malawi and Zambia that they will put further effort for the establishment of a durable partnership for the effective development of the Nacala Corridor. (Full text of Joint Statement can be seen in Figure C.3.1).
- The seminar consisted not only in publicizing the actions and activities within the implementation of PEDEC-Nacala, but also represented an opportunity to publicize the development potential of the Nacala Corridor Region, as well as allowing an opportunity to make contributions and expectations about the development of the Corridor by countries of the hinterland who are the users of the Corridor.
- Opportunities and potential investments were presented, both in terms of logistics as well as agricultural and industrial levels for Mozambique, Malawi and Zambia, the fruit of the challenges for an effective integration of the Nacala Corridor.
- The Seminar also raised the need for joint effort to formulate better strategies to stimulate development and promote investment in the Nacala Corridor, and thus realize the common dream of seeing the Zambia - Malawi - Mozambique Growth Triangle (ZMM-GT) in the routes of world trade.

- Different actions (Presentations, Panel Discussion, Exhibition, and Optional Tour to Nacala Port) were taken in order to facilitate communication among different organizations, such as government officials from Mozambique, Malawi and Zambia, development partners and private companies during this occasion.
- The Governments of Malawi and Zambia are engaged in the implementation of actions and infrastructure projects for the Nacala Corridor in their countries, and are willing to implement further actions and projects undergoing on the Mozambican side to facilitate the development of the industrial and commercial sector on the SADC region in general and on the Corridor in particular.



Top-left: Group photo at the first seminar, Top-right: Open Discussion at the second seminar
Bottom-left: Group photo at the second seminar, Bottom-right: Presentation from GAZEDA at the second seminar

Photo C.3.1 International Seminars held in Mozambique

Joint Statement by the Governments of Mozambique,

Malawi and Zambia on

Vision of Nacala International Corridor

We have had active discussions about the future of the Nacala Corridor:

We have come to understand that the Nacala Corridor should play a vital role for promoting sustainable development of the regions related to the Nacala Corridor in Mozambique, Malawi, and Zambia.

The Governments of Mozambique, Malawi and Zambia remain committed to efforts directed at development of the Nacala Corridor due to high socio-economic benefits that will be unlocked through the use of the Nacala Development Corridor. For the realization of full development outcomes arising from this spatial development initiative, it is essential to ensure that the corridor remains efficient, reliable and therefore attractive to investors for complementary investments.

To this end, we agreed to strengthen our cooperation for developing and sustaining not only the Nacala Corridor as an international development corridor, but also for promoting regional development in relation to the Nacala Corridor:

The Governments of Mozambique, Malawi and Zambia agreed that a permanent inter-governmental coordination and cooperation mechanism among the three countries be established in order to guide the development initiative and to jointly monitor the progress of activities in the three countries and take actions required for the realization of the Nacala Corridor regional development.

Nampula City, Nampula Province, Mozambique
21 March 2014

The representatives from the Republic of Mozambique, the Republic of Malawi and the Republic of Zambia, for “the Second International Seminar on Nacala Corridor Regional Development Strategies”

Figure C.3.1 Joint Statement at the 2nd International Seminar

Appendix-D Records of Meetings with Government Institutions

D.1 Consultative Meetings with Government Institutions

Steering Committee Meetings (S/C) and Working Group Meetings (W/G) were the two main mechanisms for guiding the Project (PEDEC-Nacala) and sharing study results of the Project among concerned government institutions. In addition, Discussion Group Meetings, Explanation to Provincial Governments (by Road Show) and International Seminars were held for the purposes of consultation and information sharing among government institutions.

The records of major meetings with government institutions which are listed below are summarized in this chapter.

Table D.1.1 List of Meetings Whose Records are Summarized in this Chapter

No.	Date	Main Objectives	Venue	No. of Participants*
Steering Committee (SC) Meetings				
SC1	04 May 2012	To explain the Inception Report of PEDEC-Nacala (ICR) and Launch the Project (PEDEC-Nacala)	Maputo	32
SC2	27 Nov 2012	To explain the Progress Report of PEDEC-Nacala (PR)	Maputo	19
SC3	30 Aug 2013	To explain the Interim Report of PEDEC-Nacala (ITR)	Maputo	15
SC4	26 May 2014	To explain the Draft Strategies Report (Summary) of PEDEC-Nacala	Maputo	38
SC5	09 Dec 2014	To explain the Draft Final Report of PEDEC-Nacala (DFR)	Maputo	25
Working Group (WG) Meetings				
WG2	06 Sep 2012	To share the study progress of each sector To implement a Vision Workshop	Maputo	7
WG3	21 Sep 2012	To share the study progress of each sector To implement a Vision Workshop	Maputo	8
WG4	28 Sep 2012	To share the study progress of each sector To implement a Vision Workshop	Nampula	16
WG8	10 Jun 2013	To explain the Interim Report (ITR) and priority project ideas of PEDEC-Nacala	Nampula	11
WG9	12 Jun 2013	To explain the Interim Report (ITR) and priority project ideas of PEDEC-Nacala	Maputo	19
WG10**	09-10 Dec 2013	To implement a SEA Workshop	Nampula	21

WG11	13 Dec 2013	To share the results of the SEA Workshop held in Nampula	Maputo	19
Integrated Working Group Meetings				
IWG1	26 Nov 2012	To explain the Progress Report of PEDEC-Nacala (PR)	Maputo	23
IWG2	29 Aug 2013	To explain the Interim Report of PEDEC-Nacala (ITR)	Maputo	28
IWG3	08 Dec 2014	To explain the Draft Final Report of PEDEC-Nacala (DFR)	Maputo	20
Discussion Group Meeting (DGM) **				
DGM	30 Sep 2013	To discuss Nacala Bay Area and Greater Nampula development programmes, and the railway cargo operation programme	Maputo	30

Note: Participants from the Japanese side are not included (*). Representatives from municipalities and districts (mayors and district administrators) attended the Discussion Group Meeting, the 10th Working Group meeting in Nampula, and the 2nd International Seminar to discuss the Project (**).

D.2 Summary of Discussions with Government Institutions

(1) Steering Committee Meetings

Table D.2.1 Summary Discussions of Steering Committee Meetings

1st S/C Meeting for Explanation of the Inception Report and Project Launching, 04 May 2012, Maputo
<p><u>Comments and Suggestions</u></p> <ul style="list-style-type: none"> • The district of Mocuba of Zambezia Province shall not be considered as part of the study area during the survey phase.¹ • Neighbouring countries, such as Malawi, Zambia and Tanzania, will be included in the study, since the Nacala Corridor passes through Malawi and there is an inter-linkage with the corridor of Zambia. Studies on these neighbouring countries will be done mainly by reviewing existing documents relating to these countries, as well as by field visits to those countries. Cargo movement surveys will be conducted at the boundaries of Mozambique with neighbouring countries. Part of Tanzania will be studied from a viewpoint of water resources because the river basin of the Rovuma spreads over both Mozambique and Tanzania. <p><u>Recommendations</u></p> <ul style="list-style-type: none"> • It was recommended to the JICA Team for PEDEC-Nacala to work closely with the related authorities and institutions. • The JICA Study Team for PEDEC-Nacala should coordinate with the UN-Habitat team, which is conducting a study on urban development of Nacala and Nampula. <p><u>Conclusions</u></p> <ul style="list-style-type: none"> • Public institutions that are project partners and part of the Steering Committee and/or the Working Group, should share relevant information with the JICA Study Team for PEDEC-Nacala to support the project for efficient and successful operation. • It was agreed that the two International Seminars, scheduled to be held in December 2012 and November 2013, should be held after the technical meetings of the Working Group and Steering Committee. The participating members, date and venue should be determined and approved later. • It was agreed to carry out four (4) meetings of the Steering Committee and four (4) meetings of the Working Group during the project. • The Working Group may meet either in Maputo or in Nampula, as well as in the provinces of the project intervention. • Contents of the Inception Report were generally agreed among the Steering Committee members.
2nd S/C Meeting for Explanation of the Progress Report, 27 Nov 2012, Maputo
<p><u>Comments, Suggestions and Questions concerning the five provinces</u></p> <ul style="list-style-type: none"> • The report reflects the existing development programmes of the provinces. • The report should refer to the projects to increase the capacity of water and power for the districts of Mocuba, Palma, Pemba and Macuzi. • The report should recommend the installation of training institutions in the district of Macuze to meet future needs of human resources for Macuze area. • The revitalization of the road linking Nacala and Palma along the coast should be included in the report.

¹ Although it was agreed in the first Steering Committee meeting that PEDEC-Nacala does not cover Mocuba District, PEDEC-Nacala strategies include the urban centre hierarchy and SEZ projects including Mocuba.

- Enhancement of the existing technical-vocational school in Monapo should be included.
- Extension of the road connecting Mutarara District to EN7 should be included in the report to support the logistics of various goods and commodities of the province.

Conclusions and Recommendations

- The project is well underway and the project team has reviewed existing programmes.
- It was recommended to the JICA Study Team for PEDEC-Nacala to review the studies that were conducted in 2010 for the Spatial Development Initiatives and Corridor Development in the region.
- It was recommended that the members of the Working Group and the Provincial Governments should provide information required for PEDEC-Nacala and maintain good coordination with PEDEC-Nacala.
- Contents of the Progress Report were generally agreed among the Steering Committee members.

3rd S/C Meeting for Explanation of the Interim Report, 30 Aug 2013, Maputo

Comments, Suggestions and Questions

- It is necessary to intervene to ensure that the railway lines of Moatize-Nacala and Moatize-Nacala-Macuze are not exclusively for the transportation of mineral resources, but also for the transport of general cargo and passengers.
- Need to develop more marketing activities on the Nacala Port to exploit its full capacity.
- Information on ecotourism in Tete Province needs to be included in the report, in the context of utilizing the potential of Magoé National Park.
- Strategies to overcome congestion in Moatize-Nacala railway line should be included in the report.
- Dam construction projects over the Zambezi River including Borroma, Mutapa and Mphanda Nkuwa dams should be included in the report.
- Railway line and road construction projects, which connect Balama district to the Pemba Port for the discovery of reserves of graphite in the Balama District, should be included in the report.
- Will the Pemba Port be used within the Nacala Corridor Region's development strategies?
- It would be useful to reflect in the report the Cuamba-Marrupa road construction project.
- It would be important to consider the projects for rehabilitation of Quelimane-Mocuba railway and construction of a railway that connects the district of Mocuba to the prospective railway Moatize-Macuze-Nacala, because these projects could contribute to boost the economy of Mocuba District where the establishment of a Special Economic Zone (SEZ) is planned.
- The SDI (Spatial Development Initiative) Unit is conducting studies for the preparation of projects to the road management and road safety, which can be provided to the JICA Study Team for PEDEC-Nacala. The SDI Unit will develop partnerships within PEDEC-Nacala.
- Regarding the capacity building activities provided by PEDEC-Nacala, it would be appropriate to include the National Directorate of Industry and the National Centre for Sustainable Development (in MICOA).
- The report should include strategies to minimize migration to large urban centres of the Nacala Corridor Region.
- How will the funding be mobilized to implement planned projects by 2017?
- The National Government will formulate a strategy of communication and dissemination of project results, as well as establish mechanisms for implementing programmes, after approval of the Final Report of PEDEC-Nacala.
- The PEDEC-Nacala should present proposals for construction and/or development of vocational schools for the purpose of human resource development to meet the demands from projects along the Nacala Corridor.

Findings and Recommendations

- The meetings gave an opportunity for members of the Working Group and the Steering Committee to have a thorough overview of the Interim Report, as well as to give their contributions to the enrichment of the Interim Report.
- For the PEDEC-Nacala, it is necessary to consider the balance in the formulation of strategies to guide investments to stimulate economic development in the Nacala Corridor.
- It is necessary to harmonize PEDEC-Nacala with other instruments of economic planning, including the Five Year Plan of the Government, the Provincial and Sectorial Strategic Plans, so that the final document is consistent with the objectives set by the Government under the National Development Strategy of the Country.
- The report should also present different scenarios of development of the country, taking into account the potential growth of the Mozambican economy combined with the impact of the large-scale projects extracting gas and coal, as well as their logistics.
- Moreover, the report should highlight the importance of urban centres, namely, Nacala, Nampula and Cuamba, and crucial strengthening of infrastructure of railways, roads and ports, power grids and water supply, which can contribute greatly in attracting private investments with the potential to induce the development of this region.
- The need for greater coordination among the PEDEC proposals and plans/strategies already developed and in progress was recommended, with particular emphasis on the Master Plans for the Coal and Gas Sector and Provincial Strategic Plans, Integrated Growth Poles Project by the World Bank, ProSAVANA Project, and the Plan for Strategic Investment Promotion by CPI.
- Regarding the creation of discussion groups for programmes for specific areas, it was proposed to create a forum that will discuss relevant issues in an integrated manner.
- Contents of the Interim Report were generally agreed among the Steering Committee members.

4th S/C Meeting for Explanation of the Draft Strategies Report (Summary), 26 May 2014, Maputo**Presentation**

- Presentation on PEDEC-Nacala by Dr. Danilo Nala, Director General, GAZEDA.
- Presentation regarding on-going projects in the port and railway sectors by Mr. Paulo Tarmamade, CFM.
 - Nacala Railway
 - Development of Pemba Port and Palma Port, and their roles
- Presentation regarding on-going projects in the electricity sector by Mr. Anthony Munguambe, EDM
 - Transmission line of Chimuara-Nampula-Namialo-Nacala etc.
- Presentation on completed, on-going and planned projects in the road sector by Mr. Paulo Baúque, ANE
 - Completed projects: Marrupa-Ruaça, Rio Lurio-Namialo, Rio Ligonha-Nampula, Mocuba Alto Benfica and Mocuba -Nampevo
 - Ongoing projects: Sections Cuamba-Nampula, Cuamba-Magige, Mueda-Namoto and Montepuez-Ruaça
 - Projects to start: Milange - Sections Alto Benfica, Cuamba - Lichinga
 - Projects in preparation: Stretch Nampula-Nametil
 - Projects with no funding: Sections Chimuara-Namacura, Chimuara-Quelimane, Cuamba-Marupa, Montepuez-Mueda and Rio Lurio-Macomia.
- Presentation on water sector by Ms. Fernanda Quintano, FIPAG
 - Examination of possibility of usage of underground water for water supply in Nacala Porto

Comments, Suggestions and Questions

- The project must ensure greater involvement and participation of local people in the development process of the region. Particular attention to the issue of human capital formation is also necessary.
- A roadshow of stakeholder meetings in the five provinces covered by the project should be held before submitting the "PEDEC-Nacala" to the Council of Ministers.
- It is necessary to ensure the expansion of the road network in the provinces of Niassa and Cabo Delgado, in order to reduce the pressure due to the transport of minerals on existing roads
- There is a need for greater coordination among the sectors in joint supervision of the capacity of key infrastructure to realize harmonious development.
- Are the water, electricity and road sectors open to public-private partnerships to secure funding for projects in the Nacala Corridor region?
- Implementation of projects to ensure adequate generation of electricity for the Nacala Corridor Region, to provide alternative sources of electricity to Cahora Bassa should be undertaken.
- The planning exercise under the "PEDEC-Nacala" is interlinked with other sectors and their planning tools, and this project is of paramount importance to the Government of Mozambique, for it is an umbrella project for other projects and initiatives to develop the Nacala Corridor Region.
- As to the involvement of private sectors in the implementation of projects of the energy, water, road sectors through public-private partnerships, it was explained that there was room for private initiative, and, in the case of the water sector, the key question is the level of water prices.

Findings and Recommendations

- The meeting was an opportunity for deep and comprehensive discussion on priority programmes and projects proposed by the study of PEDEC-Nacala.
- The event also enabled harmonization of priority programmes and projects and other sectoral initiatives in the Nacala Corridor Region.
- The contents of the Draft PEDEC-Nacala Strategies Report (Summary) were generally agreed among the Steering Committee members.

5th S/C Meeting for Explanation of the Draft Final Report, 09 Dec. 2014, MaputoPresentation by GAZEDA and the JICA Study Team for PEDEC-Nacala

- Presentation on the progress of PEDEC-Nacala, as well as the contents of DFR.

Comments, Suggestions and Questions

[Dr. Danilo Nala, GAZEDA]

- We need to disseminate the information regarding this project and put it on the website, because there are many people who are aware of PEDEC project, but their levels of understanding about PEDEC are quite different.

[Mr. Kota Sakaguchi, JICA Headquarters]

- In order to explain the responses to the given comments from the stakeholders, having a second roadshow of stakeholder meetings is an option. However, if this is difficult, we need to find an alternative mechanism or use different methods.

[Mr. Paulo Tarmamade, CFM]

- With regard to community participation, I think that it is very important not only to publish the report on the website, but also to establish a platform of continuous communication with the communities.

[Mr. Benjamin Chilenge, MIREM]

- I do believe that the comments and concerns of the communities raised in the first roadshow of stakeholder meetings are relevant to PEDEC-Nacala and we should consider the ideas of community participation and include them in the report.

- As per the development scenario, scenario B-3 is the most preferable, since we can see diversity in economic activities. It is important to acquire investment toward various industries with linkage to the mining activity.

[Ms. Elisa Somane, Permanent Secretary of Zambezia Province]

- The presentation was very good, and I suppose there was a great effort required for this report.
- The comments given in the stakeholder meetings are very important, and it is necessary to deeply examine them.
- District and provincial strategic plans should be considered in the implementation of the projects for development.
- The relationship between PEDEC-Nacala and ProSAVANA should be understood by the communities. There should be clearness in terms of the roles of each project.

[Mr. Manuel Guimaraes, Permanent Secretary of Nampula Province]

- How are we going to finance all these projects? Who is going to provide the finance and when? Nampula Province wants the implementation of PEDEC as soon as possible.

[Mr. Benjamin Chilenge, MIREM]

- We need to bear in mind that we can attract investment because there are large scale economic projects that have great potential. It is not possible to realise passenger transport alone in the Nacala Corridor, but passenger transport becomes possible by being aligned with the large cargo transport project.

[Mr. Paulo Tarmamade, CFM]

- Passenger transport will be realised because of the prospective railway upgrading for coal transport. The quota for passenger transport on the Nacala Corridor Railway has already been reserved.

[Mr. Yoshihisa Asada, JICA Study Team for PEDEC-Nacala]

- If we are to organise another series of stakeholder meetings to explain the answers for comments from stakeholders (in the last August stakeholder meetings), we will need to ask for a lot of cooperation from provincial governments.

[Dr. Danilo Nala, GAZEDA]

- Yesterday in the Integrated Working Group Meeting, we tried to define the meaning of “benefits to the communities.” Many people think that it is about social responsibility. However, PEDEC brings much more than that. The benefits to the communities under PEDEC projects are about opportunities whereby the farmers can work for the projects, they can sell their products, and their children can get education and health services. Benefits are not just given by the PEDEC-Nacala, but people are able to get benefits by participating in development and by producing. This kind of message should be disseminated to the communities as their prospective benefits under the PEDEC-Nacala.
- Comments from stakeholder meetings will appear as an appendix or an annex to the report.
- The new agency for Nacala Corridor Development, which is to be established later on, will be responsible for responding to further comments on PEDEC from stakeholders.
- In the Council of Ministers, funding for large projects was discussed. In addition, JICA has already funded some projects and will do more. Other development partners also would like to put their investments along the Nacala Corridor. The funding will be a gradual process, not everything at once in the beginning.

Presentations by GAZEDA and the JICA Study Team for PEDEC-Nacala

- Presentation on alternative scenarios
- Presentation on overall development strategies and high priority projects
- Presentation on revisions made for the Draft Final Report.

Comments, Suggestions and Questions

[Dr. Danilo Nala, GAZEDA]

- One of the aspects which were emphasized in the Council of Ministers was the role of Palma City in Cabo Delgado Province. In PEDEC-Nacala, the development projects for Palma City have already been listed as High Priority projects.

[Ms. Rosa Cesaltina, MICOA]

- I would like to request the PEDE-Nacala team to include the construction of an environmental laboratory for Palma.
- Under MICOA a programme called PECODA (programme of education for environmental development) is implemented, which promotes plantation in three hundred locations. Will this project be incorporated into PEDEC-Nacala?

[Mr. Kota Sakaguchi, JICA Headquarters]

- We would like to put rehabilitation of the bridges along EN380 in Cabo Delgado Province as one of the High Priority Projects.
- As we know, there are around 80 projects proposed by PEDEC-Nacala, and it is not possible to manage all of them, that is why there is a need for establishing an agency which is to coordinate or deal with the 80 projects.

[Mr. Godinho Alves, CPI]

- Regarding funds, I would like to see in the report the inclusion of at least one recommendation about funding. There are many modalities including public private partnership. We can propose industrial parks that can be used for gathering funds.

[Ms. Lina Portugal, Permanent Secretary of Cabo Delgado Province]

- The new agency for the Nacala Corridor Development should be understood as a platform of opportunities.
- In Mozambique there are many studies done, but not many implementations. More focus should be put on implementation.
- In Pemba, the first step for construction of a logistic base has been started. How can this logistic base be incorporated into the PEDEC project?
- I am very happy to hear that Palma is already included in the study. Population estimation for Palma should be included in the report.
- The project for Lurio River Basin development is not advisable, since the water amount in the dry season is not sufficient.

[Mr. Manuel Guimaraes, Permanent Secretary of Nampula Province]

- I would like to emphasize that the dissemination and information sharing, as well as communication strategy among different sectors is important to everyone involved in the project. What happens is that sometimes one sector can start with its activities in one place and another project is going to start its activities in the same place where the other sector has already started its activities, this shows lack of communication among the sectors. CDN now has started building a wall along the railway from Nampula city. On one hand this is positive and on the other hand this is negative because one community living on one side will face difficulty regarding how to communicate with the other community living on the other side of the wall. So my question is: will the population living along the corridor be protected?

[Mr. Feliciano Mazige, IIAM]

- Strategies for the agricultural sector in PEDEC seem to deal only with support for small scale farmers. The agricultural sector should be dealt broadly in the strategy, based on PEDSA.

- Capacity development for land management is very important in Mozambique to avoid land conflicts which may arise in the future. Support for RAI implementation and DUAT acquisition is a significant element, and more stress should be put in it.
- Were there any alignments between the district and provincial strategic plans for the project? Regarding the High Priority Projects, what criteria were used for the selection of these projects?
- What synergies, harmonization and alignments are there between PEDEC and ProSAVANA in order to involve all farmers of the agriculture sector in the development of Nacala Corridor?

[Adelaide Carlos, FIPAG]

- Is water supply in Nacala Bay Area planned taking into account the current projects that are on-going?

[Mr. Yoshihisa Asada, PEDEC-Nacala Study Team]

- The new agency which is planned to be established for Nacala Corridor Region's development will be responsible for monitoring activities of different projects in the Nacala Corridor Region.
- Industrial Parks are planned not only in Nacala but also in Cuamba. They will accommodate manufacturing industries including agro-processing.
- The main corridors and sub-corridors are identified by considering how the networks can be linked to the areas where there are populations engaged in economic activities.
- As per the logistic base in Pemba, it is already included in the report in the chapters for the urban development sector and the port sector.
- It is difficult to make an estimation on population in Palma, since the population can change greatly because of the natural gas-based chemical industries.
- The idea of Lurio River water resources development project still remains in the report. According to the data collected, water is sufficient even in the dry season. However, we know that it is necessary to reconstruct a metrological and hydrological data observation network in order to conduct integrated water resources management including Lurio River water resources development.
- About the comment from IIAM on how to deal with the agricultural sector, PEDEC-Nacala deals with not only support for small-scale farmers, but also other measures in developing value chains for the agricultural sector. Please refer to the report.
- Regarding water supply in Nacala Bay Area, urban water demand in Nampula, Nacala and Pemba is estimated by considering existing and proposed projects.

[Ms. Lina Portugal, Permanent Secretary of Cabo Delgado]

- Concerning the environmental laboratory in Palma, if the one proposed in Nacala can target all of the northern provinces, I think it is not necessary to establish a lab in Palma.

[Mr. Yoshihisa Asada, PEDEC-Nacala Study Team]

- The laboratory will cover the northern provinces including Cabo Delgado, it is not only for Nacala Bay Area.

[Dr. Danilo Nala, GAZEDA]

- Provincial strategic plans were consulted and aligned with the projects within PEDEC and reflected in the report.
- The priority projects are complementing existing projects. If we read the report carefully we will notice that all the projects are inter-connected with other projects.
- An agency which will coordinate all the projects will be established, but this agency will not replace any provincial or district governments.
- Each of the proposed projects will need a specific study. The bypass will also need a specific study.
- With an agency to be established, community participation will be included in all the activities of the project.
- There is also the inclusion of industrial parks in our document as was mentioned in this meeting.

(2) Working Group Meetings**Table D.2.2 Summary Discussions of Working Group Meetings**

2nd W/G Meeting for Project Vision Workshop, 6 Sep. 2012, Maputo
<p><u>Result of Vision Workshop</u></p> <ul style="list-style-type: none"> • Topic: What is the future vision that you want for your country? • The following ideas were raised by the participants: <ul style="list-style-type: none"> ➤ Peace/ Equality/ Prosperity/ Planning/ Education/ Health/ Food Security/ Good Governance and Good Leadership • After collecting opinions, voting was done to choose the most important aspects to describe the vision, and the following three were selected. <ul style="list-style-type: none"> ➤ Peace ➤ Equality ➤ Prosperity
3rd W/G Meeting for Project Vision Workshop, 21 Sep. 2012, Maputo
<p><u>Result of Vision Workshop</u></p> <ul style="list-style-type: none"> • Topic: In the previous workshop held on September 6th, the future vision for the Nacala Corridor Regional Development was formulated as “Peace, Equality, and Prosperity.” What do we need to do first to realize the future vision we discussed last time? • The following ideas were raised by the participants: <ul style="list-style-type: none"> ➤ <u>To invest in technical and professional knowledge (8)</u> ➤ <u>To prepare an inventory of the resources of the country (quantification and mapping) (6)</u> ➤ <u>To promote good leadership for a fairer society (6)</u> ➤ To promote food security for harmony in the country) (2) ➤ To invest in health for the development of human and social capital (0) • Participants voted to prioritize actions, and the top three actions were chosen as the first step of the actions to attain the proposed future vision of the region.
4th W/G Meeting for Project Vision Workshop, 28 Sep. 2012, Nampula
<p><u>Result of Vision Workshop</u></p> <ul style="list-style-type: none"> • Topic: What is the future vision that you want for your country? • The following ideas were raised by the participants: <ul style="list-style-type: none"> ➤ <u>Prosperity (19)</u> ➤ <u>Economic Autonomy and Stability (10)</u> ➤ <u>Social Stability (8)</u> ➤ Equity (3) • Participants voted to select the most important visions, and the top three choices were chosen as the future vision as below. <ul style="list-style-type: none"> ➤ “Mocambique Prospero, Autonomo, e Socio-economicamente Estave (Mozambique with Prosperity, Autonomy and Social-economic Stability)”

8th W/G Meeting for Explanation of the Interim Report and Priority Projects, 10 Jun. 2013, Nampula

Presentation by PEDEC-Nacala Study Team

- Contents of ITR as well as Priority Projects were explained by the team.

Comments, Suggestions and Questions

- Regarding water supply, a dam should be constructed along the Lurio River so that water resources from the river can be provided both to Nacala and Pemba. (Cabo Delgado Province)
 - Response by the Team: Utilization of Megaruma Dam can be one of the solutions to supply water to Pemba.
- Since environmental problems in Tete Province are enormous, we would like PEDEC to prioritize environmental management in Tete as a high priority. (Tete Province)
 - Response by the Team: PEDEC is actually proposing to establish environmental laboratories in Maputo, Tete and Nampula, including human resource development.
- Information on private initiatives in the natural gas industry should be investigated, and possibility of a chemical industrial park in Palma should be examined. (GAZEDA)
 - Response by the Team: Such information will be collected and integrated into the study, although careful observation is required to evaluate the potential of natural gas chemical industries in Palma as well as activities of private sectors.

Conclusion

- Contents of the Interim Report were generally agreed among the Nampula Working Group members.

9th W/G Meeting for Explanation of the ITR and Priority Projects, 12 Jun. 2013, Maputo

Presentation by JICA Study Team for PEDEC-Nacala

- Contents of Interim Report (ITR) as well as ideas on priority projects were explained by the team.

Comments, Suggestions and Questions

- Information sharing on the method of SEA in PEDEC-Nacala is appreciated. (MICOA)
 - Response by the Team: Information sharing is going to be done through Working Group Meetings.
- The water channel from the Lurio River to the Mecuburi River is not feasible due to the low water volume in the dry season. (MIREM)
 - Response by the Team: The data collected in this study shows water can be taken from Lurio River even in the dry season. However, in order to assess the river water situation of the Lurio River, more data is required.
- A natural gas-exporting port in Palma, as well as a pipelining from Palma through Pemba to Nacala should be considered. (MIREM)
 - Response by the Team: A natural gas exporting port is planned in Palma. Although concrete examination on pipelining has not been done yet, there is a possibility of developing chemical industries in Pemba or Nacala.
- How are the projects proposed in PEDEC-Nacala going to be implemented? Through a special agency or individual ministries?
 - Response by the Team: An umbrella organization is needed, which coordinates and manages all the projects in an integrated manner.

Conclusion

- Contents of the Interim Report were generally agreed among the Working Group members.

10th W/G Meeting for Implementing SEA workshop, 09-10 Dec. 2013, NampulaParticipants

- 7 participants from Provincial Directorates of Cabo Delgado, Niassa, Zambezia and Nampula
- 2 participants from UCODIN (Nampula)
- 2 participants from UN-Habitat (Nampula)
- 1 participant from Nampula Municipality
- 1 participant from Nampula District
- 1 participant from Nacala Municipality
- 1 participant from Nacala-a-Velha District
- 1 participant from Nacala District
- 1 participant from Port of Nacala
- 2 participants from GAZEDA Nacala
- PEDEC-Nacala Study Team

Presentations

- Explanation regarding the outline of PEDEC-Nacala
- Explanation regarding ideas for high-priority programmes and projects
- Explanation regarding the SEA Workshop

Methods used for SEA Workshop

The following methods for SEA were firstly explained by the JICA Study Team for PEDEC-Nacala, and an actual demonstration as training was implemented in the workshop through group work.

- Environmental Risk and Opportunity Matrix: is to assess potential risks and opportunities associated with a PPP (Policy, Plan and Programme) in order to integrate recommendations or mitigation actions into PPP. This matrix was prepared through group discussions.
- Environmental Impact Matrix: is to evaluate the individual PPP in relation to a range of environmental criteria which serve as indicators of the existing environmental conditions that can be classified in the following four categories: natural resources; socio-cultural; economic; and institutional issues. This matrix was prepared by evaluating the impact of each PPP through group discussion.
- Compatibility Matrix: is to compare how different policies interact, whether they support each other, have potential conflict with each other, or have no significant interaction with each other.

11th W/G Meeting for Sharing the Result of the SEA Workshop held in Nampula, 13 Dec. 2013, MaputoPresentations

- Explanation regarding the outline of PEDEC-Nacala
- Explanation regarding ideas on high-priority programmes and projects
- Presentation regarding outcome of SEA Workshop in Nampula

Comments, Suggestions and Questions

- It seems that not all the risks were considered in the SEA Workshop in Nampula, especially gender and HIV. Sedimentation, erosion and noise caused by construction should also be examined. (MICOA)
- I understood that this workshop was done as a way to consider mitigation measures. However, if a full-scale SEA is to be done, many more factors should be involved in the analysis, such as the balance of natural resources as a whole and detailed effects of road/ railway bypasses. (MICOA)
- An environmental laboratory can be a good measure, though education on environmental management should be presented to residents and investors.
- As per road and railway bypasses, impacts on natural resources should be carefully examined.

(3) Integrated Working Groups**Table D.2.3 Summary Discussions of Integrated Working Groups**

1st Integrated W/G Meeting for Explanation of Progress Report, 26 Nov. 2012, Maputo
<p><u>Presentation by JICA Study Team for PEDEC-Nacala</u></p> <ul style="list-style-type: none"> • Contents of the Progress Report (PR) were explained by the team. • Results of the previous Working Group Meetings were presented, especially regarding the following points: <ul style="list-style-type: none"> ➤ Comments raised on the water resources development of the Lurio River basin. ➤ Results of the vision workshop held in Maputo and Nampula <p><u>Report on Vietnam Tour</u></p> <p>Dr. Simão Joaquim from GAZEDA presented a report regarding the Vietnam Tour which was held from 11 to 17 November 2012 as follows.</p> <ul style="list-style-type: none"> • Vietnam has a lot of similarities with Mozambique. • In this sense, the objective of the study tour was to learn from the experiences of Vietnam, particularly industrial parks. • 5 industrial parks were visited. • The Mozambican participants could learn how great the benefits of having industrial parks in a country can be. <p><u>Questions and Comments to the Presentation and the Progress Report</u></p> <p>[Mr. Louis Antonio, Tete Province]</p> <ul style="list-style-type: none"> • There is a plan for a new railway line, which runs from Chiuta-Zambezia-Nacala (without going through Malawi). <p>[Mr. Sertorio de Azevedo, Niassa Province]</p> <ul style="list-style-type: none"> • The tourism sector should be linked to the mineral resources sector. • Not all local people understand all these large-scale projects that are going on in the country, nor understand the benefits of having these projects. <p>[Mrs. Felicidade Muocha, UCODIN, Nampula]</p> <ul style="list-style-type: none"> • Urban development is causing a lot of immigration, and people come from the central and southern regions of the country and even from the neighbouring countries towards the megaproject sites in search of better living. <p>[Mr. Omar Saide, Cabo Delgado Province]</p> <ul style="list-style-type: none"> • Another road connection from Nacala to Palma, which runs along the coast, is necessary for easier access to the hinterlands. • Rehabilitation of the Rio Montepuez dam should be incorporated in the project. • Logistics by air should be also included in order to promote local production. • There should be a research institute for natural resources in Cabo Delgado. <p>[Mr. Bernadino Davida Novele, DNA/MOPH]</p> <ul style="list-style-type: none"> • There is a plan for construction of Lurio 2 dam both for water and for electricity. <p>[Mr. Manuel Ruas, SDI Unit, MTC]</p> <ul style="list-style-type: none"> • What is the purpose of the international seminar? How will that benefit the project and the country? What is the strategy to attract investments to the country? How is the study going to help these projects? <p>[Mr. Henrique Andre, MTC]</p> <ul style="list-style-type: none"> • There should be an elaboration for an integrated development of the Nacala Region.

[Mr. Antonio Miambo, CENACARTA]

- What is the method of dissemination of information to interested parties and the public in general?

[Mr. Antonio Luis Machel, Ministry of Public Affairs]

- Feasibility studies for Pandacua dam, Lubata dam, and Borongo dam are underway for electricity supply.

Conclusions

- The comments expressed above to the presentation and the Progress Report contained useful information to be considered in the course of the study of PEDEC-Nacala.
- Contents of the Progress Report were generally accepted among the Integrated Working Group members.

2nd Integrated W/G Meeting for Explanation of the Interim Report, 29 Aug. 2013, Maputo

Presentation by JICA Study Team for PEDEC-Nacala

- Contents of ITR, preliminary results of the study, and proposed projects were explained by the team.

Discussions

[Ms. Felicidade Auxilio, UCODIN- Nampula]

- What are different choices for resolving the issue of water shortage in the cities of Nampula and Nacala in future years?
- In relation to the future of the city of Nampula, what can be done to cope with the increase of incoming immigrants, which is taking place in this city?

[Mr. Manuel Ruas, SDI-Unit, MTC]

- A study group by Mozambicans should be established along with the JICA Study Team for PEDEC-Nacala in order to improve the formulation of projects.
- GAZEDA should be the leader of this Mozambican study group and also lead the planning on how the infrastructures (railways) should be built or rebuilt in the corridors linking Zambia and Malawi to Mozambique, as these countries do not have ports but they have potential economic competitiveness.

[Sortorio Azevedo, Niassa Province]

- Lack of rehabilitation of railways in the province of Niassa does not enable the province to develop as it should.

Conclusion

- Contents of the Interim Report were generally accepted among the Integrated Working Group members.

3rd Integrated W/G for Explanation of the Draft Final Report, 08 Dec. 2014, Maputo

Presentation by GAZEDA and PEDEC-Nacala Study Team

- Presentation regarding the progress of PEDEC-Nacala, as well as the contents of the Draft Final Report (DFR)
- Presentation of a summary of the Road Show of stakeholder meetings and provincial government meetings

Discussion

[Dr. Danilo Nala, GAZEDA]

- There is a need to deeply analyse questions from stakeholders in order to see the best ways to respond to them in the report.

[Mr. Filipe Duarte, Tete Province]

- In an indirect or implicit way, the establishment of environmental laboratories responds to the health issues because it will allow the monitoring of the quality of the environment. The improvement of production also has to do with the health in some way.

[Mr. Simões Victorino, JICA Mozambique]

- When we talk about benefits to the community, it is important to think about the issue of water.

[Mr. Anibal Manave, CFM]

- CFM is facing difficulty in making the projection of traffic generated within the scope of ProSAVANA or PEDEC. CFM has begun the process of rehabilitation of the port. To be able to get the financing it is necessary to have a sound basis on what will be produced in the areas of PEDEC and what will be exported.

[Ms. Felicidade Muocha, UCODIN, Nampula]

- It is important to answer the questions from stakeholders in a selective way according to the scope and objectives of this study.
- Health issues are implicitly included in the water supply sector. If water is brought to the communities, it will contribute to better health of the community.

[Ms. Josefa Jussar, MICOA]

- It is necessary to make a list of comments and answers for the stakeholders' comments and attach it to the report. Further, that document should be uploaded to the website. This will ensure the accountability of this project in the long run.

[Dr. Danilo Nalá]

- We must be innovative and explain to the civil society what we understand to be the benefits to the community. People usually perceive benefits for society as direct benefits, such as distribution of seeds or distribution of food items. But for us the benefit to the community is the community access to jobs. We have to bear in mind that the communities will be able to obtain employment through the projects of PEDEC-Nacala and the benefits to the communities are the communities' own work to generate income.
- PEDEC-Nacala was presented at the Social Economic Council and was applauded and welcomed by all. However, only the next Government is to approve this project (PEDEC-Nacala) because it is a very strategic plan. We think that the decision taken by the current Government is correct because the effective implementation of this project is going to happen in the next Government. The great advantage of this is that we have the possibility to go back to the provinces and to say that the report was presented at the Council of Ministers as information and all the concerns and questions raised in the previous road show of stakeholder meetings are incorporated into this report.
- The proposal to disclose the report on the website will reach few people and does not reach the majority of those who have asked these questions. We have to think of alternatives to make the report available for public access. We can see if we can distribute brochures or if we put excerpts of the report on the website. I agree with the proposal to add the comments in the form of an attachment. The report is open for further comment, or contributions.

Presentations by GAZEDA and PEDEC-Nacala Study Team

- Presentation regarding alternative scenarios
- Presentation regarding overall development strategies and high priority projects
- Presentation regarding revisions made for the Draft Final Report.

Comments, Suggestions and Questions

[Mr. Kota Sakaguchi, JICA Headquarter]

- There is a need to place the construction of bridges in Cabo Delgado Province as a high priority.
- It is important to set up a coordination structure.

[Mr. Paulo Bauque, ANE]

- It is true that there is a need for the 8 bridges between Macomia and Ouasse to be placed as high priority.

[Ms. Josefa Jussara, MICOA]

- Is there a need for creation of a new agency to deal with various projects of PEDEC-Nacala, or do we implement them by the existing structure of the government level?

[Ms. Fatima Milissão, Cabo Delgado Province]

- Water supply from the Lúrio River or the Megaluma River needs to be included in the strategy because the city may be left without water with the expansion and growth of this area.

[Mr. Anibal Manave, CFM]

- CFM would like to have an estimate of current volumes of cargo. He said that last week there was a presentation that showed another traffic projection for 2017. Creation of a unit that can coordinate the activities in the Nacala Bay in order to avoid duplication of projects.
- A master plan for the Nacala Bay Area needs to be formulated.

[Mr. Yoshihisa Asada, PEDEC-Nacala Study Team]

- In vol. 2 page 19-4, there is a project for the improvement of Palma and Pemba roads. Construction of bridges can be dealt in this framework, and this can be changed to be high priority projects.
- Strategies for the water supply in rural areas are already included in this study.
- As for the master plan for the Nacala Bay Area, Section 16.1 describes how the Nacala Bay Area should be developed.

[Dr. Danilo Nalá, GAZEDA]

- In relation to the coordination in Nacala Bay, it is necessary to assume that each entity has its specific competence to make the right decisions. The big question is the coordination and promotion of investment.
- Concerning the master plan for the Nacala Bay Area, we have specific projects that should be coordinated when an agency starts operation.

Conclusion

- Contents of the Draft Final Report were generally agreed among the Integrated Working Group members.

(4) Discussion Group Meeting

Table D.2.4 Summary Discussion of Group Meeting

Discussion Group Meeting for Discussing Programmes in Nacala Bay Area and Greater Nampula, 30 Sep. 2013, Maputo

Objective of the Meeting

- The objective of this meeting is to discuss among various stakeholders the following three priority programmes and to receive contributions.
 - Nacala Bay Area Development Programme
 - Greater Nampula Area Development Programme
 - Operation for Regional/International Railway Cargos

Participants

- Ministry of Planning and Development (MPD);
- Ministry of Transport and Communications (MTC);
- Ministry of Energy (ME);
- Ministry for Coordination of Environmental Affairs (MICOA);
- Government of Nampula-Rapale District;
- Government of Nacala-Porto District;
- Government of Nacala-a-Velha District;

- Municipal Council of Nampula City;
- Municipal Council of Nacala City;
- National Directorate of Water (DNA);
- Mozambique Ports and Railways (CFM);
- Eletricidade de Mozambique (EDM);
- ARA Centre and North;
- Airports of Mozambique;
- UN-Habitat
- UCODIN;
- ENRC;
- Vale Mozambique;
- Road Fund;
- National Roads Administration (ANE); and
- Office for Economic Areas with Accelerated Development (GAZEDA).

Presentations

- Presentation regarding Greater Nampula Area Development Programme
 - Five projects are proposed in this Programme, namely, (i) railway bypass; (ii) multi-modal terminal and railway shunting yard relocation; (iii) Nampula southern road bypass; (iv) urban redevelopment; and (v) other long-term projects, especially the relocation the Nampula International Airport.
 - The railway bypass (about 44 kilometres) should be developed and it should take place before the operation of full-scale coal transport. It should be built about 10 km north of the current route, so that together with other projects it contributes to harmonious urban growth.

Comments, Suggestions and Questions

- The bypass project is an issue that the Nampula City is discussing with the Ministry of Transport and Communication (MTC), Vale Mozambique and CFM, trying to persuade the operator to produce better alternative solutions, rather than increasing the number of crossings and bridges in the city.
- MTC is not the institution approving the railway track and issue DUAT, so it has no legal power to force the operator to implement the railway line diversion project (railway bypass project), but negotiations are underway between the parties involved.
- PEDEC-Nacala report should present the benefits to be gained with the implementation of the bypass and its costs, to enable the government to implement a feasibility study.
- Even with the implementation of the railway bypass, the existing line should not be disabled, it may serve to transport passengers and general cargo and this may contribute to promotion of urban economic development.
- It is necessary to plan and forecast the future city structure within the urban planning for the integration and harmony of infrastructures.
- It is important to secure the space for construction of infrastructure, such as electricity substations, treatment centres, and water supply and sanitation facilities, in order to avoid the cost burden in the future and in order that the municipality could attract more people to the urban area and to its periphery.
- Recently proponents of an investment project tried to locate the venture in Anchilo. However, this area has no electricity to make investments possible.
- Anchilo and Rapale should become a buffer zone outside the centre of Nampula, and may also contribute to the reducing the congestion of investment projects in the city.

Presentation

- Presentation regarding Nacala Bay Area Development Program
 - Five projects were proposed for this programme, namely: (i) Nacala industrial park project; (ii) port access road; (iii) multi-modal terminal and railway shunting yard; (iv) airport city and access road development; and (v) projects for electricity and water supply;

Comments and Suggestions

- It is necessary to consider the need for a railway bypass in the centre of the town of Nacala-a-Velha.
- The urban vision for Nacala-a-Velha as well as its reflection into PDUT (District Land Use Plan), which was prepared in a rural vision, is needed.
- It is of an urgent need to draw up a development plan for Nacala-a-Velha, especially for non-residential areas.
- Since DUATs were issued to the projects for a second port terminal and refinery construction these projects should be taken into consideration in PEDEC-Nacala. A careful review is necessary because PEDEC-Nacala might have designated residential areas over the lands for the second port terminal and refinery construction.
- There is a need for urgent development of a comprehensive plan for Nacala Area's development covering Nacala Porto, Nacala-a-Velha and Port area considering the detailed plan for New Nacala Airport and other development plans.
- Environmental problems in Nacala Municipality are not reflected in the report. For example, erosion affects almost the entire municipality. Especially, the area that is proposed for IFZ's is such an area, which might cause failure of some projects.

Presentations

- Presentation regarding Operation for Regional/International Railway Cargoes
 - It was explained that the concessionaire is responsible for the operation of both coal and non-coal cargo trains with consideration for safety and sustainability.
 - The concerns are , firstly, how the level of services, capacity, security and cooperation with the regional economy can be ensured, and secondly, how the regional railway cargo can be promoted.
 - Information was requested regarding the amount of cargo and passengers under the agreement between the Government and the concessionaires, also requested was an operating diagram of the railway, location plans and stations for cargo and passengers, areas of shunting yards, railway sidings and crossover levels.

Comments, Suggestions and Questions

- It depends on how INATTER, regulatory body of Nacala Corridor Railway, regulates goods transaction on Moatize-Nacala line, but what is guaranteed is that there will be a certain number of trains for general cargoes and passengers.
- Nacala-Porto and Nacala-a-Velha should be strongly linked by road to cope with the growth that occurs in these districts
- The location of the multimodal terminal and railway shunting yard should be near the bypass between Nacala-Porto and Nacala-a-Velha instead of the proposed location, due to topographical conditions.
- Marine erosion in the area of Nacala Bay should be taken into account.

Appendix-E Understanding of Comments from Stakeholder Meetings and Responses to Stakeholders' Comments

E.1 Objectives

For PEDEC-Nacala, a series of stakeholder meetings were held in the five provinces related to the Nacala Corridor in August 2014. Most stakeholders' comments or views were expressed during the discussion sessions of the stakeholder meetings. Some comments were delivered in written form in response to questionnaires distributed in the stakeholder meetings and also sent by e-mails after the stakeholder meetings. More than 200 comments were collected in total.

The PEDEC-Nacala Team reviewed and examined these comments to consider how to understand and respond to them. According to the results of the examination, this memo "Understanding of Comments from the Stakeholder Meetings and Responses to Stakeholders' Comments" was prepared.

Outlines of the stakeholder meetings are summarised in the below tables.

Table E.1.1 Outlines of Stakeholder Meetings in the Five Provinces for PEDEC-Nacala

(1) Nampula Province Stakeholder Meeting

Date & Time	Monday, 11 th August 2014 9:20-15:45
Place	Conference Room, Copa Cabana, Nampula City
Chairman	Mr. Elias Paulo, GAZEDA
Participants	Provincial government officer and municipal mayor: 4 people Other government officer: 4 people Government company: 1 person Private company: 22 people NGO: 18 people University and institution: 6 people Other: 12 people Total 67 people
No. of Questionnaires Collected	13 sheets (12 sheets during the meeting and 1 sheet after the meeting by E-mail)

(2) Cabo Delgado Province Stakeholder Meeting

Date & Time	Thursday, 14th August 2014 09:15-12:00
Place	Conference Room, Kauri Resort, Pemba City
Chairman	Permanent Secretary
Participants	Provincial government officer: 9 people (including Permanent Secretary) Other government officer: 5 people Government company: 5 people Private company: 6 people NGO: 37 people University and institution: 8 people Other: 22 people Total 92 people
No. of Questionnaires Collected	14 sheets (14 sheets collected during the meeting)

(3) Niassa Provincie Government Meeting

Date & Time	Monday 18th August 2014 9:50-12:00
Place	Provincial Government Conference Room, Lichinga City
Chairman	Niassa Province Governor
Participants	Provincial Government Officers: 30 people Total 30 people

(4) Niassa Province Stakeholder Meeting

Date & Time	Monday 18th August 2014 14:10-17:00
Place	Conference Room, IFAPA, Lichinga City
Chairman	Permanent Secretary
Participants	Provincial government officer: 1 person (Permanent Secretary) Other government officer : 4 people Government company 2 people Private company: 10 people NGO: 27 people University and institution: 3 people Other: 5 people Total 52 people
No. of Questionnaires Collected	3 sheets (3 sheets collected during the meeting)

(5) Zambezia Province Stakeholder Meeting

Date & Time	Wednesday 20th August 2014 8:10-11:25
Place	Conference Room, Hotel Chuabo, Quelimane City
Chairman	First half: Permanent Secretary /Second half: Planning & Finance Department Director
Participants	Provincial government officer and district mayor: 30 people (including Permanent Secretary) Other government officer: 4 people Government Company: 2 people Private company: 7 people NGO: 5 people Other: 1 person Total 49 people
No. of Questionnaires Collected	7 sheets (1 sheet collected during the meeting and 6 sheets after the meeting at the provincial government office)

(6) Tete Province Government Meeting

Date & Time	Friday, 22nd August 2014 8:40-9:20
Place	Conference Room, Provincial Government Office, Tete City
Chairman	Tete Province Governor
Participants	Provincial government officer: 19 people Total 19 people

(7) Tete Province Stakeholder Meeting

Date & Time	Friday, 22nd August 2014 14:10-17:15
Place	Conference Room, Paraiso Misterioso, Tete City
Chairman	Mr. Elias Paulo, GAZEDA
Participants	Provincial government officer and municipal mayor: 4 people Other government officer: 7 people Government company: 1 person Private company: 5 people NGO: 35 people University and institution: 1 person Others: 4 people Total 57 people
No. of Questionnaires Collected	1 sheet (1 sheet after the meeting by E-mail)

E.2 Comments from the Stakeholder Meetings

The comments from the stakeholder meetings are generally divided into six topics. The interests expressed by the participants in the stakeholder meetings are categorised as follows:

- A.** Formulation process of PEDEC-Nacala development strategies
- B.** Micro-level perspectives and benefits to communities
- C.** Social service sectors and social aspects
- D.** Relationship between PEDEC-Nacala and ProSAVANA-PD
- E.** Ownership of the Project “PEDEC-Nacala”
- F.** Contents of PEDEC-Nacala development strategies

The understanding of the comments and responses to the comments by the PEDEC-Nacala Team were summarised as follows:

E.2.1 A: Formulation Process of PEDEC-Nacala Development Strategies

(1) Formulation Process of Strategies: Comments

Questions and comments on the formulation process of the strategies are summarised as follows:

- A.1. How have stakeholder meetings been held and will stakeholder meetings be held in the future, in the process of formulating the PEDEC-Nacala development strategies?
- A.2. It is desirable to share the minutes of the stakeholder meetings carried out in the five provinces.
- A.3. Although it was stated that the objective of the stakeholder meeting was to listen to participants’ opinions and views, it seemed to be just a meeting for presentations.
- A.4. What are roles of the civil society in the formulation process of PEDEC-Nacala development strategies?
- A.5. "Community Participation" should be included in PEDEC-Nacala development strategies.

(2) Formulation Process of Strategies: Responses

A.1&A.2 (Project Characters and the Formulation Process of Strategies)

- PEDEC-Nacala is a project for strategy formulation to propose a broad strategic framework for development that would influence the future of spatial structure, infrastructure and industries in wide areas which occupy the northern half of the Mozambican national territory. Because of these characteristics, in the first two years since the commencement of the Project (since April 2012), the PEDEC-Nacala study was carried out mostly through discussion at meetings between the working group and the steering committee whose members are representatives of national and provincial government institutions. After general directions of development strategies were identified in these government meetings, stakeholder meetings with civil society organisations, private business groups and universities were started for the purpose of listening to and reflecting wide stakeholders’ comments, opinions and views onto development strategies. (See Section 1.8.1 of Chapter 1 - Main Text of the Final Study Report.)
- The PEDEC-Nacala study has been carried out through the following stages: information collection, issue identification, preparation of alternative scenarios, and formulation of development strategies. Presentations and discussions at the stakeholder meetings covered the

results of all of the study stages of PEDEC-Nacala. (See Section 1.8.1 of Chapter 1 - Main Text of the Final Study Report.)

- This process of strategy formulation was designed and implemented by following the JICA Guidelines for Environmental and Social Considerations.

A.2&A.3 (Stakeholder Meeting Held August 2014)

- In August 2014, stakeholder meetings were held in the five provinces related to the Nacala Corridor Region (Nampula, Niassa, Cabo Delgado, Tete and Zambezia Provinces), inviting a wide range of stakeholders, including civil society organisations, business groups and universities, as well as government institutions.
- The stakeholder meetings were organised by the provincial governments, and the presentations and explanations in the meetings were made by GAZEDA, which is the secretariat of the Project.
- In the stakeholder meetings, presentations and question & answer sessions were organised to cover "general summary of this strategy formulation project," "identified issues and alternative development scenarios" and "contents of the strategies".
- The selection of invitees for the stakeholder meetings was done by widely including representatives of civil society, private business groups and universities, who are usually invited by provincial government-private forums.
- Comments from the stakeholder meetings were collected through the comments made during the meetings, as well as questionnaires distributed at meetings and e-mails sent after the meeting.
- The total number of acquired comments from stakeholders amounted to more than 200.

A.4 (Role of Civil Society)

- In the process of formulating the PEDEC-Nacala development strategies, civil society groups could contribute to the formulation of development strategies by participating in stakeholder meetings, as well as presenting of their comments after the stakeholder meetings.
- In addition, for the implementation phase of PEDEC-Nacala strategies, it is considered necessary to create a special government body in charge of promoting and coordinating the PEDEC-Nacala development strategies. As part of its activities, it is expected for the special government body to establish and operate committees in which representatives from civil society and private business groups can participate for the promotion of sustainable and inclusive development. (See Section 18.5.4 of Chapter 18 and Recommendation - Main Text of the Final Study Report)

A.5 (Community Participation)

- It is recommended that the effort at achieving greater community participation should be emphasised in the phases of preparing and implementing concrete development programmes and environmental programmes under the macro development framework recommended by PEDEC-Nacala. (See Section 18.5.3 of Chapter 18 and Recommendation - Main Text of the Final Study Report)

E.2.2 B: Micro-Level Perspectives and Benefits to Communities

(1) Micro-Level Perspectives and Benefits to Communities: Comments

The questions and comments regarding the understanding of the current situation and issues, as well as the content of the strategies include:

- It seems that there are only proposals for roads and railways in PEDEC-Nacala, and the understanding of the reality of local communities and micro-level perspectives is inadequate.
- Benefits to communities to be brought by implementing proposed strategies and projects are not clearly explained.
- It does not seem that people's livelihood could be improved with the implementation of the proposed strategies.

(2) Micro-Level Perspectives and Benefits to Communities: Responses

Conceptual Framework

- The PEDEC-Nacala strategies aim to provide a macro development framework (including spatial structure, urban centres, infrastructures, industrial development policy) for the Nacala Corridor Region. (See Chapter 13 - Main Text of the Final Study Report)
- The macro development framework provided by PEDEC-Nacala will enable communities to participate in various development opportunities and to efficiently create a fruitful effect on such community participation. (See Sections 13.3.2 and 13.3.3 of Chapter 13 - Main Text of the Final Study Report)

Benefits to Communities

- Under the macro development framework designed by PEDEC-Nacala, transport costs will be reduced in large areas of the Nacala Corridor Region. The fall in transport costs would contribute to the decrease of prices of fuel, building materials, as well as for other consumables. (See Sections 13.2.3 and 13.3.3 of Chapter 13 - Main Text of the Final Study Report)
- This situation will attract traders to come to rural areas to purchase agricultural products. It will also become easier for small farmers to supply their products to markets. The establishment of the macro development framework of PEDEC-Nacala will contribute to the establishment of a value chain for the agricultural sector. As a result, agricultural production in rural communities will increase. (See Sections 13.2.3 and 13.3.3 of Chapter 13 - Main Text of the Final Study Report)
- The development of extended corridor networks in wider areas of the Nacala Corridor Region will induce the development of urban centres located at nodal points of transport corridors. Urban functions will be added to rural centres as an extended network of transport corridors is developed. Furthermore, such urban functions will be enhanced as Infrastructures are developed. As a result, many urban and rural centres of the Nacala Corridor Region will improve their functions so as to provide wide rural areas with greater access to commercial centres, administrative service centres and health and education services. (See Sections 13.2.3 and 13.3.3 of Chapter 13 - Main Text of the Final Study Report)

Social Development Strategies to Communities

The PEDEC-Nacala recommends the following ideas and measures to promote social development for local communities: (See Chapter 18 - Main Text of the Final Study Report.)

- Improvement of community-based school management for primary schools (see Sections 18.2.5 and 18.2.6 of Chapter 18 - Main Text of the Final Study Report)
- Improving the science and mathematics education in secondary education (see Sections 18.2.5 and 18.2.6 of Chapter 18 - Main Text of the Final Study Report)
- Support for small-scale farmers in rural communities in promoting the acquisition of DUAT (See Sections 18.6.3 and 18.6.4 of Chapter 18 - Main Text of the Final Study Report)
- Assistance in the development of schools in less accessible areas (see Sections 18.2.5 and 18.2.6 of Chapter 18 - Main Text of the Final Study Report)
- Assistance in the development of health centres in less accessible areas (see Sections 18.3.5 and 18.3.6 of Chapter 18 - Main Text of the Final Study Report)

E.2.3 C: Social Service Sectors and Social Aspects

(1) Social Services Sectors and Social Aspects: Comments

Questions, comments and opinions concerning the understanding of issues and development strategies related to social services sectors include:

- The PEDEC-Nacala study does not pay enough attention and consideration to the health sector. The description of the health sector in the study report is insufficient.
- Not only basic education but also higher education should be taken into account in the development strategies.
- Gender issues are not mentioned in the development strategies.

(2) Social Services Sectors and Social Aspects: Responses

General

- The PEDEC-Nacala proposes development strategies for wide areas covering the northern half of the country of Mozambique; therefore, the core part of PEDEC-Nacala development strategies is composed of spatial development and economic development strategies. However, at the same time, measures for the social sector and social development are broadly proposed to meet people's social needs (needs for social services and social development) which would arise and increase with the acceleration of development in the Nacala Corridor Region. (See Chapter 18 - Main Text of the Final Study Report)
- PEDEC-Nacala considers it essential to realise both Dynamic Development and Inclusive Development simultaneously. It seeks to involve people who are often times left behind from participation in development opportunities, and has made efforts to formulate development strategies in this regard. (See Section 10.4 (4) of Chapter 10, Chapter 13 and Chapter 18 - Main Text of the Final Study Report)

Health and Education Sectors

- By promoting the development of health and education sectors, as well as human resource development, PEDEC-Nacala formulates the strategies that would enable local people to

benefit from the Dynamic Development to be driven by the development of transport corridors. (See Chapter 13 and Chapter 18 - Main Text of the Final Study Report)

- The Final Study Report of PEDEC-Nacala provides present situational analyses of social services sectors and proposes social development strategies for the future. (See Chapter 18 - Main Text of the Final Study Report)
- Some data presented in the Draft PEDEC Strategies Report were not the most recent available, and they have been updated in the Final Study Report. (See Chapter 18 - Main Text of the Final Study Report)

Higher Education

- PEDEC-Nacala has done analysis and examination on higher education as well. With regard to human resource development for the industrial sector, PEDEC-Nacala proposes the establishment of not only medium-level technical and vocational education schools (TVE schools), but also junior college-level superior polytechnics concerning Nacala SEZ and natural gas exploitation and chemical industries in Cabo Delgado. (See Section 18.4 of Chapter 18 - Main Text of the Final Study Report)

Gender

- Gender considerations had not been included in the development strategies of PEDEC-Nacala. However, since they are important cross-cutting issues related to various sectors, gender issues are incorporated into the development strategies of PEDEC-Nacala emphasising its importance. In addition, the Final Study Report of PEDEC-Nacala recommends the monitoring of gender mainstreaming in each sector according to the National Plan for the Advancement of Women (PNAM) in the implementation phase of development strategies. (See Section 18.5.3 of Chapter 18 and Recommendation - Main Text of the Final Study Report)

E.2.4 D: Relationship between PEDEC-Nacala and ProSAVANA-PD

(1) Relationship between PEDEC-Nacala and ProSAVANA-PD: Comments

Questions, comments and opinions about the project's relationship with the ProSAVANA-PD (Nacala Corridor Agricultural Development Master Plan Study) include:

- Does PEDEC-Nacala take into account ProSAVANA-PD (Nacala Corridor Agricultural Development Master Plan Study)? How is it considered?
- What is the relationship between PEDEC-Nacala and ProSAVANA-PD?
- How is ProSAVANA-PD positioned in PEDEC-Nacala?
- How will PEDEC-Nacala implement ProSAVANA-PD strategies, while the ProSAVANA-PD is in dialogue and discussion with stakeholders?
- How the PEDEC-Nacala evaluates ProSAVANA-PD?
- PEDEC-Nacala should be linked with the activities of ProSAVANA-PD.

(2) Relationship between PEDEC-Nacala and ProSAVANA-PD: Responses

Relationship between ProSAVANA-PD and PEDEC-Nacala, and How ProSavana-PD is positioned in PEDEC-Nacala: Responses

- The PEDEC-Nacala provides an overall picture of development for the Nacala Corridor Region including infrastructure development and a variety of economic sectors, while

ProSAVANA-PD aims to present a plan for improving the livelihoods of the farmers of nineteen districts in three provinces with high agricultural potential along the Nacala Corridor. PEDEC-Nacala considers that it is important for the two projects to be consistent with each other. In this way, discussions and coordination have been done between these two projects.

- The agricultural sector of the PEDEC-Nacala study consists of present situational analysis, proposed agricultural policies and development strategies, which are consistent with the "Strategic Plan for Agricultural Development (PEDSA) 2010-2019," an upper-level plan to ProSAVANA-PD. (See Section 4.1 of Chapter 4 and Section 14.2 of Chapter 14 – Main Text of the Final Study Report)
- The PEDEC-Nacala covers a much larger geographic area than that of ProSAVANA-PD which is a project to support master plan formulation in the nineteen districts along the Nacala Corridor. In this area, in addition to ProSAVANA-PD, various development plans based on PEDSA exist. By being consistent with PEDSA, PEDEC-Nacala could ensure its consistence with those development plans. PEDSA has four strategic objectives (pillars), namely “(1) to increase productivity and production, competitiveness and its contribution to food security and nutrition”, “(2) to improve the guiding framework and services for more market access”, “(3) sustainable use of resources, land, water, forests, and fauna”, “(4) strengthen institutions and organisations for agriculture development”. (See Section 4.1 of Chapter 4 – Main Text of the Final Study Report)

E.2.5 E: Ownership of the Project “PEDEC-Nacala”

(1) Ownership of the Project: Comments

Comments were raised as follows:

- Why are PEDEC-Nacala development strategies formulated by Japanese?
- Why the PEDEC-Nacala study is not conducted by Mozambican consultants?
- For what kind of interests does Japan have in doing PEDEC-Nacala study?

(2) Ownership of the Project: Responses

- PEDEC-Nacala is an important project to the Government of Mozambique. The Government of Mozambique has requested the Government of Japan for technical assistance for the formulation of development strategies for the Nacala Corridor Region, and that is how this Project was started.
- The results of the PEDEC-Nacala study have been discussed by the Investment Council and the Economic Council. PEDEC-Nacala has been in the ownership of the Government of Mozambique.
- Assistance to PEDEC-Nacala by the Government of Japan is technical assistance to the Government of Mozambique in the formulation of development strategies for the Nacala Corridor Region. In this regard, a team of Japanese experts has been dispatched to provide the Mozambican Government with technical services. The PEDEC-Nacala Team consisting of Japanese experts and their Mozambican counterparts had various discussions with the Mozambican side in working group meetings and steering committee meetings for information collection, issue identification and strategy formulation.

E.2.6 F: Contents of PEDEC-Nacala Development Strategies

(1) Contents of Development Strategies: Comments

The following comments were raised:

- PEDEC-Nacala strategies seem to take into account only export-related industries. PEDEC-Nacala strategies appear to have been prepared so that foreign companies can benefit from the development in the Nacala Corridor Region.

(2) Contents of Development Strategies: Responses

- As for industrial development strategies, PEDEC-Nacala proposes to emphasise the manufacturing sector, which is considered to be driven by the rehabilitation and upgrading of Nacala Port, as well as by the development the trunk roads and railways of the Nacala Corridor. (See Chapter 13 - Main Text of the Final Study Report)
- This is a strategy aiming at promoting development so that local people can take advantage of economic opportunities to be created by domestic and foreign investment which are to be realised by the development of a gateway port and multi-modal transport corridors. That is, it is a strategy with a view to pursue industrial development, in which not only foreign companies but also domestic companies can expand their activities.
- PEDEC-Nacala selected development strategies and scenarios based on “an extended spatial pattern of a transport corridor network and urban centres” which enables the development of diversified economies. PEDEC-Nacala rejected not only development strategies and scenario based on “an enclave development pattern” which limits development in narrow geographical areas, but also rejected those based on “a single corridor pattern” which cannot extend development benefits widely in the Nacala Corridor Region. (See Chapter 13 - Main Text of the Final Study Report)
- Having selected such a development scenario, PEDEC-Nacala presents the development strategies which enable SMEs and local communities to get benefits through linkage programmes from economic development opportunities to arise due to the development of multi-functional transport corridors and promotion of foreign investments. (See Section 13.2 of Chapter 13 - Main Text of the Final Study Report)