Chapter 5 Existing Conditions of Infrastructure

5.1 Roads

5.1.1 Road System and Road Policies

The classified roads in Mozambique consist of national roads (primary and secondary) and regional roads (tertiary and vicinal roads). These roads are administrated by the National Road Administration (ANE). Urban roads and unclassified roads fall under the jurisdiction of the municipal councils and the district administrations respectively. Urban roads are classified into four categories (primary, secondary, tertiary and unclassified such as footpaths) as well. In short, the road transport system in Mozambique operates at following three levels:

- In the three east-west corridors (Maputo, Beira and Nacala) and the main north-south corridor that runs from south to north
- In major urban areas and particularly in the vicinity of ports
- In rural areas that feed the main corridors

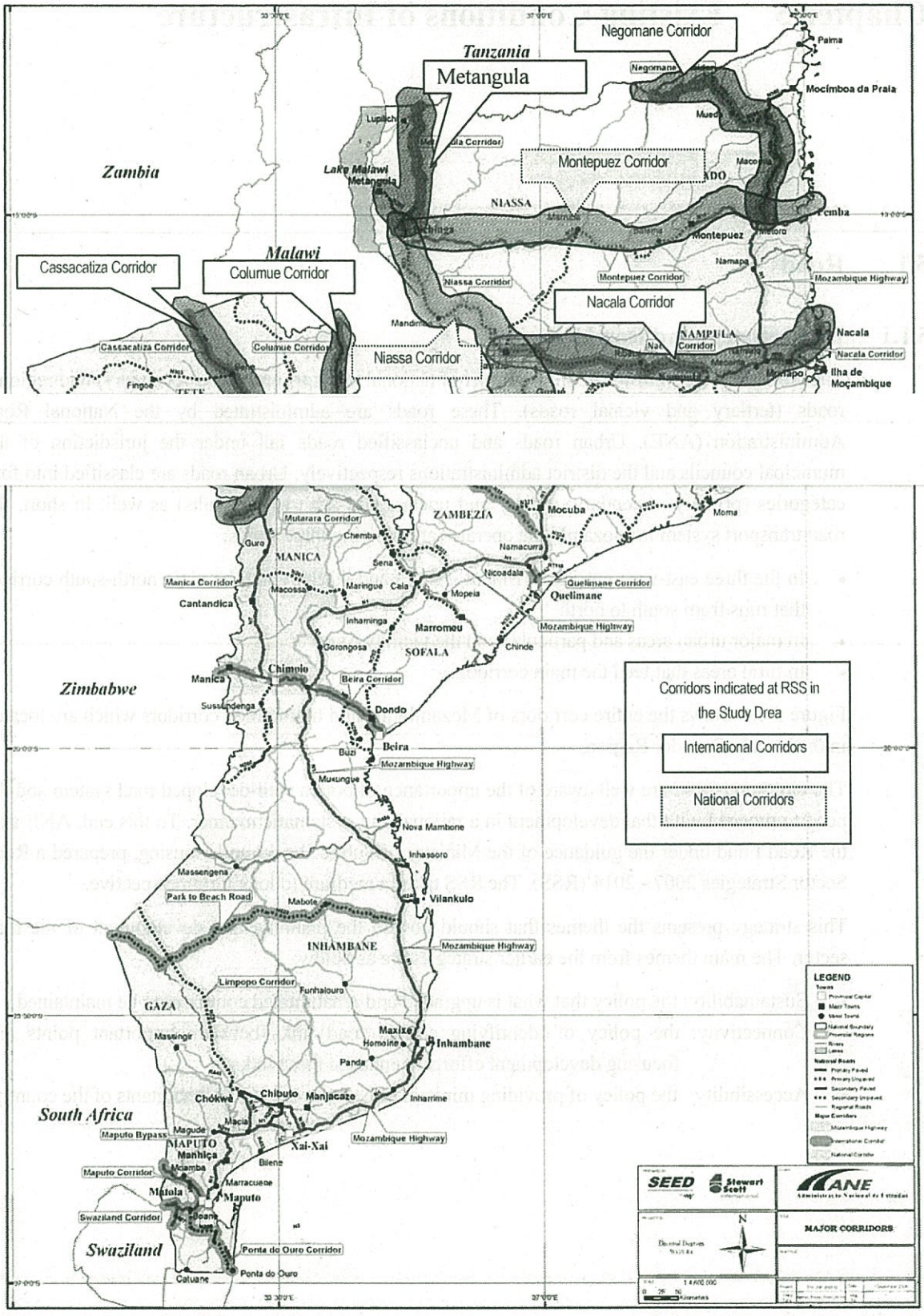
Figure 5.1.1 shows the entire corridors of Mozambique and highlighted corridors which are located in the Nacala Corridor Region.

The GoM and ANE are well aware of the importance of both a well-developed road system and the need to proceed with that development in a rational and systematic manner. To this end, ANE and, the Road Fund under the guidance of the Ministry of Public Works and Housing, prepared a Road Sector Strategies 2007 - 2014[1](RSS). The RSS takes a medium to long term perspective.

This strategy presents the themes that should govern the planning and development of the road sector. The main themes from the earlier strategies are as below:

- Sustainability: the policy that what is upgraded and rehabilitated continues to be maintained
- Connectivity: the policy of identifying critical road links between important points and focusing development efforts to enhance these links
- Accessibility: the policy of providing minimal or better access to all inhabitants of the country

[1] The RSS is normally a 5-year plan; however the end of previous RSS was extended from 2011 to 2014 due to non-attainment of goal levels.



Source: ANE, with highlights by the JICA Study Team

Figure 5.1.1 Road Corridors Identified by RSS

5.1.2 Existing Road Conditions

(1) Road Network

The current Mozambique classified road network is estimated at around 30,000 km, of which less than 20% are paved. Of the paved roads, the majority (88%) were estimated to be in good to fair conditions, however only 57% of the unpaved roads were estimated to be fully travelable throughout the year. Urban roads are also mostly unpaved with only 500 km of the urban road being paved in the whole of Mozambique. Out of the 3,000 km of urban road, 2,500 km (77%) is still unpaved according to Road Sector Strategy 2007-11 report.

In the Nacala Corridor Region currently, almost all trunk roads pass through the centre of cities and towns. However despite the fact that most trips are pedestrian, there are no proper pedestrian facilities and the pedestrians are exposing themselves to the risk of traffic accidents. The total road network in the five provinces is 21,327 km. As described in Table 5.1.1, 8,426 km (40%) of that total is in good travelable conditions, 6,869 km (32%) is in normal conditions, 3,512 km (20%) in poor conditions, 1,652 km (8%) in very poor conditions and the remaining 5% are impassable. Hence the internal access roads continue to be a barrier to the pursuit of economic activities in various parts of the country.

Table 5.1.1 Road Network in the Five Provinces

Classification	Nampula			Niassa			Cabo Dergado		
	Paved	Unpaved	Total	Paved	Unpaved	Total	Paved	Unpaved	Total
Primary	492	495	987	376	367	743	282	135	417
	49.85%	50.15%	100.00%	50.61%	49.39%	100.00%	67.63%	32.37%	100.00%
Secondary		166	166	106	240	346	240	125	365
	0.00%	100.00%	100.00%	30.64%	69.36%	100.00%	65.75%	34.25%	100.00%
Tertiary		1925	1,925	107	1836	1,943	91	1637	1,728
	0.00%	100.00%	100.00%	5.51%	94.49%	100.00%	5.27%	94.73%	100.00%
Vicinal		935	935	483	966	1,449		417	417
	0.00%	100.00%	100.00%	33.33%	66.67%	100.00%	0.00%	100.00%	100.00%
Non-classified Road		503	503	42	499	541	21	717	738
	0.00%	100.00%	100.00%	7.76%	92.24%	100.00%	2.85%	97.15%	100.00%
Total	492	4,024	4,516	1,114	3,908	5,022	634	3,031	3,665
Classification	Zambezia			Tete			Total		
	Paved	Unpaved	Total	Paved	Unpaved	Total	Paved	Unpaved	Total
Primary	730	301	1,031	540		540	2,420	1,298	3,718
	70.81%	29.19%	100.00%	100.00%	0.00%	100.00%	65.09%	34.91%	100.00%
Secondary		720	720	287	942	1,229	633	2,193	2,826
	0.00%	100.00%	100.00%	23.35%	76.65%	100.00%	22.40%	77.60%	100.00%
Tertiary	16	1727	1,743		788	788	214	7,913	8,127
	0.92%	99.08%	100.00%	0.00%	100.00%	100.00%	2.63%	97.37%	100.00%
Vicinal	15	981	996		413	413	498	3,712	4,210
	1.51%	98.49%	100.00%	0.00%	100.00%	100.00%	11.83%	88.17%	100.00%
Non-classified Road		664	664			0	63	2,383	2,446
	0.00%	100.00%	100.00%	0.00%	0.00%	0.00%	2.58%	97.42%	100.00%
Total	761	4,393	5,154	827	2,143	2,970	3,828	17,499	21,327

Source: ANE, data as of 2005
Note: Separate data for paved and unpaved road is not available after 2006.

(2) Road Maintenance

Periodic and routine maintenance of primary, secondary and tertiary roads is under the direct

responsibility of the Directorate of Maintenance (DIMAN) and Provincial Delegation (DPANE) of ANE. Actual engineering works in DIMAN are outsourced to consultant firms and routine/periodic works for road maintenance are also outsourced to contractors with 2-year contracts.

In the Nacala Corridor Region, the length of paved roads has been on the increase in recent years and it is expected more in the near future. It is necessary to strengthen the capacity (both government and private sectors) of maintenance of paved roads in inland provinces.

5.1.3 Existing Programmes and Projects for Road Sector

Given this situation, the following projects and programmes are on-going:

- Common Basket Fund and Sector Budget Support: EU, SIDA, etc.
- Major Road Improvement : 14 projects in the five provinces
- Road Maintenance Programmes and Projects
  - [illegible]
- District Road Programme
  - ➢ Agriculture Sector Programme Support II (Rural Roads Component) (ASPS II) - DANIDA
  - ➢ Programme for Road Access to Agricultural Markets - PROMER - IFAD
  - ➢ Programme of Roads under the Promotion of Fishing Craft-ProPESCA - IFAD
- Axle Load Control Programme

A long list of road improvement projects is proposed by both PRISE (Integrated Road Sector Programme) 2011-2014 and PII (Integrated Investment Programme) 2012-2015.

Proposed road improvement projects by both PRISE and PII are listed in Table 5.1.2. Current status of each planned road project is categorized as follows:

- A: Project is already committed to, however actual funding is not realised yet
- B: Feasibility study or detailed design has been finished and ANE expects its appraisal
- C: ANE plans to develop this section, however, it still seeks a source of project funding

Normally, once a project has been committed to, one or two years are spent for the procurement procedure of a supervision consultant and that of a contractor.[2] Furthermore, three years are usually required to complete the civil works.

[2] The main reason for this situation is that government officers in the implementation agencies are not familiar with development partners' rules and regulations regarding the procurement

Table 5.1.2 Road Projects included by PRISE and PII for the Nacala Corridor Region

Classification (Route No.)	Location	Code	Corridor	Proposed By	Length (km)	Current Status
N380: Sunate -Macomia	Cabo-Delgado	C-1	Negomane Corridor	PII 2012 - 2015	113	A: Finding for partner
N1: Rio Lúrio- Metoro	Cabo-Delgado	C-2	Mozanbique Highway	PII 2012 - 2015	74	C: Commited by GOC
R698: Mueda -Montepuéz	Cabo Delgado	C-3		PII 2012 - 2015	216	A: Finding for partner
N381/R1251: Negomane - Mueda	Cabo Delgado	C-4	Nagomane Corridor	PRISE	175	C: Commited by AfDB
R762: Pemba - Mocimboa da Praia	Cabo Delgado	C-9		-	192	C: Commited by Anadarko (Private fund)
N360: Cuamba -Marrupa	Niassa	NI-1		PII 2012 - 2015	249	A: Finding for partner
N13: Lichinga - Mandimba	Niassa	NI-2	Niassa Corridor	PRISE	150	C: Commited by AfDB and GOJ
N13: Mandimba - Cuamba	Niassa	NI-3	Nacala Corridor, Niassa Corridor	PRISE	152	C: Commited by AfDB
R657: Magige - Cuamba	Niassa	NI-4	Niassa Corridor	PRISE	90	C: Commited by GOP
N103: Magige-Lioma Mutuali-Lioma	Zambézia	Z-1		PII 2012 - 2015	67	A: Finding for partner
N325,N324: Malei-Olinga-Pebane	Zambézia	Z-2		PII 2012 - 2015	191	A: Finding for partner
N103: Rehabiritation of Existing 13 Bridge	Zambézia	Z-3	Niassa Corridor	-	-	C: Waiting for fund (GOJ)
N11: Milange - Alto Benfica	Zambézia	Z-4	Quelimane Corridor	PRISE	94	C: Commited by EU
R689: Monapo - Angoche	Nampula	NA-1		PII 2012 - 2015	173	A: Finding for partner
N104: Nampula-Namitil	Nampula	NA-2		PII 2012 - 2015 PRISE	60	C: Commted by Korian Exim
R683, R680, N324 & N320: Nametil - Chalaua-Moma	Nampula	NA-2		PII 2012 - 2015 PRISE	159	A: Finding for partner
R703: Nacala - Nacala Velha	Nampula	NA-20		-	18	C: Commited by WB
N322: Madamba - Mutarara	Tete	T-1	Mutarara Corridor	PII 2012 - 2012	350	A: Finding for partner
N303: Bene-Figoe - Zumbo	Tete	T-2		PII 2012 - 2012	348	A: Finding for partner
R602: Mphende - Mukumbura	Tete	T-3		PRISE	50	C: Commited

Note: "Code" in this table is consistent with the ID in the Figure 5.1.1.
Source: PRISE, Integrated Road Sector Programme 2011-2014, and PII, Integrated Investment Programme 2012-2015

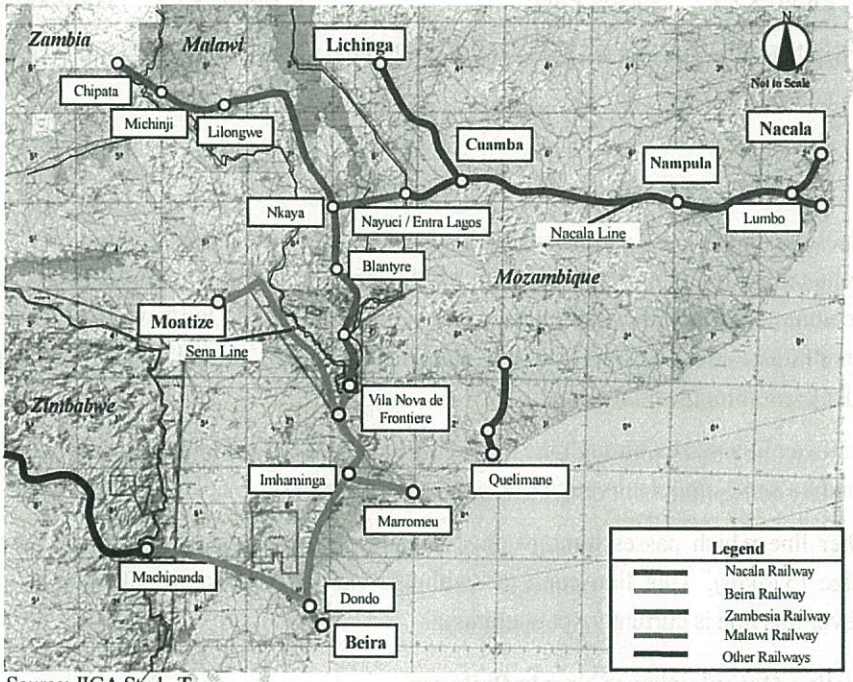
Source: JICA Study Team based on the following documents
1) Ponto de Situacao das Principais Obras do Pes 2012
2) Programa Integrado do Sector de Estradas 2012-2014, Draft
3) PII, Integrated Investment Programme 2012-2015

Figure 5.1.2 Road Projects included by PRISE and PII for the Nacala Corrido

5.2 Railways

5.2.1 Existing Conditions of Railways in Mozambique

The Mozambique railway system is divided into four largely independent sub-networks: Nacala Railway, Beira Railway, Maputo Railway and Zambézia Railway (Quelimane). They do not form a national network because the Mozambique railway was constructed for the purposes of exporting mineral resources, which are produced in the interior of southern Africa, and importing goods from the ports to the interior. The railway map of Nacala Railway and Beira Railway, which pass through the Nacala Corridor Region is shown below.



Source: JICA Study Team

Figure 5.2.1 Railway Routes Surrounding the Nacala Corridor Region

On average, the Nacala Line operates one pair of passenger trains (six pairs a week) and one pair of cargo trains each day. The passenger train is limited to the section between Nampula and Cuamba at the moment. The trains between Nacala and Blantyre (Malawi) carry general transit cargo in containers. These cargo trains do not have a regular train schedule, and run from time to time depending on the amount of cargo available. The Nacala Line links to the Malawi Railway and a transit cargo train is operated between the two countries. The Lichinga Line does not operate passenger trains, and no cargo trains have been operated since the beginning of 2012 up to the survey date. However there are on-going projects in Niassa Province for industrial tree planting and use of the railway is desirable to transport wood products from Lichinga to the outside, probably to Nacala Port, as well as to other cities including Nampula and cities in Malawi. Tree planting companies have expected for years the railway line between Lichinga and Cuamba to be rehabilitated. In actuality, the rehabilitation work for Lichinga-Cuamba Line was started by Vale in March 2014.

The railway at Nacala Port and Namialo Station are shown below.

Source: Photo by JICA Study Team

Photo 5.2.1 Nacala Port

Source: Photo by JICA Study Team

Photo 5.2.2 Namialo Station

The Nacala Railway network consists of the following lines, totalling 919 km:

All lines are single track and non-electrified. Almost all the sections of the Nacala Line have been rehabilitated with 40 kg/m rail and twin-block sleepers. The track is in sufficient condition for the traffic volume as of today which runs at an average speed of 30 km/h. Communication between the drivers of trains and the operation control centre in Nacala is carried out by signalling and through a satellite telecommunication system.

The railway line passes through the city centres of major cities in the Nacala Corridor Region such as Cuamba and Nampula dividing the major built-up areas.

Another line which passes through the Nacala Corridor Region is the Sena Line from Beira to Moatize (575km). This line connects with the railway to Malawi at Vila Nova da Fronteira. However this line is currently not operational.

(1) Operation Organisation of Nacala Railways

In the Nacala Railway, CDN has owned the concession to operate for 15 years since January 2005, and the concession agreement will be renewed every 15 years. CDN was launched through investment from an American railway investment company and CFM. Presently, SDCN owns 51% of its shares and CDN owns 49%. After acquisition of 51% of the shares of SDCN in 2010, Vale Mozambique S.A., a coal mining company (hereinafter "Vale"), raised its ownership of shares to 67% in 2011. Vale also owns 51% of the shares of SDCN, which is the operation and maintenance concessionaire of Malawi Railway.

(2) Status of Transportation of Nacala Railway

Nacala Railway is entirely a single track railway with few crossing stations. The longest distance between crossing stations is 102 km between Caramage and Iapala. Currently, the maximum number of trains operating per day is limited to three pairs, since the average speed is limited to 30 km/h.

Cargo Transport

Cargo traffic is classified into 3 different types, namely:

- Internal Traffic: Cargo transportation inside the country (Mozambique)
- Regional Traffic: Cargo transportation from Mozambique to the neighbouring countries, and vice-versa
- Transit Traffic: Cargo transportation in transit from Mozambique to Malawi and vice-versa

Main cargo items are classified as below:

- Upward (from Nacala to Cuamba, Lichinga and Entre Lagos / Malawi)
  : Cement, Fuel, Wheat, Salt, Miscellaneous etc.
- Downward (from Entre Lagos / Malawi, Cuamba and Lichinga to Nacala)
  : Cotton, Sugar, Beans, Timber, Tobacco etc.

The transit cargo upward is mainly to Malawi and it accounts for nearly 80% of the total upward traffic volume. Cargo trains have a maximum of 25 wagons with a total loading capacity of 1,000 tons.

The upward and downward cargo traffic volume in 2010 and 2011 are shown in Table 5.2.1 and the same for Passenger Traffic are shown in Table 5.2.2.

Table 5.2.1 Cargo Traffic Volume

(unit: ton/year)

Direction	Type of Cargo	2010	2011
Upward (from Nacala)	Internal Cargo	36,748	32,403
	Regional Cargo	4,998	2,590
	Transit Cargo	143,098	(no data)
	Total	**184,844**	**34,993**
Downward (to Nacala)	Internal Cargo	18,585	17,063
	Regional Cargo	8,741	10,564
	Transit Cargo	61,051	(no data)
	Total	**88,377**	**27,627**

Source: JICA Study Team

Table 5.2.2 Passenger Traffic Volume

(unit: pax/year)

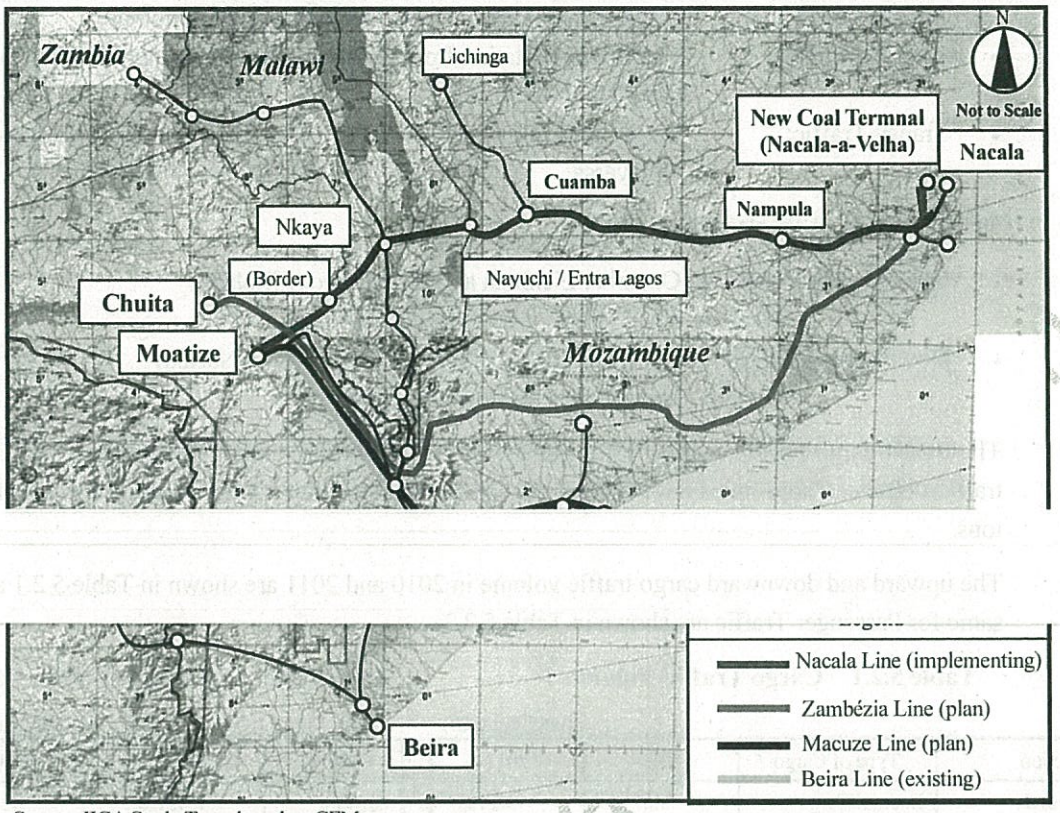
Direction	2010	2011
Upward	457,898	430,128
Downward	468,521	434,298
Total	**926,419**	**864,426**

Source: JICA Study Team

5.2.2 On-going and Planned Projects of the Railway Sector

Presently, the Government of Mozambique is planning 3 lines, in addition to the existing Beira Line, to transport coal from Tete Province to the ports on the Indian Ocean.

- Nacala Line : Tete (Moatize) to Nacala Port passing through Malawi
- Zambézia Line : Tete (Chuita) to Nacala Port via Zambézia Province detouring south of Malawi
- Macuze Line : Tete (Moatize) to Macuze Port in Zambézia Province
- [Beira Line (existing): Tete (Moatize) to Beira Port]



Source: JICA Study Team based on CFM

Figure 5.2.2 Coal Transportation Railways

Specifications and current status for each corridor are shown in Table 5.2.3.

Table 5.2.3 Specifications and Current Status for Each Corridor

Name of Port	Nacala Railway	Zambézia Railway	Macuze Railway	Beira Railway
Network Capacity Upper Column: First Capacity Lower Column in a Parenthesis: Eventual Capacity	22 Million Ton per Annum (MTPA) (30 MTPA)	40 MTPA (60 MTPA)	25 MTPA (50 MTPA)	6.5 MTPA
Type of Work	Rehabilitation of existing line and construction of new line	Construction of new line	Construction of new line and new port in Macuze	Rehabilitation of existing line
Route Length	913km	1,100km	520km	575km
Completion Year	2015	2015	2017	2012
Current Status (As of May 2013)	Under construction	Pre-F/S was completed. Under negotiation with GoM and Concessionaire	Under selection of concessionaire	Under operation

Source: JICA Study Team

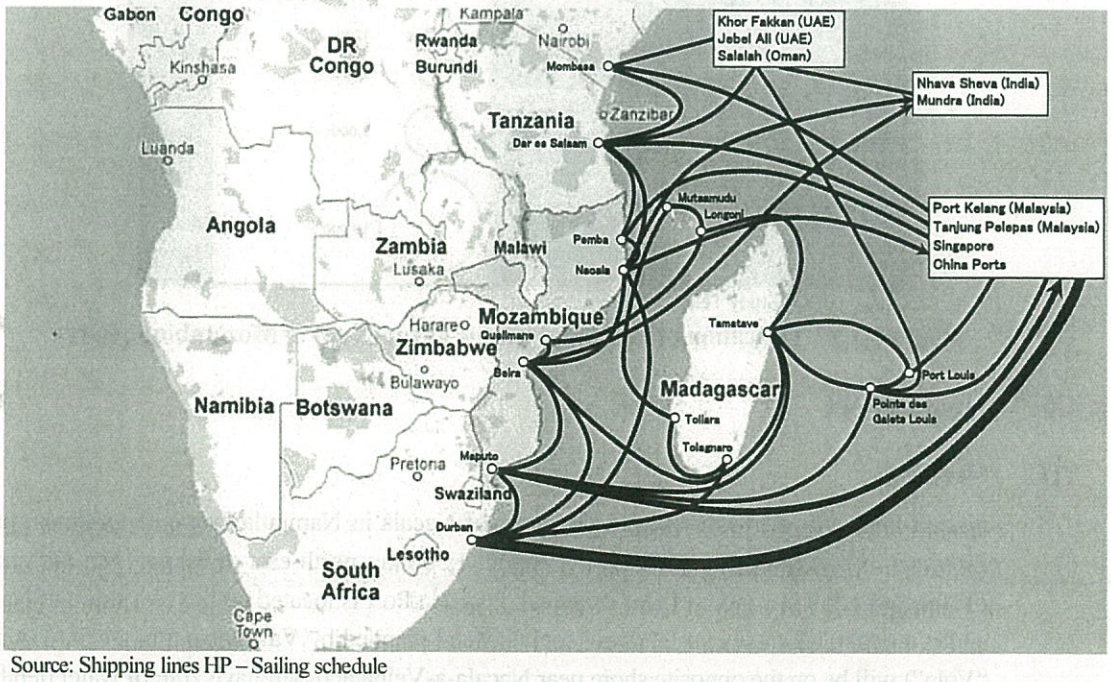
5.3 Ports

5.3.1 Mozambique Ports

(1) Overview

Mozambique ports have the roles of not only international trade for import and export and cabotage transport (domestic sea lanes) but also significant access for the land locked countries in the Southern African Region. The determining factor for ship transport is the ports and the water depth related to the ship draft. Under this vision, all Mozambique ports proceeded management transformation of CFM (Portos e Caminhos de Ferro, the Port and Railways Corporation) for privatization. The international trade has been increasing due to the country's and SADC's commercial trade growth but the cabotage transport has been reducing drastically. Among the various reasons are the total lack of a national fleet, restricting legislation and absence of incentive etc.

Under the above situation and progress, Mozambique has owned and operated the ports of Maputo, Beira, Quelimane, Nacala and Pemba as the public gate-ports for the major international trade. In addition, there are the privately operated berths for mineral and ore/bulk terminals. In respect of the international container traffic to/from Mozambique, the majority of container shipments are currently moving via Durban by feeder service and directly by the loop of Asia, India and Middle-East service. As far as the main liner services are concerned, the services for East Asia constitute the majority due to Mozambican ports' geographical position on the east coast of the African continent, and traditionally close trade relationships with Asian countries. In some trade lanes for East Asia, Mozambican ports are combined with Indian Ocean island ports as they are located on the routes from Asia. In the trade lanes for the Middle East/South Asia, the Kenyan and Tanzanian Ports are combined.



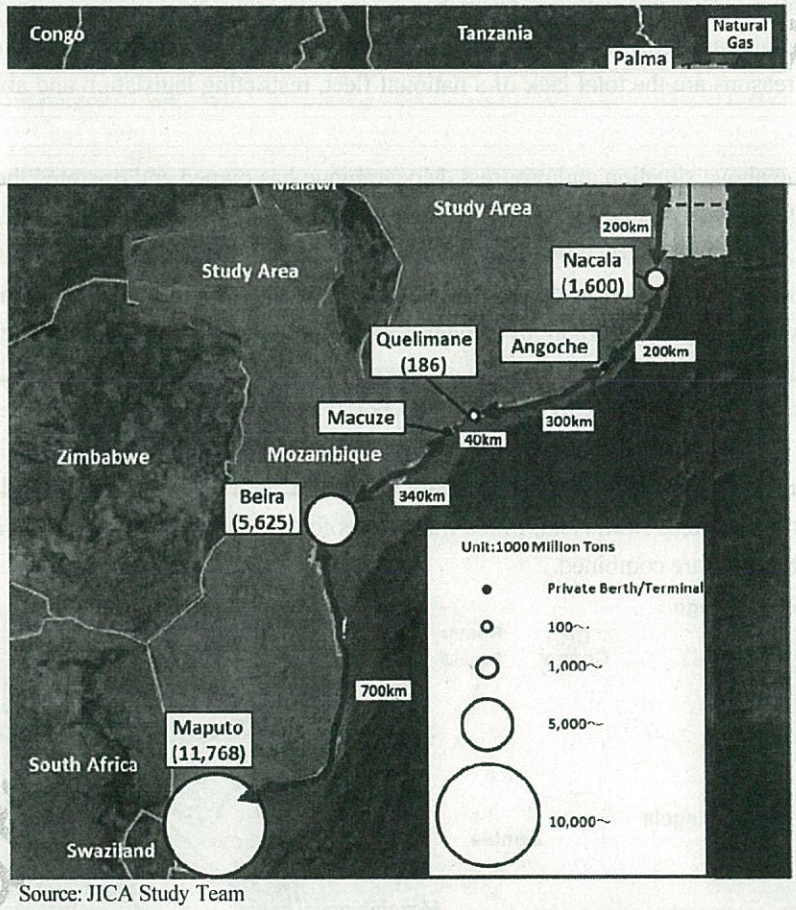
Source: Shipping lines HP – Sailing schedule

Figure 5.3.1 Liner Service covering the Ports around Mozambique

(2) Cargo Throughput

Cargo throughput in 2011 by port and transport mode is shown in Figure 5.3.2.

Currently, almost 100% of the handled cargo by the ports in Mozambique is for international trade with 10.4 million tons for export and 8.7 million tons for import including the transit cargoes. It is apparent that Mozambique ports have contributed significantly to the international trade of the land locked countries in the Southern African region. Nacala Port has the third largest cargo throughput in Mozambique. The study area has two major public ports, namely Nacala Port and Pemba Port. Since natural gas has been found along the coast of the northern part of Mozambique, Palma will be a base for LNG production for a short-time. There is also a potential to develop gas related industry in the hinterland of Palma.



Source: JICA Study Team

Figure 5.3.2 Location of Ports and Cargo Throughput in Mozambique Ports

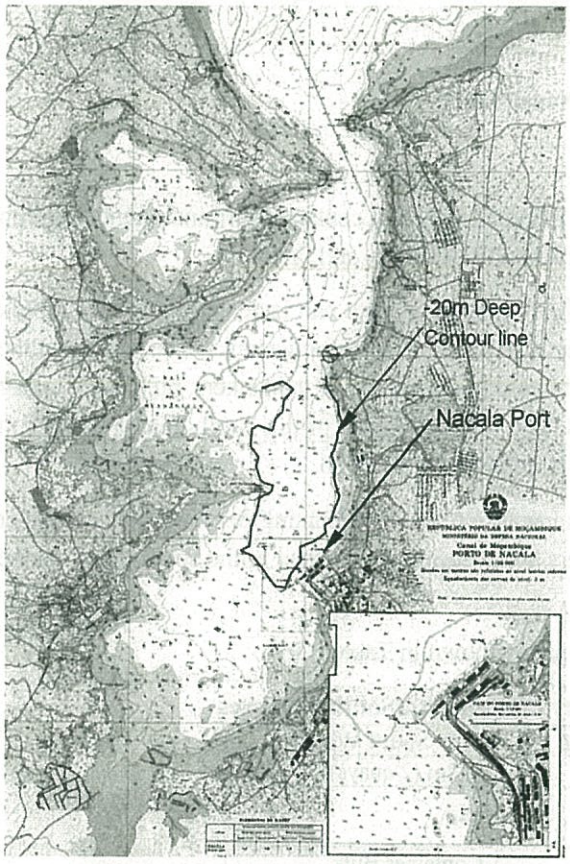
5.3.2 Nacala Port

(1) Overview

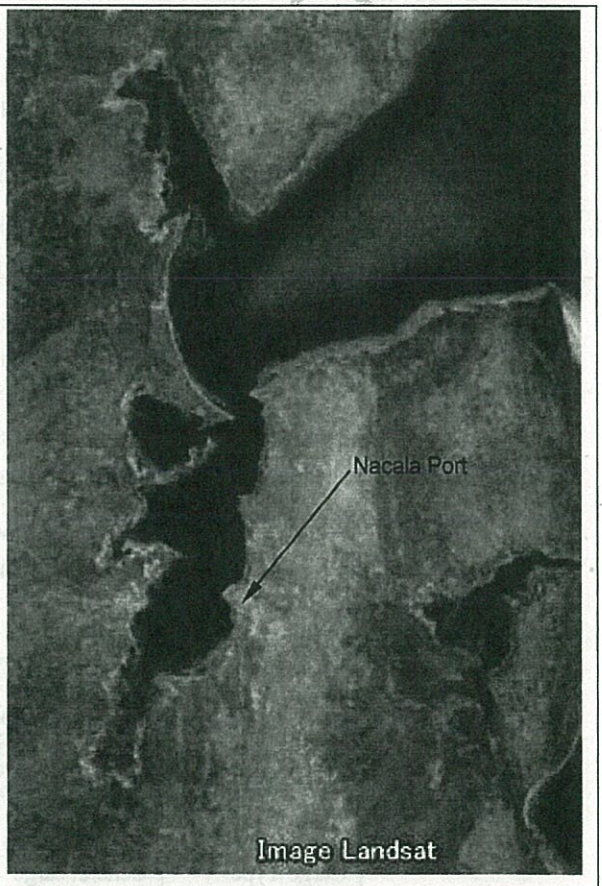
Nacala Port is located in the deep water bay of Nacala in Nampula Province, the most populated Province in Mozambique. Nacala port is about 1,500 km north-east of Maputo, 850 km north-east of Beira and 860 km south of Dar es Salaam. Nacala Port is located on the east shore of Nacala bay and is a natural deep-sea port. A new coal terminal planned by Vale Mozambique S.A. (hereinafter "Vale") will be on the opposite shore near Nacala-a-Velha and will have 20m of water depth.

Development of the Northern Provinces in Mozambique is one of the prioritized strategies of the Government of Mozambique, and a variety of industrial development projects are on-going or planned, which include agricultural development in Nampula, forestry development in Niassa, and SEZ development in Nacala. Nacala Port which has an advantage of water depth and is the 2nd deepest port in south-eastern Africa mainly contributes to the cargo movements in Northern Mozambique. Also, Nacala Port has great potential to develop deep quays without major dredging work.

At present, the volume of transit cargo from/to Malawi is small due to the poor condition of the Nacala Corridor but is expected to increase along with improvement of the corridor under the current and future projects. Furthermore, the planned development and expansion of coal mining projects in Tete Province is expected to bring a large amount of cargoes to Nacala Port. Together with other transportation projects planned in the Nacala Corridor, the Nacala Port is expected to greatly increase its handling volume and, as a result, contribute to the regional economy.



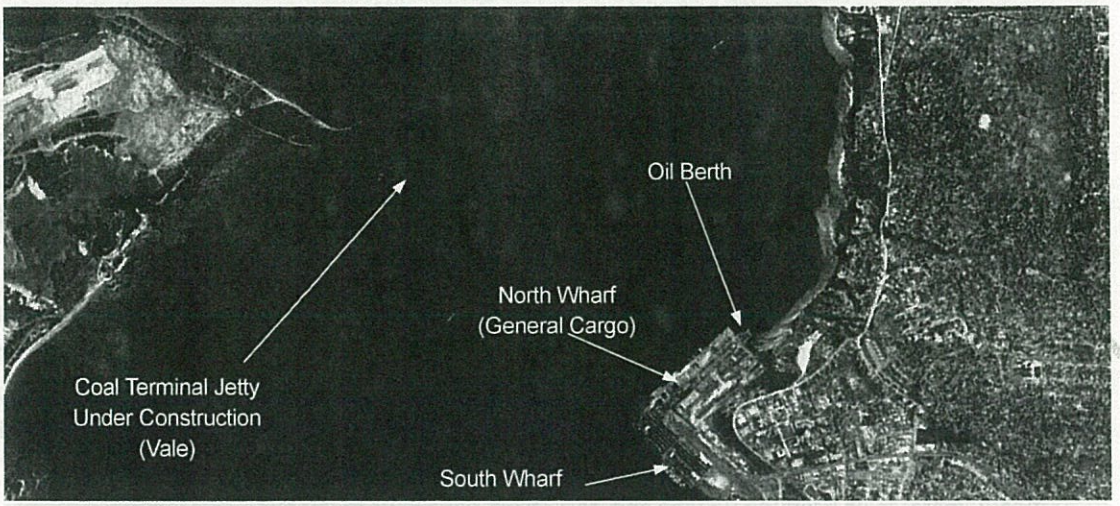
Ministerio de Mozambique, Canal de Mozambique, Porto de Nacala, 49611-M



Google earth image 2014

Source: Navigation Chart & Google earth

Figure 5.3.3 Nacala Bay



Source: Google Earth 2014

Figure 5.3.4 Nacala Port

(2) Port Facility and Cargo Handling Capacity

Nacala Port consists of the South and North Wharves with the container terminal, general cargo wharf, bulk cargo wharf, warehouses, liquid bulk handling facility and rail ramp.

The North Wharf has a quay of 620 m in length, of which the north part is dedicated for liquid bulk handling. A four kilometre long pipeline connects the terminal and storage tanks. The north part the quay of 312.5 m has a water depth of 10 m and is used for berthing of the tankers, bulk carriers (for fertilizer and plaster) and conversional vessels. The remaining part of the North Wharf has 7.5 m depth for berthing mainly conventional vessels handling general cargo.

The South Wharf has a quay of 372 m and is capable of accommodating berthing of 2 container vessels at the same time. The large bulk carriers are occasionally berthed at the south wharf as the depth is 14 m.

The specifications and capacity of the wharves are as shown in Table 5.3.1.

Table 5.3.1 Specification/Capacity of the North/South Wharves

Item	North Wharf	South Wharf
Quay Length	620m (4 quays)	372m (2 quays)
Draft	10m (312.5m) 7.5m (307.5m)	14m
Cargo Type	General cargo	Container/Bulk
Handling Capacity	2.4 million ton/year	124,000 TEU
Warehouses	8 warehouses (50,000 ton each)	-
Container Storage	-	4,982 TEU 48 Reefer plugs
Equipment	4 Electric quay cranes 3 Payloaders 3 Forklifts (2.5 – 3.0 t)	4 Reachstackers (45 t) 3 Toplifters (45 t) 1 Sidelifter (9 t) 1 RMG (25 t)

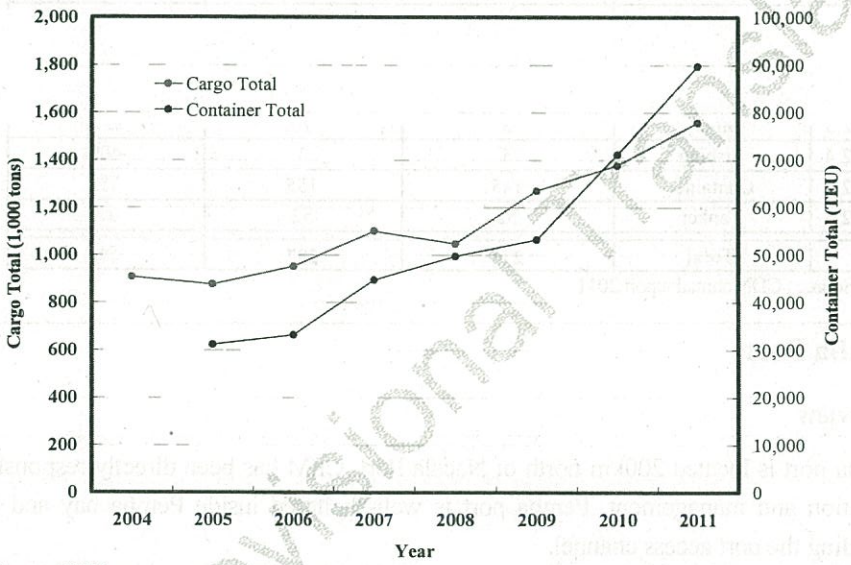
Source: CDN

(3) Cargo Throughput and Vessel Traffic

1) Cargo Throughput

According to the statistics of CDN, Nacala Port handled 1,557,000 tons in 2011 against 1,376,000 for same period in 2010, which shows an increase of about 13%. The containerized cargo also has increased with an annual growth rate of about 20% for 2009 - 2010. Major items of general cargoes are fuel, clinker, bulk wheat, corn, fertilizer, scrap, machines, sugar, gypsum, cement, rice and frozen fish. The historical movements with the transportation modes and the major handling commodities are as shown in Table 5.3.2.

More than 95% of the cargoes are international related, which means the domestic cargo is less than 5%. The import is larger than the export in volume. The container traffic is balanced between export and import.



Source: CDN

Figure 5.3.5 Cargo Throughput of Nacala Port

Table 5.3.2 Details of Cargo Throughput of Nacala Port (2010 & 2011)

Domestic Cargo			International Cargo			Transit - Malawi			Transshipment & Transfer		
Item	2010	2011	Item	2010	2011	Item	2010	2011	Item	2010	2011
Loading	**(27.0)**	**(29.6)**	**Export**	**(335.8)**	**(333.2)**	**Loading**	**(48.9)**	**(88.8)**	**Transshipment**	**(99.8)**	**(138.8)**
Oil	19.7	25.4	Corn		29.0	Container	40.7	74.4	Container	99.8	113.8
Container	7.3	4.2	Scrap Metal	8.0	3.0	Sugar	8.2	6.1	Wheat	0.0	25.0
			Container	327.8	301.2	Scrap Metal	0.0	8.3			
Unloading	**(25.7)**	**(8.5)**	**Import**	**(654.4)**	**(811.8)**	**Unloading**	**(185.0)**	**(125.6)**	**Transfer**	**(0.0)**	**(23.2)**
Fuel	3.0	0.7	Oil	132.3	166.9	Oil	12.3	0.0	Container	0.0	23.2
Container	21.4	7.8	Rice	9.8	4.2	Fertilizer	36.9	14.3			
Miscellaneous	1.3	0.0	Wheat	63.0	59.1	Soybean Oil	0.0	2.7			
			Soybean Oil	0.0	2.0	Wheat	97.6	70.9			
			Oil Palm	49.8	66.9	Container	38.2	37.7			
			Frozen Fish	1.7	1.2						
			Plastering Material	2.4	5.5						
			Clinker	158.5	134.9						
			Cement	4.6	5.0						
			Machinery	0.8	6.3						
			Container	229.5	359.2						
			Miscellaneous	2.0	0.6						
Total	**(52.7)**	**(38.1)**	**Total**	**(990.2)**	**(1,145.0)**	**Total**	**(233.9)**	**(214.4)**	**Total**	**(99.8)**	**(162.0)**

(Unit: x 1,000 tons)

Grand Total 2010	**1,376.6**
Grand Total 2011	**1,559.5**

Source: CFM

2) Vessel Traffic

In 2011, Nacala Port had 287 vessel calls, which includes 155 container vessels and 23 bulk carriers (both international). International and domestic voyages increased over 4% in 2011. The terminal had 78 calls by tankers including 26 domestic voyages. As of 2011, the international bulk carriers increased over 53% compared to 2010. The calling record with the voyage mode is shown in Table 5.3.3 below.

Table 5.3.3 Calling Record by the Voyage Mode

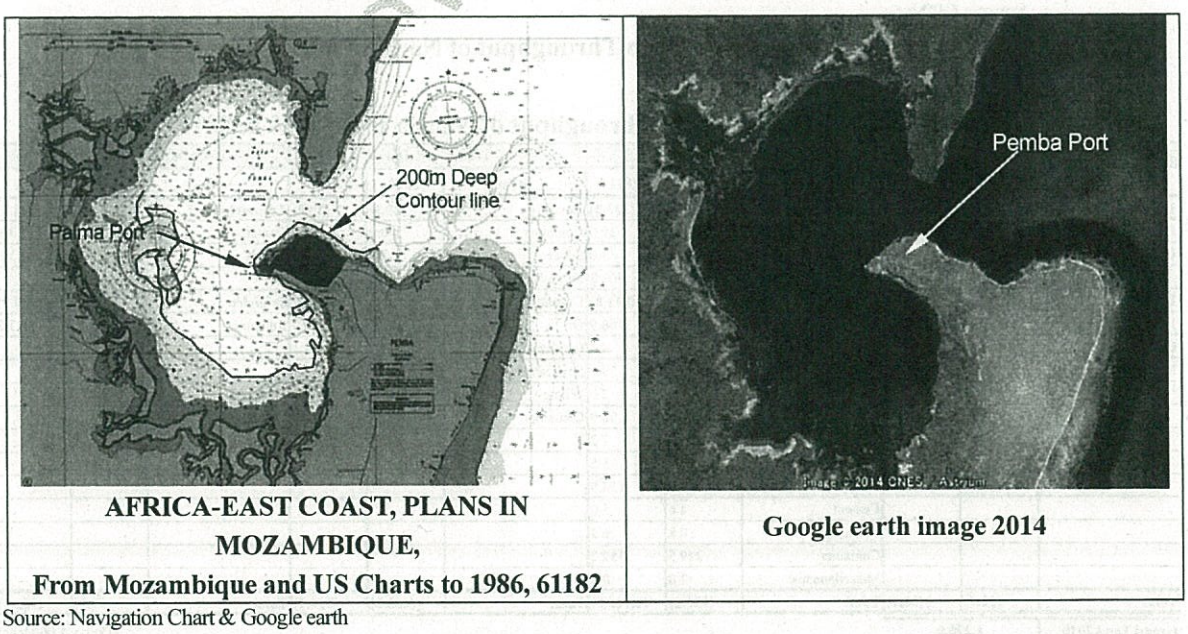
	Vessel	2010	2011	Increase Rate
1	**Domestic**	**25**	**26**	4%
1.1	General Cargo	1	0	-100%
1.2	Container	0	0	0%
1.3	Others	0	0	0%
1.4	Tanker	24	26	8%
2.3	Others	8	10	25%
2.4	Fishing	5	3	-40%
2.5	Container	145	155	7%
2.6	Tanker	52	52	0%
	Total	**274**	**287**	5%

Source : CDN annual report 2011

5.3.3 Pemba Port

(1) Overview

Pemba port is located 200km north of Nacala Port. CFM has been directly responsible for the port operation and management. Pemba port is well-sheltered inside Pemba bay and has 20m depth including the port access channel.



AFRICA-EAST COAST, PLANS IN MOZAMBIQUE,
From Mozambique and US Charts to 1986, 61182

Google earth image 2014

Source: Navigation Chart & Google earth

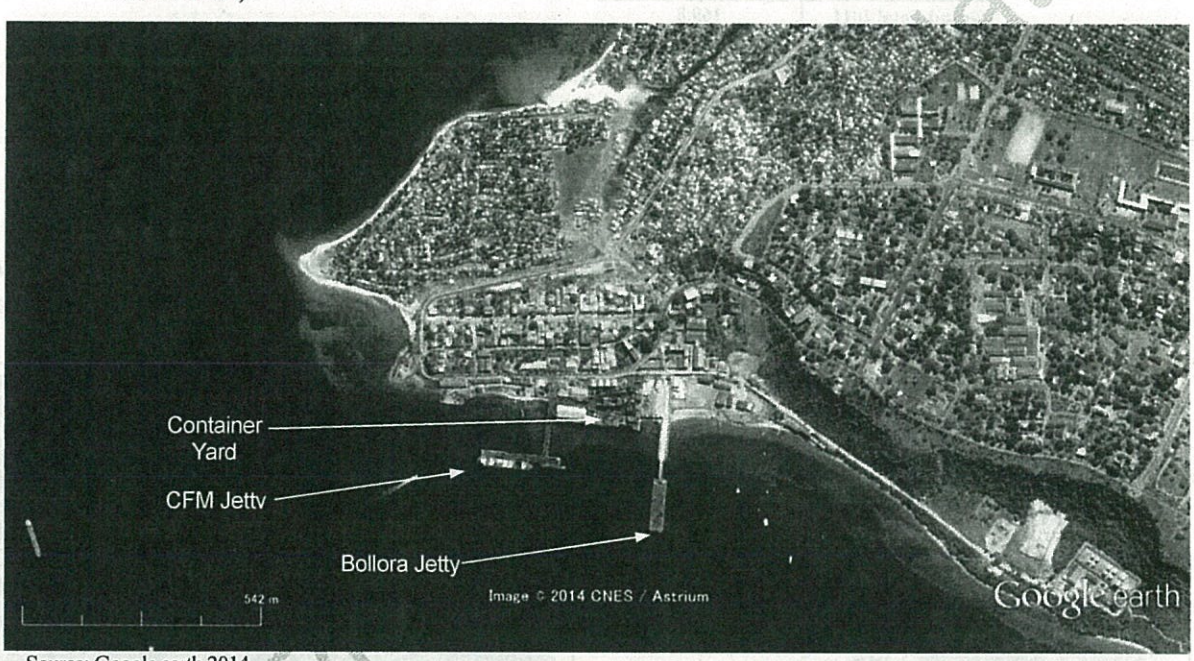
Figure 5.3.6 Pemba Bay

(2) Port Facility and Cargo Handling Capacity

The layout of port facilities is shown in Figure 5.3.7. The port has only one jetty, of which the length and width are 185m and 70m respectively. Water depth alongside the jetty is 7.5m (12m at high tide). The tide level difference is 4.4m. The jetty is connected to the land by a 79m bridge. The jetty was constructed in 1957 and refurbished in 1996, but the reinforcing materials have partially deteriorated.

The port provides a warehouse (1,700m^2), container yard (which is being expanded to 7,000m^2) and reach stackers for container handling at the yard. There is no quay crane provided.

In addition, Bollore, which is one of the offshore gas development companies, has constructed a jetty for supply boats that work with the offshore rigs/platforms (120m in length and 40m long access road).



Source: Google earth 2014

Figure 5.3.7 Pemba Port

In 2011, a total of 65 commercial cargo vessels called at the port, all of which were general cargo vessels except for 3 tankers. In addition, the calling of supply boats and other vessels relating to the gas development project at Rovuma basin has been increasing recently.

The cargo throughput has increased to 169,659 tons consisting of 118,833 tons for the containerized cargo and 50,826 tons for the non-containerized cargo. The international cargo constitutes the majority at more than 80%. The growth rate for 2010-2011 was recorded as 29% due to increased export of timber and imports relating to the gas development. The record of cargo commodities and handling weight are shown below in Table 5.3.4.

Table 5.3.4 Details of Cargo Throughput of Pemba Port (2010 & 2011)

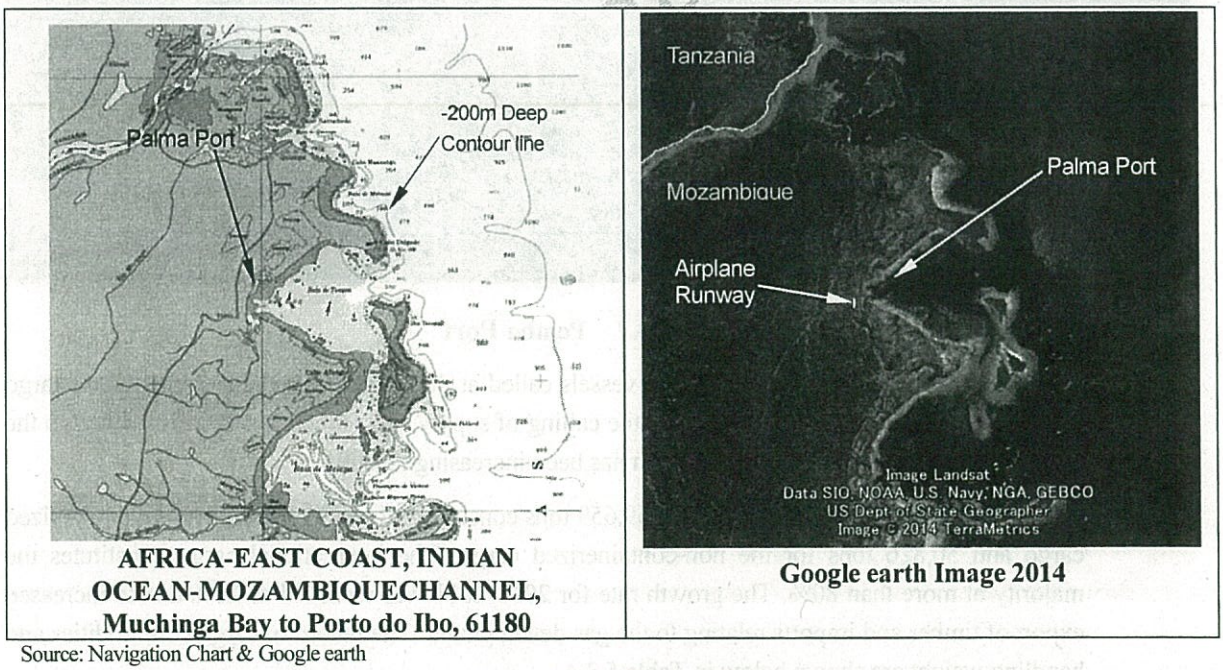
Domestic Cargo			International Cargo		
Item	**2010**	**2011**	**Item**	**2010**	**2011**
Loading	**(23.4)**	**(18.9)**	**Export**	**(65.2)**	**(89.3)**
Container	3.3	0.8	Container	65.2	88.8
Miscellaneous	20.1	18.1	Miscellaneous	0.0	0.5
Unloading	**(13.1)**	**(10.4)**	**Import**	**(29.2)**	**(51.2)**
Fuel	4.9	3.3	Container	22.3	26.3
Container	0.6	0.8	M. Transport	0.0	0.1
Miscellaneous	7.6	6.3	Miscellaneous	6.9	24.8
Total	**(36.5)**	**(29.3)**	**Total**	**(94.4)**	**(140.5)**
Grand Total 2010	**130.9**				
Grand Total 2011	**169.8**				

(Unit: x 1,000 tons)

Source: CFM

(1) Overview

Palma port is located 400km north of Nacala Port and 30km south of the Tanzania border. There are currently no port facilities, but some small fishermen's boats are observed along the shoreline near the village. There is an approximately 1,000m long runway (unpaved) for small aircraft. There is no airport building at the aircraft runway.



AFRICA-EAST COAST, INDIAN OCEAN-MOZAMBIQUECHANNEL, Muchinga Bay to Porto do Ibo, 61180

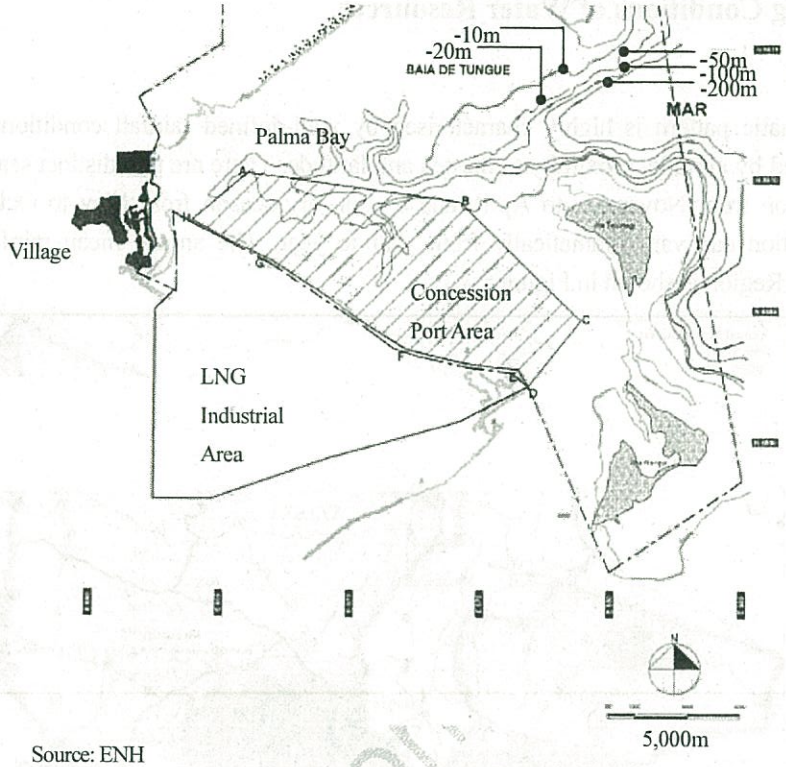
Google earth Image 2014

Source: Navigation Chart & Google earth

Figure 5.3.8 Palma Bay

As shown on the Figure 5.3.8, the bay is deep in the middle. The -100m deep contour line extends into the middle of the bay, and the depth immediately becomes more shallow toward the end of the bay. The -10m contour line lies very close to the end of the bay and lies 100-200m from the shoreline. A small village is located at the west end of the bay.

The south shore shallow area of the bay is planned for the new port development area (6,000ha) for which PCD has been given the concession contract. The concession contract for the land area facing this port area (7,000ha) has been given to the natural gas developers to develop LNG plant facilities.



Source: ENH

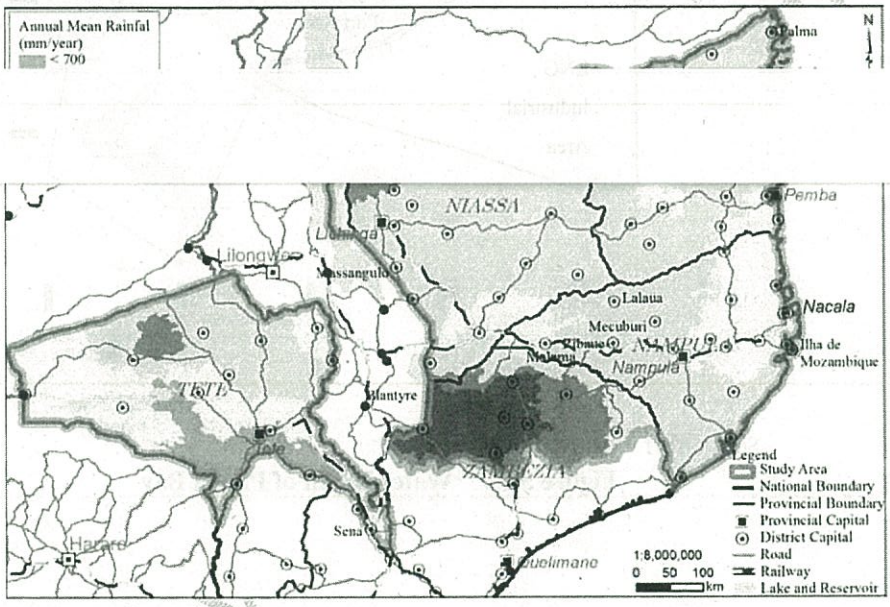
Figure 5.3.9 Water Depth of Palma Bay

5.4 Water Resources

5.4.1 Existing Conditions of Water Resources

(1) Climate

The climatic pattern is highly characterised by well-defined rainfall conditions and is strongly influenced by altitude, proximity to the sea and latitude. There are two distinct seasons, a warm and wet season from November to April, and a cool, dry season from May to October. The annual precipitation can vary dramatically from year to year. The annual mean rainfall of the Nacala Corridor Region is shown in Figure 5.4.1.



Source: JICA Study Team

Figure 5.4.1 Annual Mean Rainfall of the Nacala Corridor Region (mm/y)

(2) Basin Boundaries and Water Resources Administration

Differing according to the administration boundary, river basins are managed by five administrations established by the Water Law in 1991 as follows:

- Administração Regional de Águas (Regional Water Management Administration) (ARA-Norte: ARA-N)
- ARA-Centro Norte (ARA-CN)
- ARA-Zambeze (ARA-Z)
- ARA-Centro (ARA-C)
- ARA-Sul (ARA-S)

The Nacala Corridor Region is located in ARA-N, ARA-CN and the northern part of ARA-Z.

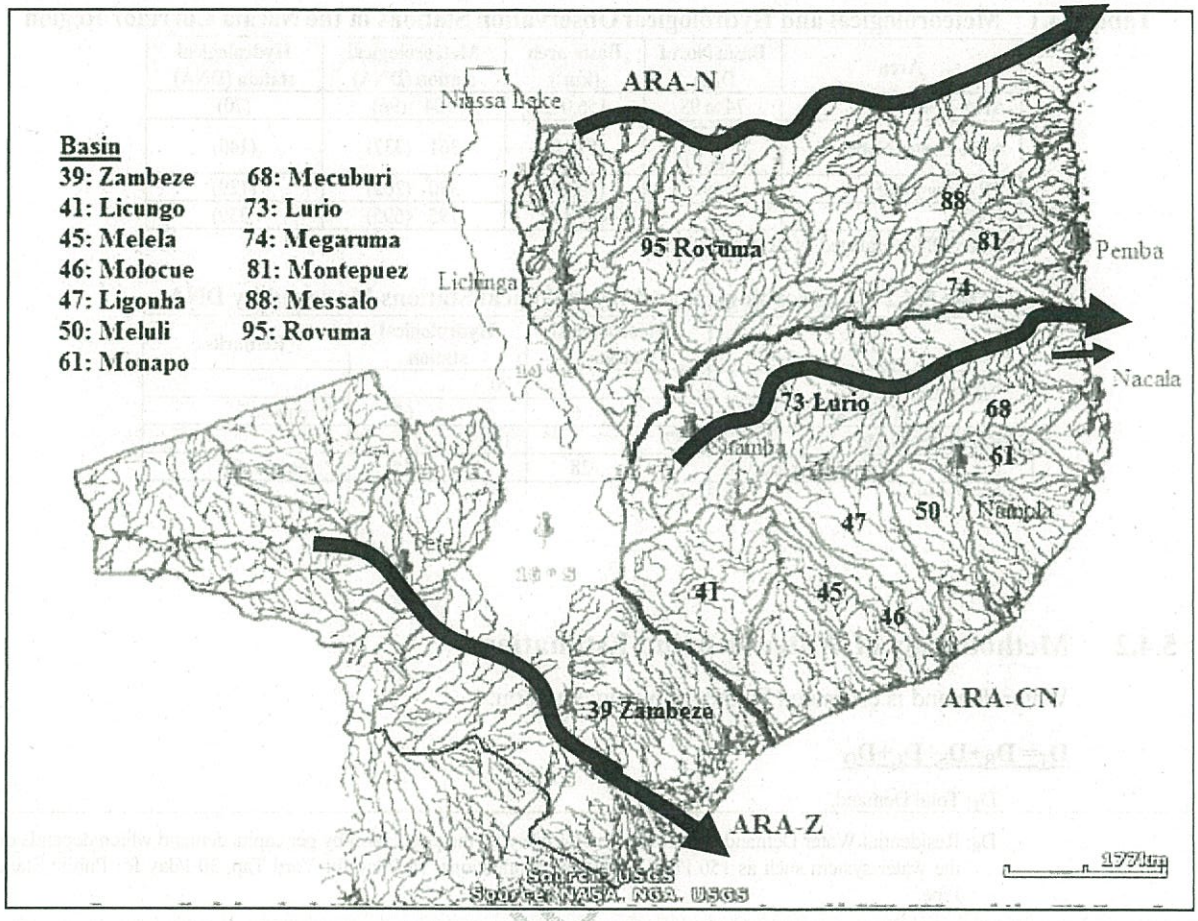


Figure 5.4.2 ARA Management Areas and Major River Basins in the Nacala Corridor Region

- ARA Norte – covers the area from the northern border to the border of the Lúrio River basin.
- ARA Centro Norte – covers the area from the Lúrio River basin to the northeast border of the Zambeze River basin.
- ARA Zambeze – covers the Zambeze River basin.

(3) Meteorological and Hydrological Observation Stations in the Nacala Corridor Region

It is reported that there are a total of 795 meteorological observation stations and 339 hydrological observation stations in ARA Norte, Centro Norte and Zambeze. Direcção Nacional de Águas: National Directorate of Water (DNA) used to have 695 meteorological stations and 339 hydrological stations. Other organisations of the National Meteorological Institute (INAM), etc. have meteorological stations only in town areas. But, most of them have malfunctioned in spite of the fact that the official count of inoperable stations is only about 35%. According to DNA, functioning observation stations total less than 100 for meteorology and 70 for hydrometric stations. DNA has started to establish the "HADSTRA" telemetric network observation system based on satellite communication in 2010 and it is expected to be completed in 2013.

Observation stations were selected at upstream, middle stream and downstream in each basin for the verification of existing reports.

Table 5.4.1 Meteorological and Hydrological Observation Stations in the Nacala Corridor Region

Area	Basin No. of DNA	Basin area (km^2)	Meteorological station (DNA)	Hydrological station (DNA)
ARA-Norte	74 to 98	156,012	104 (96)	(70)
ARA-Centro Norte	40 to 73 & 99 to 104	187,100	361 (337)	(140)
ARA-Zambeze	39	140,000	330 (262)	(129)
Total	-	483,112	795 (695)	(339)

Source: DNA, arranged by JICA Study Team

Table 5.4.2 Meteorological and Hydrological Stations Managed by DNA

Area	Meteorological station	Hydrological station	Remarks
ARA-Norte	96	70	
Collected for analysis	6	6*	*: request: 7
ARA-Centro Norte	337	140	
Collected for analysis	28	44*	*: request: 53
ARA-Zambeze	262	129	

5.4.2 Methodology of Water Demand Estimation

Water demand is estimated by the following equation:

$$D_T = D_R + D_S + D_L + D_O$$

D_T: Total Demand,

D_R: Residential Water Demand is computed by multiplying the population by per capita demand which depends on the water system such as 150 l/day for House connections, 90 l/day for Yard Tap, 30 l/day for Public Stand Pipe.

D_S: Water Demand for Small Business, is computed multiplying D_R by the coefficient which differs by the place and year

D_L: Operational Loss, is computed by multiplying D_R by the coefficient which differs by the place and year

D_O: Other Huge Water Demand is computed by the required land area for the specific development by the basic units as follows. 400 m^3/ha for Industries for Food/Beverage, 100 m^3/ha for Industries for Metal/Machinery, 50 m^3/ha for Wood/Furniture, 150 m^3/ha for Hotel Industries.

As a result, the total demand is expected to increase in line with the development of economic sectors and increase of population. In this section, the future water demand in in Greater Nampula Area, Nacala Bay Area, Cuamba City, Pemba City, and Lichinga City for the years 2017, 2020, 2025, 2035 are estimated as shown in the following sections.

5.4.3 Nampla City - Monapo River Basin (Basin No. 61)

Monapo River Dam, which is the water source for Nampula City is located on Monapo River 9km from the city centre of Nampula (see Figure 5.4.3). It has been supplying water with an average volume of 17,000m^3/day to Nampula City. But a water shortage will be coming soon for Nampula City. Consequently, urgent rehabilitation works on the intake facilities and water treatment facilities were scheduled to be completed by February 2013. However the works completed in early 2014. The capacity will be increased to 20,000m^3/day after the completion of rehabilitation.

Table 5.4.3 Water Source for Nampula City

Water Source	Location from City	Description	After Rehabilitation Intake Volume	Remarks
Existing Monapo Dam	9km	H=17.5m, L=330m Sv= 3.3Mil.m^3 EL=342m	Present =17,000 m^3/day 2013 = 20,000m^3/day	Under rehabilitation (intake & treatment facilities etc.)
Existing total			**20,000m^3/day**	
Year	Population		Water demand (Max. m^3/day)	Coverage
2009	538,523 (semi-rural: 61%)		21,318	52%
2020	837,429 (semi-rural: 61%)		69,541	77%
2029	1,245,996 (semi-rural: 61%)		132,732	90%

Sv=Effective storage volume of reservoir, Mil.m^3=million m^3, EL: dam crest elevation
Source: Draft Feasibility Study Report-Nampula, July 2010, MCA & FIPAG
Source for water demand forecast: MCC Baker Report, 2006
Water demand in 2009

- Domestic demand: 50.6%, 8,633 m^3/day
- Industrial/Commercial/ Institutional demand: 15.6%, 2,665 m^3/day
- Unaccounted for water: 27.7%, 4,724 m^3/day
- Operation loss: 6.1%, 1,032 m^3/day
- Total demand: 17,054m^3/day
- Maximum day demand=Average day demand x 1.25 (Max. day factor) in 2020 and 2029

5.4.4 Nacala City – around Sanhute River Basin (Basin No. 63)

Muecula Dam (Nacala Dam), which is the water source for Nacala City, is located 28 km from the city centre on Muecula River (see Figure 5.4.3). It can supply water of 7,200m^3/day. In addition to the dam, there are 6 wells in operation, but the total supply volume is inadequate to meet the water demand. Accordingly, Muecula Dam is under rehabilitation by raising its crest. The water supply volume will be increased to about 17,000m^3/day after the rehabilitation of the dam. Furthermore, four additional wells in each of the two well fields are under construction to increase the supply. The total water supply volume is expected to be 33,000m^3/day once the rehabilitation is complete. Details are shown in Table 5.4.4.

Table 5.4.4 Water Source for Nacala Bay Area

Water Source Alternative	Location from city	Description	Intake Volume (m^3/day)	After Rehabilitation (m^3/day) in 2013	Remarks
Existing Muecula Dam	28km	H=17.5m, L=330m, Sv=5.3Mil.m^3 EL=75.5m	About 7,200	Ave. Intake: 17,000 Sv= 6.6Mil.m^3	Raising height of dam 4m. (completion date: May 2013)
Mutuzi Well field	6km	3 wells (EL=121m)	2,160	7,200	Additional 4 wells/well field 6⇒8 inches Artesian well, Iron content
M'paco Well field	4km	3 wells (EL=118m)	1,512	8,400	
Existing total			**10,372**	**33,000**	
Year	Population		Water demand (Max. m^3/day)		Coverage
2009	220,757 (rural: 22%)		24,055		79%
2019	309,161 (rural: 22%)		43,557		89%
2029	434,314 (rural: 22%)		61,133		93%

Sv: effective storage volume of reservoir, Mil.m^3: million m^3, EL: dam crest elevation, (EL): well field ground EL
Source: Final Feasibility Study Report-Nacala, December 2010, May 2013, MCA and interview with FIPAG
Source for water demand forecast: MCC Baker Report, 2006
Water demand in 2009

- Domestic demand: 50%, 9,603 m^3/day
- Industrial/Commercial/Institutional demand: 10%, 1,921 m^3/day
- Unaccounted for water: 40%, 7,721 m^3/day
- Total (Average day demand): 19,244 m^3/day, Maximum day demand: 24,055 m^3/day (Max. day factor=1.25)

5.4.5 Cuamba City -- Lúrio River Basin (Basin No. 73)

Mepopolo Dam, which is the water source for Cuamba City, is located on the Mepopole River, a tributary of Lúrio River, about 30km from the city centre. It can supply water at 9,300m^3/day for Cuamba City, however this is also not sufficient for future water demand. Details are shown in Table 5.4.5.

Table 5.4.5 Water Source for Cuamba City

Water Source Alternative	Location from city	Description	Intake Volume (m^3/day)	After Rehabilitation (m^3/day)	Remarks
Mepopole Dam	30km	H=22m L=330m, Sv=2.9Mm^3 EL=994m	9,300	Intake: 10,800	Raising height of dam 4m. Charged by groundwater
Existing total					**11,000m^3/day**
Year	Population		Water demand (Max. m^3/day)		Coverage
2009	94,314		1,641?		7%
[illegible]	[illegible]		[illegible]		[illegible]

Maximum day demand=Average day demand x 1.25 (Max. day factor) in 2015 and 2029

5.4.6 Tete City - Zambeze River Basin (Basin No. 61)

The only water source for Tete City is groundwater that is located in Nhartanda Valley. It has sufficient volume of approximately 19,000m^3/day to supply Tete's water demand with its service coverage of 90%.

Currently, a Master Plan for Water Supply Development with a target year of 2037 is being carried out by FIPAG, which is financed by Vale Mozambique, S.A. The study team has been asking FIPAG for information regarding the initial findings and expected completion date of the master plan, however, no information was disclosed as of this date.

5.4.7 Pemba City -- Muaguide River Basin (Basin No. 78)

Groundwater from the Metuge Wellfield is the water source for Pemba City and presently 9,600m^3/day of water is pumped from the well. However, the well is not sufficient to meet the current and future water demands. According to the recharge volume, it is estimated that groundwater can be withdrawn at approximately 60,000m^3/day if the infrastructure is prepared. Details are shown in Table 5.4.6.

Table 5.4.6 Water Source for Pemba City

Water Source	River	Location	Description	Intake Volume etc.
Metuge Wellfield	Muaguide River Basin	40km from city	6 wells functional High content of iron	Max.14,160m^3/day Ave. 9,600 m^3/day
Existing total				**14,160m^3/day**
Year	Population		Water demand (Max. m^3/day)	Coverage
2009	153,029		10,385	66%
2020	262,622		23,498	80%
2029	408,547		40,446	90%

Coverage: house and yard tap connections account for 34% in 2020 and 41% in 2029
Source: MCA & FIPAG, Feasibility Study Report-Pemba, May 2010 and Additional groundwater investigation, Pemba, January 2012.
Source for water demand forecast: MCC Baker Report, 2006
Water demand in 2009

- Domestic demand: 42.5%, 4,415 m^3/day
- Industrial/Commercial/ Institutional demand: 15.8%, 1,645 m^3/day
- Unaccounted for water: 38.8%, 4,029 m^3/day
- Operation loss: 2.9%, 296 m^3/day
- Total demand:10,385m^3/day
- Maximum day demand=Average day demand x 1.25 (Max. day factor) in 2020 and 2029

5.4.8 Lichinga City -- Rovuma River Basin (Basin No. 95)

The water source for Lichinga City is Locumue Dam (Mini Cabora Dam), with a water supply capacity of 5,000m^3/day, which is located on the Locumue River about 8 km from the city centre. However this is inadequate to meet the future water demand. No groundwater aquifer is expected to be found in or around Lichinga City. Details are shown in Table 5.4.7.

Table 5.4.7 Water Source for Lichinga City

Water Source	River	Location	Description	Intake Volume
Existing Mini Cabora Dam	Locumue River	9km from city	H=17m, L=560m Sv=1.9million m^3 EL=1,318m	Max.5,000m^3/day for 2009
Existing-total				**Max.5,000m^3/day**
Year	Population		Water demand (Max. m^3/day)	Coverage
2009	12,281		2,265	-
2015	31,366		12,914	60%
2029	51,366		22,831	75%

H: dam height, L: dam crest length, Sv: effective storage volume of reservoir,
EL: dam crest elevation
Source: Integrated Project of Water Supply and Sanitation for the Provinces of Niassa and Nampla-Study on Water Supply and Sanitation for Four Cities-Feasibility Report (ASNANI Study June, 2008)-Vol. IV-Lichinga
Source for water demand forecast: MCC Baker Report, 2006

5.5 Power

5.5.1 Existing Conditions of the Power Sector

(1) Overview of the Power Situation in the Nacala Corridor Region

The area of Mozambique is 799,380 km^2 with a population of 22.9 million. The five provinces related to the Nacala Corridor Region (Niassa, Cabo Delgado, Nampula, Tete and Zambezia) cover 499,000 km^2 with a population of 13.4 million, representing 60% of the nation. The population is scattered over the region (the population density of Niassa, Cabo Delgado, and Tete Provinces are from 10 to 21 persons per km^2). Due to the vast area and low population density, it is difficult to extend the national power grid to the rural areas. As a result of this situation, rural areas that do not have access to electricity still rely on firewood and charcoal as the main energy sources.

Cabo Delgado	8.2%
Niassa	9 %
Nampula	13 %
Zambézia	7.3 %
Tete	10 %
National Average	16 %

Source: EDM (2011) Annual Report

Mozambique has a target to raise the household electrification rate to 15% in all provinces. However, this target has not been achieved yet. The current electrification rate of the five provinces related to the Nacala Corridor Region and the National average is shown in Table 5.5.1.

The target number of total electrified districts was planned to be increased from 104 in 2010, to 107 in 2011 and 125 in 2014. As of 2011, the number of electrified districts was 107, which corresponds to 84% of the total number of districts (128) in the country.

(2) Government Organisation Responsible for Electric Power

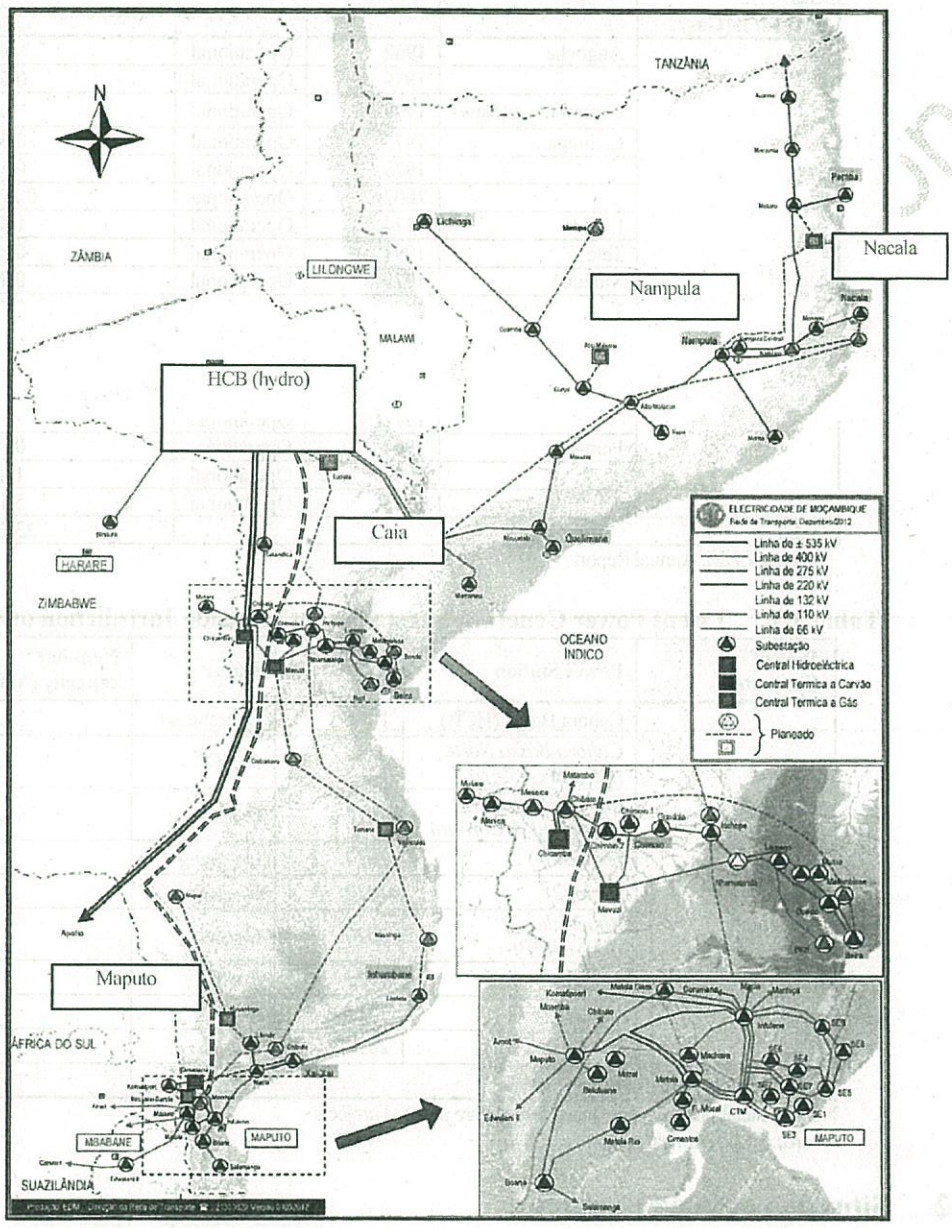
Electricidade de Moçambique (hereinafter "EDM") is a state-owned company responsible for power generation, transmission, and distribution. The total number of staff is 3,500. It is a subordinate organisation of the Ministry of Energy (hereinafter "ME").

(3) Current Situation of Power Generation and Transmission Facilities

Installed capacity of EDM power stations in the country was 28.4 MW in 2012, which consists of 1.85 MW of hydro and 26.57 MW of thermal. This capacity is not enough to supply the country. The remaining power used in the country is purchased from the "Hidroeléctrica de Cahora Bassa" (hereinafter "HCB"), which is a company owned by the governments of Mozambique and Portugal. In order to raise the self-sufficiency rate, EDM has plans to deploy new hydro power plants and put in line thermal power plants (IPP).

Currently, the standard voltages of transmission lines are 220 kV, 110 kV and 33 kV. The 110 kV

line has been extend to 2,530 km, which amounts to 50% of the total length of transmission lines in the country. The main distribution line voltage is 33 kV and it is stepped down to 22 kV, 11 kV, 6.6 kV, and 0.4 kV (66 kV is also used, but only in Tete). There is a tendency to extend the existing 33 kV transmission line in order to expand the electrification area. It has been confirmed that some of the 33 kV lines extend more than 100 km and in such cases, power loss is a great concern.



Source: EDM, 2012, National Grid Network 2

Figure 5.5.1 National Grid Network (2012)

Current and planned power generation facilities are shown in Tables 5.5.2 and 5.5.3. The present and future balances of power demand and supply are shown in Chapter 15.5.1 and Figure 15.5.1.

Table 5.5.2 List of Power Generating Installations (EDM Jurisdiction)

Type of Generation	Power Station	Installed Year	Status	Nominal capacity (MW)
Hydro Power	Cuamba	1989	Operational	1.1
	Lichinga	1983	Operational	0.75
Sub Total (Hydro)				**1.85**
Gas	None	None	None	0
Sub Total (Gas)				**0**
Diesel	Angoche	1962	Operational	0.4
		1979	Operational	0.51
	Central nova (New)	1999	Operational	2.4
	Lichinga	1975	Operational	0.56
		1979	Operational	0.52
		2002	Operational	0.204
	Lionde	1974	Operational	1.48
	Tete	1991	Operational	0.82
	Mocuba	1979	Operational	0.42
		[illegible]	[illegible]	[illegible]
		[illegible]	[illegible]	[illegible]
	Pemba	1964	Operational	0.92
		2002	Operational	1.46
		1985	Operational	5.12
Total				**23.13**

Source: EDM, Annual Report

Table 5.5.3 List of Power Generating Installations (Outside Jurisdiction of EDM)

Type of Generation	Power Station	Installed Year	Status	Nominal capacity (MW)
Hydro Power Station	Cahora Bassa (HCB)	1974	Operational	2,075
	Cahora Bassa Norte (HCB & CEZA)	*2017*	*Pre-FS*	*1,245*
	Mphanda Nkuwa (Campbell & Correia)	*2017*	*On-going*	*1,500*
	(extension)	*2020*	*On-going*	*750*
	Lúrio (2)	*2020*	*On-going*	*120*
	Alto Malema (EDM+IPP)	*2020*	*On-going*	*120*
	Mugeba	*2023*	*Pre-FS*	*100*
	Boroma	*2023*	*Pre-FS*	*200*
	Lupata	*2023*	*Pre-FS*	*600*
Total (including planned projects)				**6,710**

Note: Installations shown in italic character are planned projects.
Source: EDM, Annual Report

5.5.2 Situation of Power Supply

(1) Substation Transformers

The peak load conditions of the main substations in the five provinces related to the Nacala Corridor Region, excluding Tete, is as shown in Table 5.5.4. The peak demand at "Nampula 220" was recorded at 84% of the main transformer capacity in December 2012 and in "Nampula Central" it is already reaching its rated capacity. Nevertheless, there are plans to expand the existing distribution area that will lead to over load of substations in Nampula.

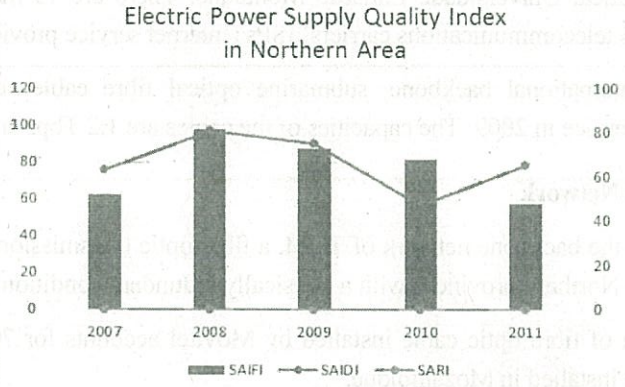
Table 5.5.4 Load Conditions of Substation Transformers

System Operation Center ATNO substation load condition (Peak)			
Substaion	Transformer Number	2005~2012 Pontencial	Load Rate (%)
Nampula 220kV	TR01	100MVA (80MW)	83.9%
	TR02	100MVA (80MW)	83.9%
Nampula Central	TR101	35MVA (28MW)	100.0%
	TR31	10MVA (8MW)	96.0%
	TR32	10MVA (8MW)	96.0%
Monapo	TR101	16MVA (12.8MW)	48.1%
	TR31	10MVA (8MW)	16.0%
Nacala Port	TR101	35MVA (28MW)	43.0%
	TR102	35MVA (28MW)	43.0%
	TR31	10MVA (8MW)	46.0%
	TR32	10MVA (8MW)	29.0%
Pemba	TR01	16MVA (12.8MW)	66.8%
Cuamba	TR01	16MVA (12.8MW)	19.4%
Lichinga	TR01	16MVA (12.8MW)	41.2%
Metoro	TR1	10MVA (8MW)	32.0%
Macomia	TR1	16MVA (12.8MW)	16.9%

Distribution TR for city side
Source: EDM, Substation survey result

(2) Transmission Line

The current load conditions of transmission lines from "Nampula 220" to "Nampula Central" is 60%.



Source: EDM Statistic (SAIFI left / SAIDI & SARI right unit), 2010

Figure 5.5.2 Index of Power Quality in the Northern Region of Mozambique

(3) Quality of Electricity

Electric power supply system reliability is evaluated by indexes, such as "System Average Interruption Duration Index" (hereinafter "SAIDI"), "System Average Interruption Frequency Index" (hereinafter "SAIFI") and "System Average Restoration time Index" (hereinafter "SARI").

Above indexes for the Northern Distribution Area, which covers the Five provinces related to the Nacala Corridor Region, is marked as; SAIDI 47 min 7 seconds, SAIFI 82 times, SARI 34 seconds. It was reported during the study mission in Nampula (May 2013) that they had black outs due to power supply failure averaging once every two days.

Most of electrical faults occurred on the 110 kV Transmission lines and transformers. The load conditions of the Nampula Central substation transformer is already overloaded due to distribution expansion projects. Moreover, most substation facilities are over 30 years old, and the substations have no back up facilities.

5.6 Telecommunications

5.6.1 Existing Conditions of the Telecommunications Sector in Mozambique

(1) Organisations in the Telecommunications Sector

The Regulator of the telecommunications sector, including Internet service, is the Instituto Nacional das Comunicações de Moçambique (INCM) and it reports to the Ministry of Transport and Communications.

In the telecommunications market in Mozambique, fixed telephone service is provided by Telecomunicações de Moçambique (TDM) and cellular mobile phone service is provided by Mozambique Cellular (mcel), Vodacom and Movitel. Movitel is the latest carrier in this market. It obtained its license in January 2011 and launched its official operation in May 2012. This company

For Internet service, in addition to being provided by the above 4 companies, there are 25 Internet Service Providers with the major ones being Tvcabo and Teledata. An Internet exchange called Mox-IX has been in service since 2002 for effective Internet traffic routing. It is located in Centro de Informática, Universidade Eduardo Mondlane. There are 15 major Internet service providers including 4 telecommunications carriers' ISPs (Internet service providers) connected with Mox-IX.

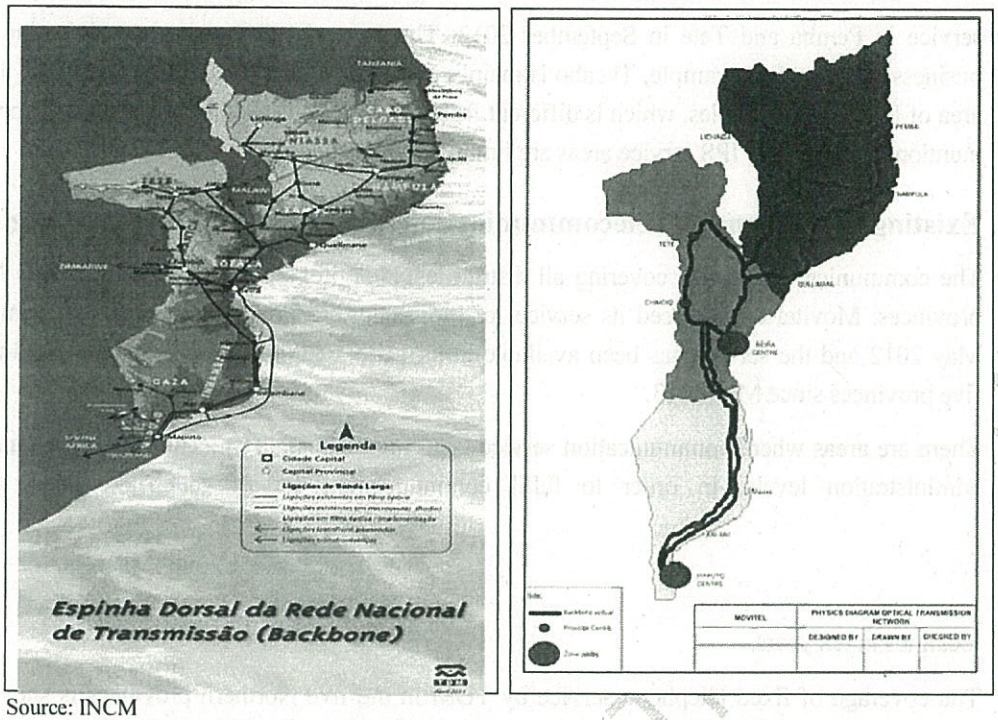
For the international backbone, submarine optical fibre cables called SEACOM and EASSy launched service in 2009. The capacities of the cables are 1.2 Tbps and 1.4 Tbps, respectively.

(2) Backbone Network

Regarding the backbone network of TDM, a fibre optic transmission system is already installed for all the five Northern provinces with a physically redundant condition.

The length of fibre optic cable installed by Movitel accounts for 70% of the total length of fibre optic cable installed in Mozambique.

The backbone networks of TDM and Movitel are shown below.



Source: INCM

Figure 5.6.1 Backbone Network (Left: TDM, Right: Movitel)

(3) Coverage of Fixed Line Service

The teledensity for fixed line service has been stagnant for more than 10 years and has gradually decreased in recent years. On the other hand, cellular phone subscriptions per 100 inhabitants have been increasing, and are expected to increase more in the future. As for the number of Internet users, there are no official survey data available so far. In the reports of ITU (International Telecommunication Union) and others, data related to the number of Internet users and the percentage of Internet users are estimated figures. The index for "percentage of individuals using the internet in 2010" in the ITU report titled "Measuring the Information Society 2011" indicated 4.2%. On the other hand, Moz-IX estimated 0.38% in 2010 for the number of internet users per 100 inhabitants.

Table 5.6.1 Fixed Telephone and Mobile Subscription per 100 Inhabitants in Mozambique

Year	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012.6
Fixed Telephone subscription per 100 inhabitants	0.34	0.38	0.38	0.39	0.43	0.40	NA	0.4	0.38	0.37
Mobile Cellular subscription per 100 inhabitants	2.6	3.39	8.35	12.6	16.8	20	28.5	30.9	33.5	40.6

Source: Mozambique INCM, ICT Sector Performance Review, 2009/2010 and ITU Report

(4) Coverage of Internet Service

Internet service coverage is still limited except for the areas covered by the communications carriers and Teledata, which is one of the major ISPs. Teledata's major customers are banks. Therefore, Teledata provides service for all provincial centres. The service area of other major ISPs, such as tvcabo or Intra, is limited to Maputo, Beila and Nampula so far, although Tvcabo will commence

service in Pemba and Tete in September 2012. The coverage difference is mainly due to their business strategy. For example, Tvcabo is mainly providing cable TV service. Therefore, Tvcabo's area of focus is major cities, which is different from the target of Teledata. Except for the previously mentioned ISPs, other IPS service areas are limited to only Maputo.

5.6.2 Existing Conditions of Telecommunications in the Nacala Corridor Region

The communication service covering all district levels is provided by mcel for the five Northern provinces. Movitel commenced its service for more than 80% of the districts in Mozambique in May 2012 and the service has been available in all district capitals in Mozambique including the five provinces since May 2013.

There are areas where communication service is still not available in localities that are under post administration levels. In order to fulfil communication services such as voice and data

localities in ten years.

The coverage of fixed telephone service by TDM in the five Northern provinces is shown in the following table.

Table 5.6.2 Coverage of Fixed Telephone Service for District Centres in 2011 (TDM)

Provinces	Number of Districts Covered	Number of Districts	Coverage (%)
Cabo Delgado	17	17	100
Niassa	7	16	44
Nampula	21	21	100
Zambézia	17	17	100
Tete	9	13	69
Total of Northern 5 Provinces	71	84	84.5
Total of Mozambique	120	142	84.5

Source: INCM

5.6.3 On-going Projects for Telecommunications Sector

INCM is implementing projects that expedite Universal Access Service as a policy of the Government of Mozambique. The source of funds for the Universal Access Service Project is called the Universal Access Service Fund. The regulation for collection for the fund is collecting 1% of net profits of communication carriers and Internet service providers. It amounts to approximately 110 – 150 million Meticais per year. The fund is utilised for investment in communication facilities for the areas selected by INCM where no communication networks exist. The contractor, selected through a bidding process, is obligated to operate for 10 years in the selected areas including installation of network equipment and facilities. The on-going project is shown below.

Table 5.6.3 Outline of Universal Service Fund Project

No.	Contract Period	Objective Area (Province, Localities)	Service Type	No. of Users	Contractor	Contract Amount (Mt)
1	2011 06 – 10 years	21 localities in Gaza (2), Inhambane (3), Manica (4), Sofala (4), Tete (4), Niassa (4) province. Number of inhabitants of those localities are 254,691	Voice Communication, Data Communication, Internet Access	Within the specified localities, the Contractor is required to get the subscribers (The required number is not specified in the Contract)	mcel	170 mil Mt.
2	2012 06 – 10 years	22 localities in Maputo (3), Gaza (2), Inhambane (3), Zambézia (5), Nampula (5), Cabo-Delgado (4) provinces and 4 Repeater stations including Base Stations. Number of inhabitants of those localities are 353,022.	Voice Communication, Data Communication, Internet Access	Within the specified localities, the Contractor is required to get the subscribers (The required number is not specified in the Contract)	mcel	62 mil Mt.

Source: INCM

5.6.4 Planned Projects for Telecommunications Sector

Telecommunications carriers have not disclosed information related to specific planned projects. As general information, the carriers' planned projects are related to the enhancement of Quality of Service and improvement of the capacity of the network, etc. An ISP should consider introduction of services related to server backup for the client, disaster recovery service, etc.

As for the projects utilising the Universal Service Fund, the third project was announced in October 2012. At the time of the second project, the bidding price was lower than the first because there was competition. The contract price of the second project was approximately one third the price of the first project.

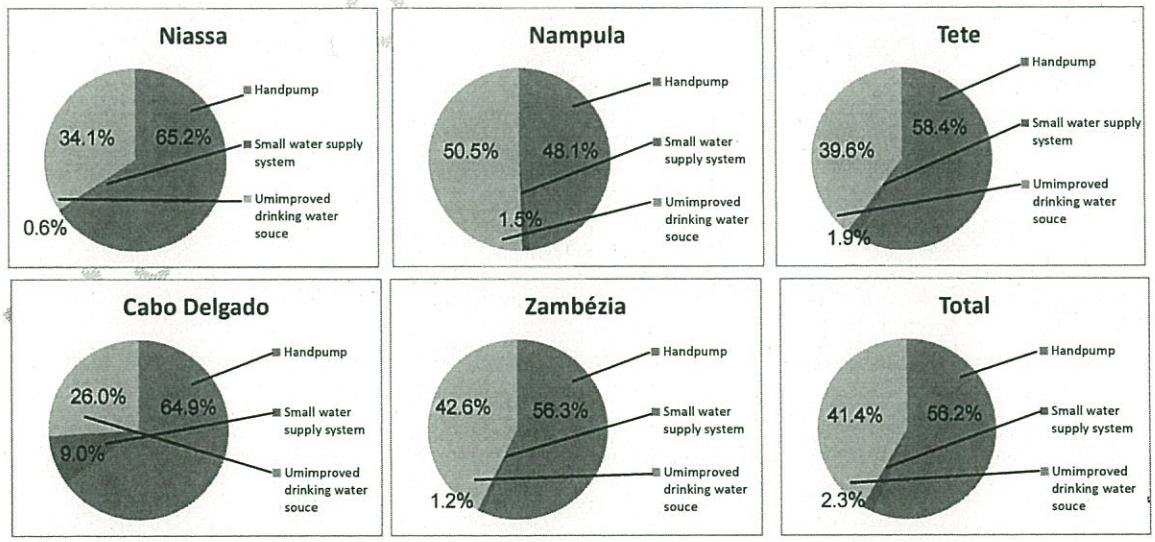
5.7 Rural Water Supply

5.7.1 Existing Conditions of Rural Water Supply

The potential of groundwater, which is the main source of water for rural water supply in the Nacala Corridor Region, is relatively low compared with other areas in Mozambique. In most areas, the average yield of a borehole is lower than $1m^3$ per hour or 17 litres per minute. Static water level in the Nacala Corridor Region is mostly only suitable for hand pumps. With regards to water quality, there are some areas, especially along the coastal area, where the water is salty. In addition, there are some areas where the water has a high iron and magnesium content.

The level of coverage of rural water supply in the Nacala Corridor Region is lower compared with the other provinces of Mozambique. The coverage in the Nacala Corridor Region was 58.6% while that in the rest of Mozambique was 76.6% in 2011. The highest coverage out of the five provinces ratios are based on an "Access" indicator used by DNA. The coverage ratios in these provinces rose in 2011 compared to 2010 except for Niassa Province, where the coverage ratio dropped due to calculations that excluded dried-up boreholes.

The conditions of rural water supply are classified into two categories: "improved drinking water source" and "unimproved drinking water source." The former comprises small water supply systems, borehole/protected dug wells with hand pumps and rainwater, whereas the latter includes unprotected dug wells, surface water and others. The majority of rural water supply in the Nacala Corridor Region is provided by borehole and protected dug wells with hand pump. The composition ranges between 65% and 48%: 65.2% in Niassa, 64.9% in Cabo Delgado, 58.4% in Tete, 56.3% in Zambézia, and 48.1% in Nampula. The average of the five provinces is 56.2%. Small water supply system used in the Nacala Corridor Region covers 2.3% in the rural area.



Source: DNA

Figure 5.7.1 Percentage of Service Population by Type of Water Facility

A small water supply system consists of a water source facility, transmission pipes, a water storage

tank, distribution pipes and water taps. There are 93 small water supply systems in the Nacala Corridor Region, 24 each in Nampula Province and Tete Province, 23 in Zambézia Province, 13 in Cabo Delgado Province and 9 in Niassa Province. The system in full or partial operation account for 86% of the water storage facilities and 63% of the water source and pipeline facilities.

The borehole/protected hand dug wells which are not in operation account for 11.3% of the total with a range between 8.9% and 17.9% in the five provinces. Out of the three types of pumps approved by DNA, Afridev is most commonly used in the Nacala Corridor Region.

5.7.2 Rural Water Supply Maintenance System

(1) Small Water Supply Systems

Small water supply systems are under the control of local governments except for the ones located in provincial capitals which are controlled by the Water and Sanitation Infrastructure Authority (AIAS).

(2) Boreholes and Hand Dug Wells with Hand Pumps

Operation and maintenance of boreholes and hand dug wells with hand pumps primarily rely on the establishment of water committees, who collect money for repairs and perform routine maintenance and minor repairs of hand pumps. The rate of existence of water committees is about 50% according to DNA data. The water committee is established at the time of construction but in many cases they do not function after the project period because they cannot collect fees from users or because major breakdowns occur.

There are different systems of maintenance and repair of hand pumps in place in the Nacala Corridor Region. In Nampula Province, the consultant contracted with the MCA project provides refresher training to local area mechanics, two each stationed at each administrative post of the seven districts. In Tete Province, there are activities undertaken by an NGO and local area mechanics separately. There seems to be a conflict arising from the difference in the charge level, the NGO charges only 15–20% of the repair cost to communities whereas the local mechanic charges the full cost. In Niassa Province, there are artisans licensed by DAS and a mechanic selected from the local community.

The limited supply of spare parts for pumps is an obstacle. Spare parts are sold in different ways, at lower prices in provincial capitals such as Nampula and Lichinga and higher prices by local shops or local vendors. The price difference is huge, 15 to 75 MT for a U-seal in provincial capitals and 500 MT in the highest case by a local vendor. There are some cases in Tete and Niassa in which spare parts are imported from the Malawian market.

5.7.3 Rural Water Supply Policies and Organizations

The "National Water Policy" prepared by the government in 1994 emphasises the participation of communities in operation and maintenance of rural water supply facilities. As an initial endeavour, education activities called "PEC" were started. A modified approach called "PEC-Zonal" started in 2002 with NGOs and consultants on a contract basis as the main implementers, which was a reflection of the government's privatisation policy. PEC-Zonal has been successful in enhancing the sustainability of the facilities and the capability of local governments, whereas it has some

challenges such as the high cost of implementation and need for long-term evaluation.

The organisations engaged in rural water supply are DNA at the national level, DAS at the provincial level and SDPI at the district level.

5.7.4 Existing Plans and Programmes for Rural Water Supply

The existing plans and programmes specific to rural water supply include the "National Water Policy" of 2007, the "Strategic Plan for Rural Water Supply and Sanitation (PESA-ASR) 2006–2015" of 2007, and the "Rural Water Supply Manual (MIPAR)" of 2001. There are a number of projects with international cooperation by JICA, SDC (Switzerland), UNICEF, AusAid, the Netherlands, MCA, Islamic Development Bank, DfID, AfDB and CIDA.

Chapter 6 Existing Conditions of Major Urban Centres

6.1 Introduction

Urban centres are very important elements of the spatial structure and places for social and economic activities in the Nacala Corridor Region. In this chapter, the present situation of major urban centres, including Nacala Bay Area (Nacala Porto Municipality and Nacala-a-Velha), Greater Nampula, Cuamba and Lichinga and Pemba, are described.

6.2 Nacala Porto Municipality and Nacala-a-Velha District

6.2.1 Present Situation in Nacala Porto Municipality and Nacala-a-Velha District

The seaport of Nacala, the starting point of the Nacala Corridor, is situated on the eastern coast of Nacala Bay, belonging to Nacala Porto Municipality. On the western coast of Nacala Bay, a large scale bulk port is under construction for the export of coal, to be operated by the mining company. The western coast of Nacala Bay mostly belongs to Nacala-a-Velha district. The combined area of Nacala Porto and Nacala-a-Velha is designated as the Nacala SEZ.

According to the census, Nacala Porto had about 206,449 inhabitants in 2007, distributed over an area of around 370 km^2, with a density of 558 persons per km^2. The municipality area is managed by two administration posts and 22 neighbourhoods (bairros). Among the 22 bairros, nine have rather rural characteristics. Nacala-a-Velha consists of two administration posts. The total population of the district was 88,807, of which 66,666 inhabitants, or 75.1% were in Nacala-a-Velha post administration and the remaining 22,141, or 24.9%, lived in Covo post administration.

6.2.2 Urban Structure and Transport System for Nacala Porto Municipality and Nacala-a-Velha District

In the entire area of the SEZ, the built-up area with a road network of secondary roads is limited to two locations, namely the city centres of Nacala Porto and Nacala-a-Velha. The corridor line, or EN-12, approaches the SEZ from the south-west and turns to the north heading to the sea port of Nacala. Along this main access route to the port city, many factories have located recently enjoying the privileges of the SEZ. From the centre of Nacala Porto, a paved road extends to the north up to the end of the peninsula where several resort facilities have been located. Near the middle of this road, the international airport is under construction. Several administrative buildings have been constructed in the area from the entrance point of the road to the gate of the airport.

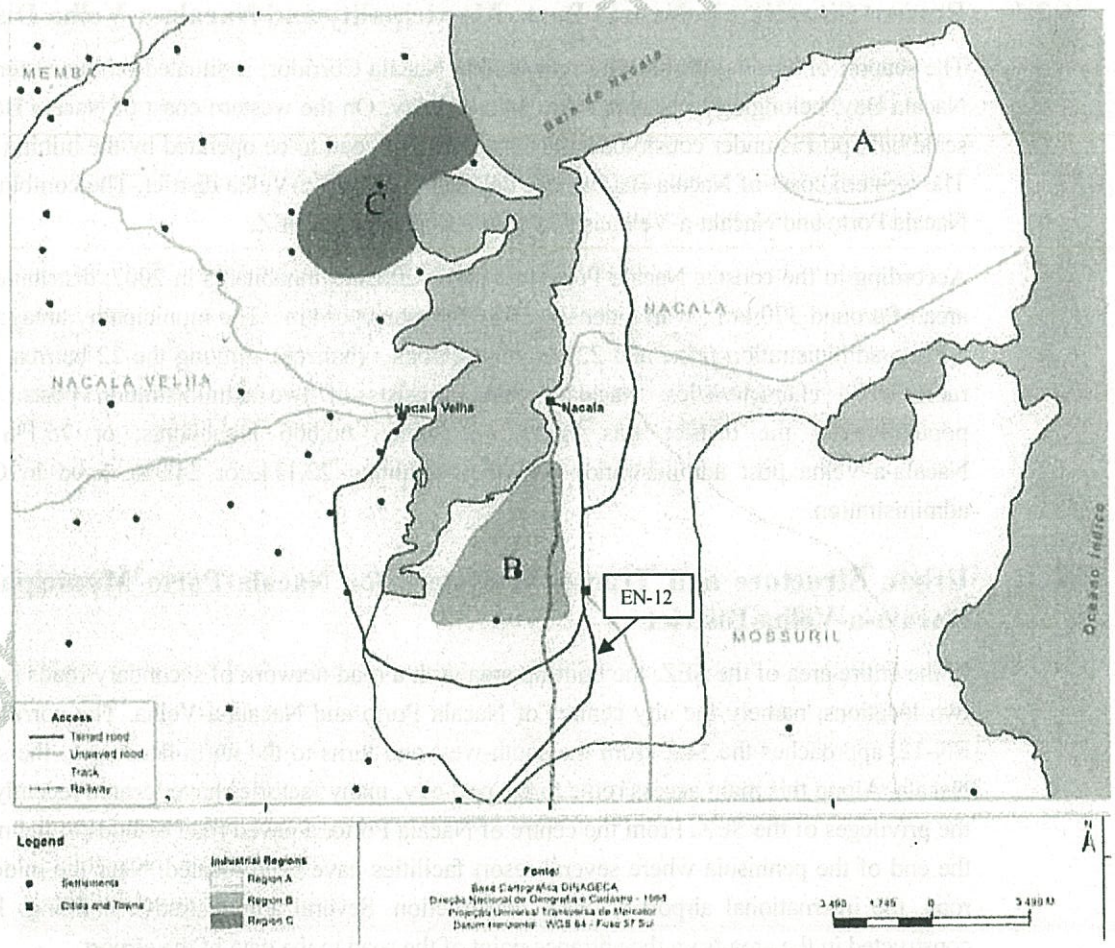
EN-12 has a junction at the south end of the bay, and the branch road extends to the city centre of Nacala-a-Velha, running along the west side of the coast. From the centre of Nacala-a-Velha,

several roads head north and west, forming radials. The one heading to the north is linked to the centre of Memba district, while the others head to rural areas and end without connecting to major roads. All of these roads are unpaved.

The city centre of Nacala Porto is situated on the planned built-up area in the middle of the eastern coast of Nacala Bay. The planned built-up area is formed from the top of the hill to the port area. There are older manufacturing industries located in the flat areas near the port. The surrounding valleys of the planned area are mostly occupied by unplanned settlements, which suffer from occasional land slide and erosion, on top of the lack of necessary infrastructure.

Nacala-a-Velha is not yet affected by urbanization pressure, but will inevitably face a massive influx of population triggered by the start of operation of both the new port dedicated to the coal export and the railway connecting the port with the Nacala Corridor. Once the urbanization starts, it will be hard to accommodate the immigrants in the existing built-up area. The district is already

GAZEDA are shown in Figure 6.2.1 along with the main road networks.



Source: GAZEDA

Figure 6.2.1 Proposed Locations of Industrial Free Zones

6.2.3 Utilities for Nacala Porto Municipality and Nacala-a-Velha District

The present water sources consist of both surface water (main system) and groundwater (secondary system). There is no sewerage system constructed in the area.

(1) Main System (Muecula Dam based Surface Water System)

The main system, developed in the mid-seventies, is Muecula Dam (Nacala Dam) located on Muecula River. This dam is being rehabilitated as ongoing construction works under MCA as a separate project independent of the short-term water supply system expansion. The rehabilitation works are aimed to expand the average capacity of the dam from 7200 m^3/day to 17,000 m^3/day with a maximum capacity in the rainy season of 25,000 m^3/day. The rehabilitation works on the dam were expected to be completed in 2013. However although the rehabilitation of framework has been already completed, the rehabilitation of pipes from the dam to the water supply facilities was not completed as of May, 2014.

Water abstracted from the dam is treated by using chemically assisted filtration consisting of coagulation/flocculation and a sedimentation system followed by a pressure filter system and is then pumped to the city using 300/400 mm diameter transmission mains of 28 km total length and is then distributed to the Nacala Porto area using a set of distribution centres. The current water treatment system is an abbreviated form of conventional water treatment that is considered as a black box and not appropriate for treatment of typical municipal water. So this treatment plant will be completely replaced by a new slow sand filter treatment plant (with a capacity of 25,000 m^3/day) as per the ongoing construction works of the MCA project (by 2014 at the latest).

This ongoing construction work also will provide an additional transmission main of 500mm diameter with a length of 19 km as the major component. At the intermediate pump station of this new transmission main an additional transmission main of 315 mm diameter with a length of about 20km is also being installed as a separate project component with funding from VALE to supply water to its facilities in Nacala-a-Velha and also to the city centre.

(2) Secondary System (Groundwater System in the 2 Aquifer Areas of Mpaco and Mutuzi)

There are 4 boreholes, 2 each in both of the aquifer areas of Mpaco and Mutuzi that are in operation and their total production capacity is 4560 m^3/day (May 2013). Water produced is distributed with no treatment other than chlorination, typical for groundwater.

Accordingly, the total production capacity of the whole system (main and secondary) amounts to 11,760 m^3/day (7200+4560). Water from both Mpaco and Mutuzi aquifers are mixed with the main system. It is noted that water from the secondary system will continue to be distributed to the Nacala Porto area only.

The project component for the secondary system regarding capacity expansion of Mpaco and Mutuzi aquifers that was initially planned under MCA finance has been modified with financing from WB. Accordingly, the total production capacity from both of these aquifers will be developed to their maximum total safe yield capacity of about 16,000 m^3/day (15,600 m^3/day to be exact) in the short-term term as the immediate water supply development for Nacala (to supply water to the current service area of Nacala Porto).

As of May 2013, 4 additional boreholes have already been completed in Mpaco resulting in a total

of 6 boreholes (along with the 2 operational ones with total production capacity of 2,160 m^3/day) and the corresponding total production capacity of this aquifer has been increased to its maximum potential yield of about 8,400 m^3/day.

Similarly for Mutuzi, 4 additional boreholes have already been completed resulting in a total of 6 boreholes (along with the 2 operational ones with a total production capacity of 2400 m^3/day) with total maximum potential yield of about 7,200 m^3/day.

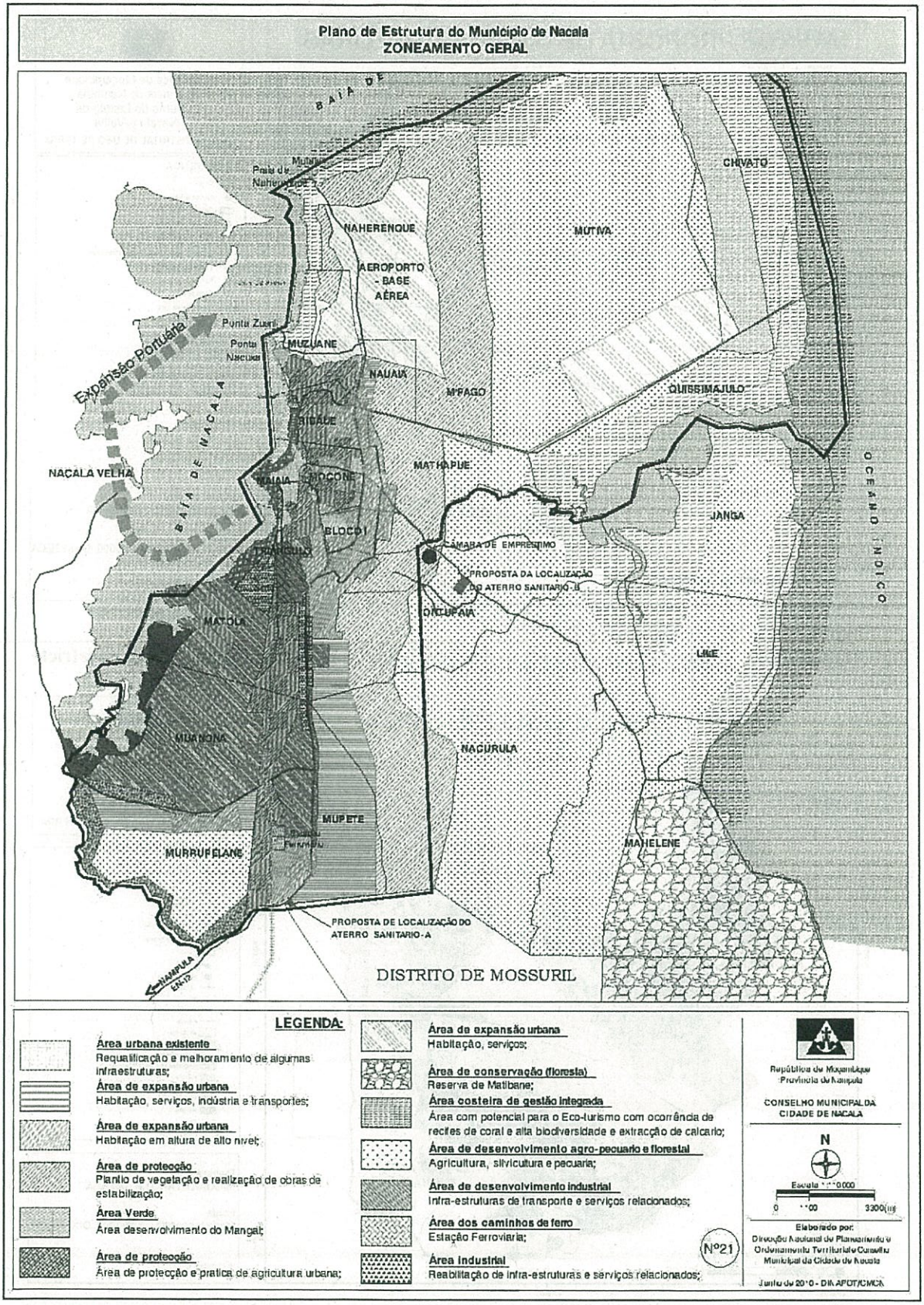
Not all of these 8 additional new boreholes drilled in Mpaco and Mutizi are currently operational since the required submersible pumps are yet to be received for installation. Even when all wells become operational, the production capacity of the Mutuzi well-field will be limited to operation of only 4 boreholes (with 2 boreholes as stand-by) with a total production capacity of only 4,800 m^3/day due to the capacity limitation in the Mutuzi water transmission mains. As such, the total operational production capacity when all 10 boreholes are in operation (6 in Mpaco and 4 in

In both local governments in the Nacala SEZ, spatial plans were prepared and approved in 2010. However, these were prepared separately with different guidelines as the status of the local governments is different.

Being a district, the newly formulated spatial plan of Nacala-a-Velha is the Land Use Plan which is basically aimed for use in rural localities. Thus, it is widely pointed out that the effectiveness of the plan might be quite limited for the rapid urbanization expected to take place in Nacala-a-Velha. There is a need to formulate a more detailed spatial plan which can be usable to guide the urbanization with more specific designation of land use.

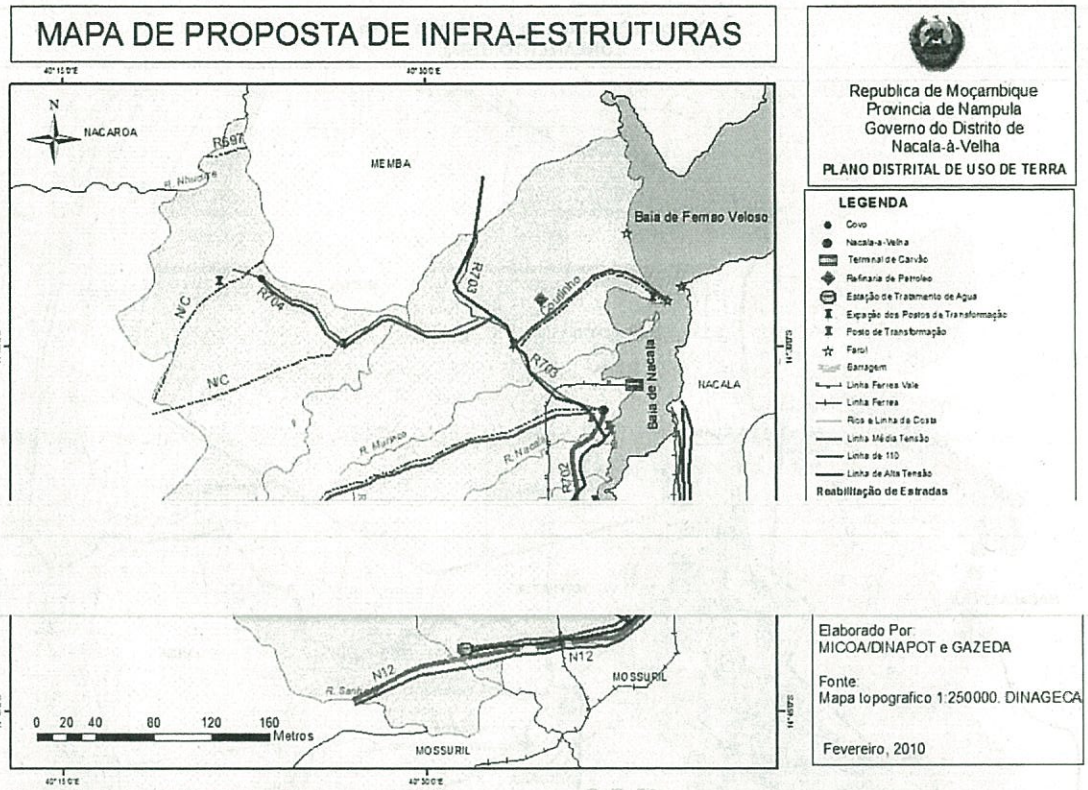
The spatial plan recently prepared for Nacala Porto Municipality has a certain level of detailed information, as it is formulated as a Structure Plan. The plan, however, may need to be modified as the concept of the Industrial Free Zone was still at an immature stage when the Structure Plan was formulated.

- Based on these facts mentioned above, there is a strong request from the local governments to formulate a structure plan for the entire SEZ, combining the territories of the two local administrations. This idea is fully supported by GAZEDA, as well as MICOA and other central government agencies. In the formulation of the Structure Plan, the following issues need to be taken into consideration:
- Identification of the future regional economic structure, which will necessarily be affected by the starting of operation of the coal industry, as well as various transport infrastructure including the airport, railway, and sea port,
- Restructuring of the transportation network to be suitable to the new composition of major transport facilities including the port, railway and airport,
- Identification of the sites of the Industrial Free Zone equipped with reliable strategies for realisation as well as more detailed consideration for identification of the most promising types of industry, and
- Identification of residential space to be promoted, as well as improvement of unplanned areas.



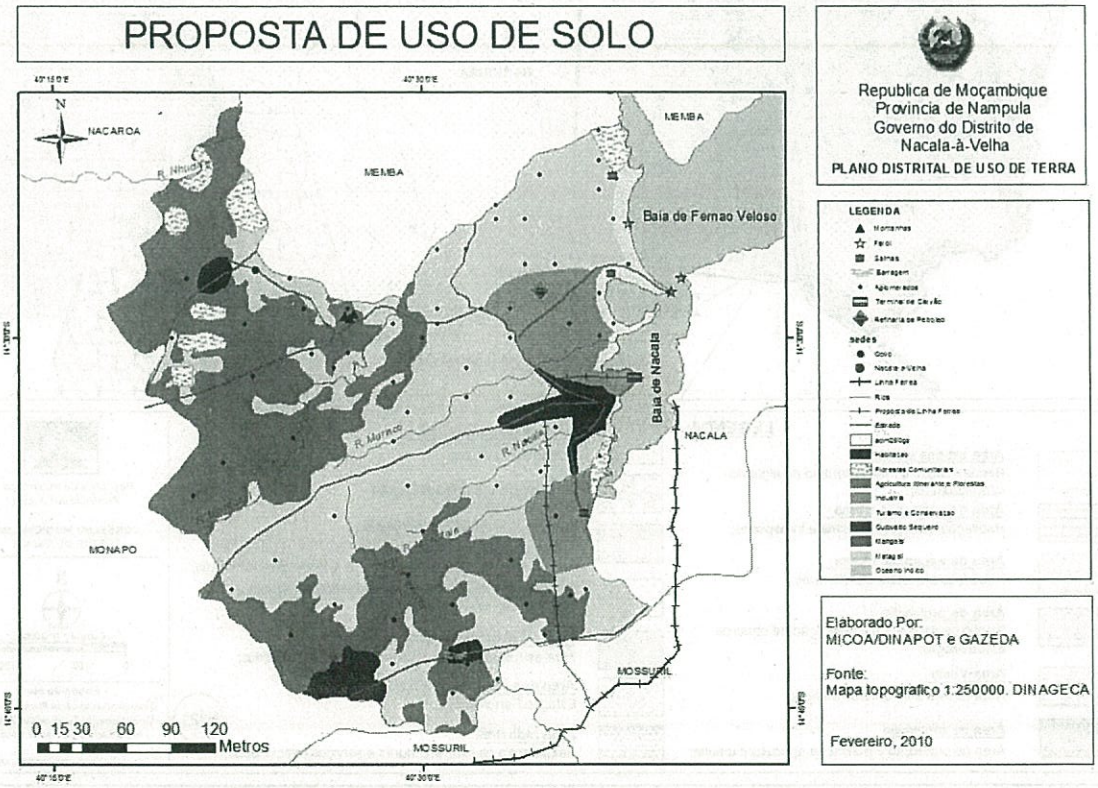
Source: Nacala Porto Municipality, 2010

Figure 6.2.2 General Zoning Plan of the New Structure Plan for Nacala Porto Municipality



Source: Nacala a Velha District Government, 2010

Figure 6.2.3 Future Infrastructures in the New Land Use Plan for Nacala-a-Velha District



Source: Nacala-a-Velha District Government, 2010

Figure 6.2.4 Future Land Use Zoning in the New Land Use Plan for Nacala-a-Velha District

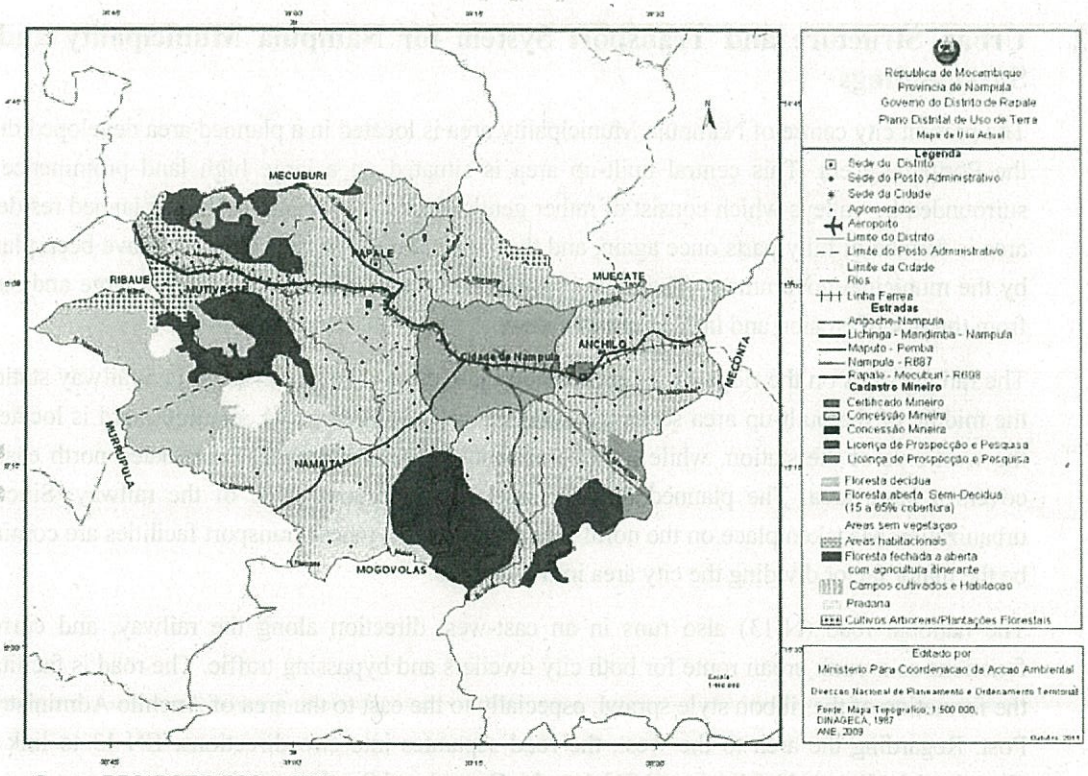
6.3 Nampula Municipality and Surroundings

6.3.1 Present Situation in Nampula Municipality and its Surroundings

Nampula is the capital city of Nampula Province, and is considered as a centre of the northern region. The Nampula urban area is the third largest in the country in terms of population and extension of infrastructure. The territory of Numpula Municipality is completely surrounded by the district of Nampula/Rapale, which has its headquarters in Rapale. The city is located along the railway line from Nacala to Malawi and the road link with the Provinces of Zambézia and Cabo Delgado.

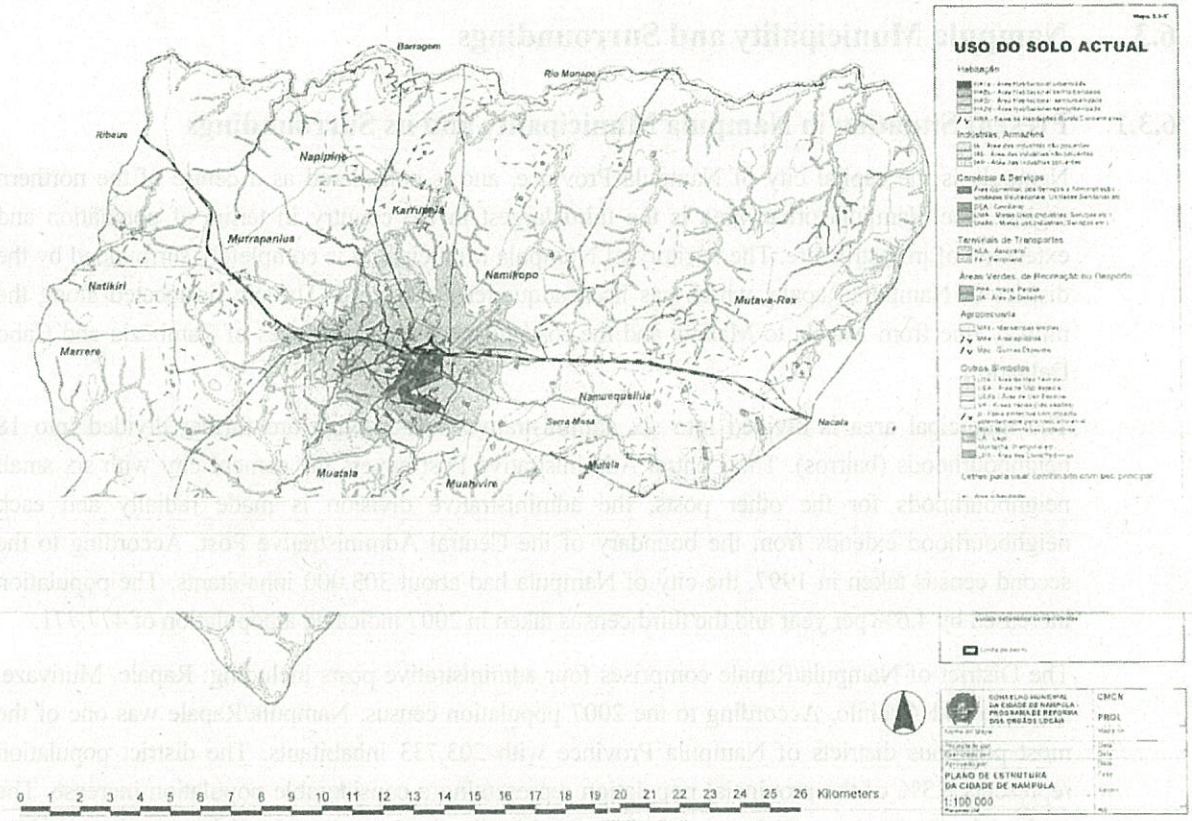
The municipal area is divided into six administrative posts, which are further divided into 18 neighbourhoods (bairros). The Central Administrative Post covers the cement city with six small neighbourhoods for the other posts, the administrative division is made radially and each neighbourhood extends from the boundary of the Central Administrative Post. According to the second census taken in 1997, the city of Nampula had about 303,000 inhabitants. The population increased by 4.6% per year and the third census taken in 2007 indicated a population of 477,771.

The District of Nampula/Rapale comprises four administrative posts including: Rapale, Mutivaze, Namaita and Anchilo. According to the 2007 population census, Nampula/Rapale was one of the most populous districts of Nampula Province with 203,733 inhabitants. The district population represents 8.3% of the provincial population representing a considerable population increase. The territorial distribution of the population in the district is rather irregular as the Anchilo administrative post had 75,543 inhabitants, corresponding to 59% of the population of the district.



Source: DINAPOT, MICOA, 2011

Figure 6.3.1 Current Land Use of Nampula-Rapale District



Source: MCA, CENACARTA

Figure 6.3.2 Current Land Use of Nampula Municipality

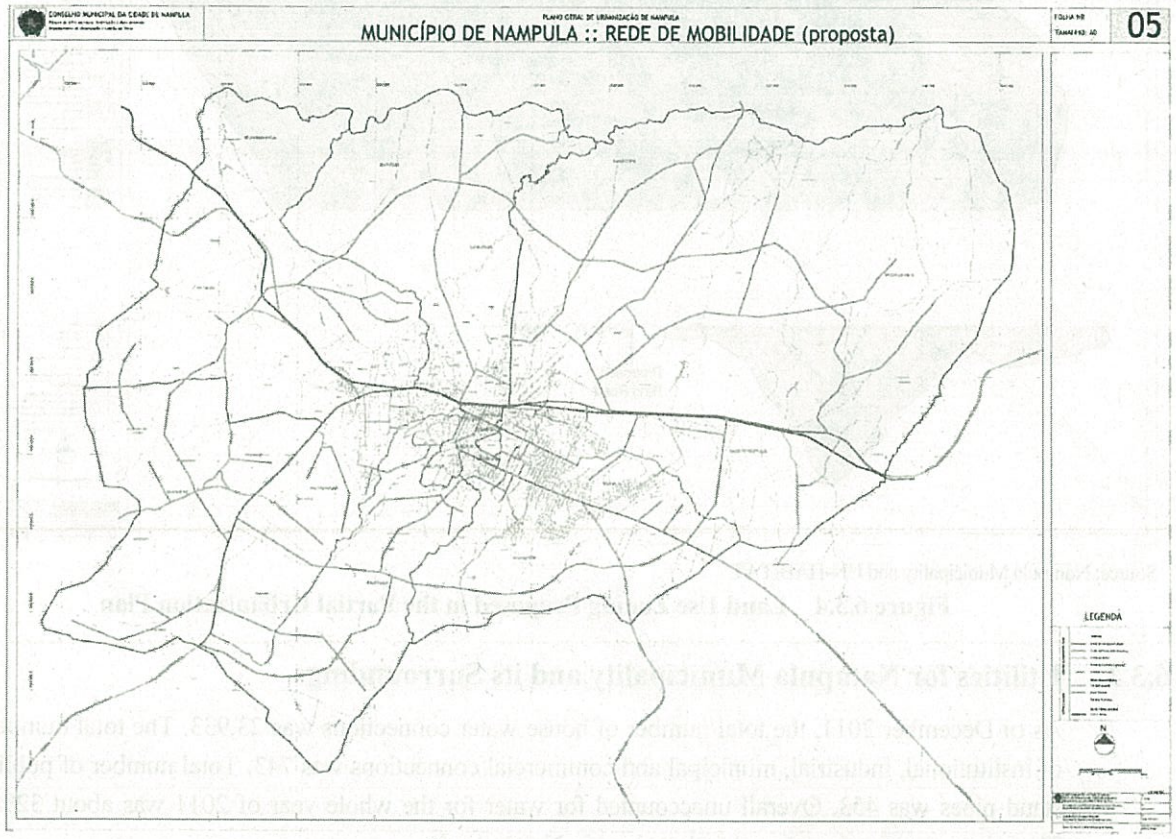
6.3.2 Urban Structure and Transport System for Nampula Municipality and its Surroundings

The present city centre of Nampula Municipality area is located in a planned area developed during the Portuguese era. This central built-up area is situated on a large high land prominence and surrounded by valleys which consist of rather gentle slopes. The fringe of the unplanned residential area is formed of hilly parts once again, and thus several housing developments have been planned by the municipal government. The area of unplanned settlements is significantly large and suffers from the risk of erosion and lack of infrastructures.

The railway runs on the ridge of the hill forming the city of Nampula. There is a railway station in the middle of the built-up area serving passengers as well as cargo. A shunting yard is located on the west side of the station, while the international airport of Nampula is situated north east and covers a large area. The planned built-up area is on the south side of the railway. Since the urbanization has taken place on the north side of the railway, these transport facilities are coming to be the major factor dividing the city area into two areas.

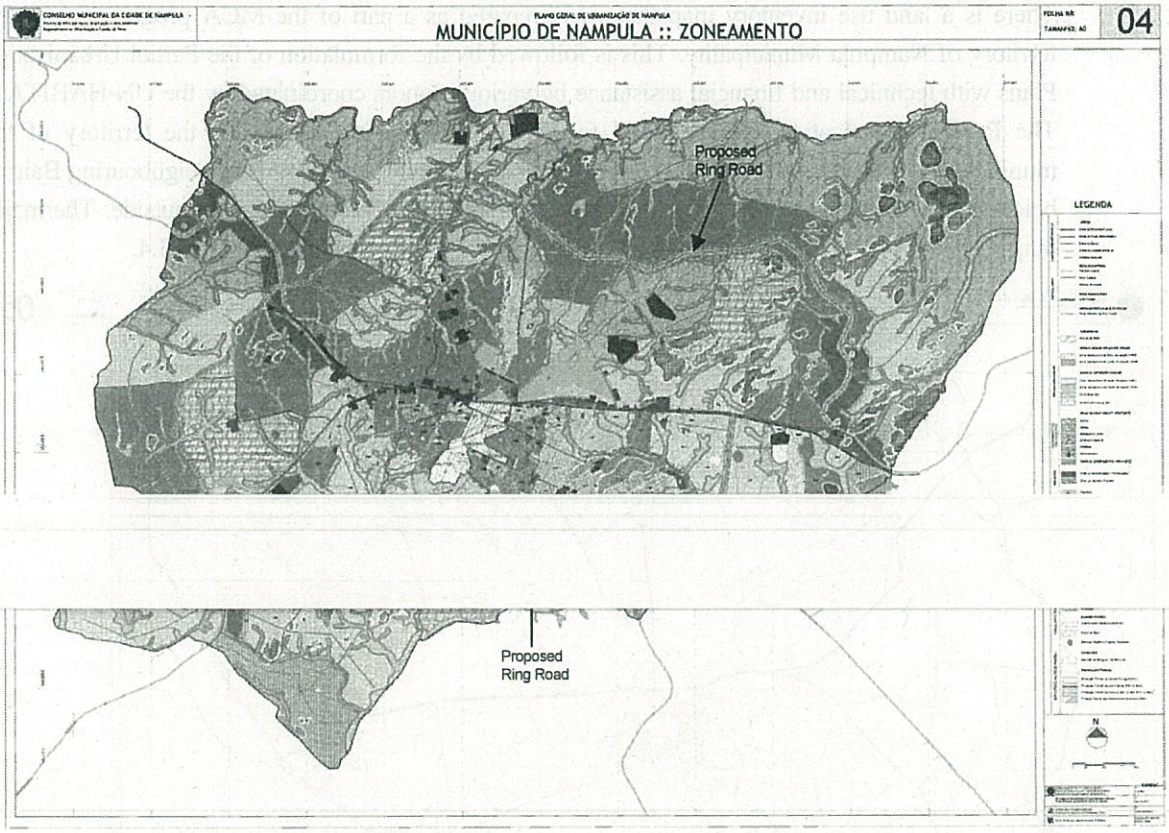
The national road (N-13) also runs in an east-west direction along the railway, and currently functions as a trunk urban route for both city dwellers and bypassing traffic. The road is facilitating the formation of the ribbon style sprawl, especially to the east to the area of Anchilo Administrative Post. Regarding the area to the west, the road separates into two directions: EN-13 to link with Cuamba, Liching, and Malawi, and EN-1 to the Central and Southern regions.

There is a land use inventory map that was prepared as a part of the MCA programme for the territory of Nampula Municipality. This is followed by the formulation of the Partial Urbanization Plans with technical and financial assistance by various donors coordinated by the UN-HABITAT. The Partial Urbanizations are prepared for five areas covering almost all the territory of the municipality except for the central city part. The programme also covered the neighbouring Bairros belonging to Nampula District along the three national roads stretching to the outside. The major outputs of the Partial Urbanization Plan are presented in Figure 6.3.3 and Figure 6.3.4.



Source: Nampula Municipality and UN-HABITAT

Figure 6.3.3 Transport Network Proposed in Partial Urbanization Plan



Source: Nampula Municipality and UN-HABITAT

Figure 6.3.4 Land Use Zoning Proposed in the Partial Urbanization Plan

6.3.3 Utilities for Nampula Municipality and its Surroundings

As of December 2011, the total number of house water connections was 23,933. The total number of institutional, industrial, municipal and commercial connections was 743. Total number of public stand pipes was 453. Overall unaccounted for water for the whole year of 2011 was about 32%. There is no sewerage system developed yet in Nampula city.

Monapo Dam, built in 1959 along Monapo River located about 9km north of the city, is the sole water source for the Nampula Water Supply System. Live storage of the dam was estimated at 3.3 million m^3 (MCA F/S on water supply with target year 2029 dated 2010). The existing capacity of the system is 20,000 m^3/day that is supposed to become doubled to 40,000 m^3/day with the completion of the construction works for the water supply system upgrade and expansion (MCA) in early 2014. However, it turns out that this construction work does not enables the Monapo Dam to reserve an enough volume of water for supplying 40,000 m^3/day. Therefore, the construction of a small weir on the Meluli River and taking water from the Meluli River for providing to the reservoir of the Monapo Dm is required. This additional work will be conducted by the support of WASIS II Additional Package.

Water abstracted from the dam is treated with a conventional water treatment process that consists of chemical addition, rapid mixing, coagulation, flocculation, sedimentation and rapid sand filtration. Treated water is pumped to the city through two 400mm nominal diameter transmission mains (one is an old asbestos cement pipe line and the other is a relatively new PVC pipe line) and

distributed via two distribution centres; one serving the city centre area and the other the airport area.

The total length of the water distribution network is about 450 km and has expanded very rapidly since 2009, which resulted in achieving a service coverage ratio of 68% in 2011. Moreover, under the ongoing WASIS Project (WB) the distribution network will be expanded further to a total length of about 510 km by 2014. The primary areas targeted for expansion of the water distribution network are the two new residential development areas of Muhala and Muahivire.

Still, due to the capacity limitation, water supply service time is currently limited to 10 hr/day. It is further reported that there is very high demand for water supply service connections from residents. This is the reason behind progressing the expansion of the water distribution network even with the limitation in production capacity that resulted in rationing of water with limited service hours. The distribution network provides 3 types of residential service levels, house connections, yard tap connections, and public stand pipes (fountains/fontenários).

There is no significant groundwater aquifer area in Nampula. Accordingly, as the future water source, Monte Tiza Dam on the Meluli River, at least for the medium term, is contemplated by DNA.

6.3.4 Planning Issues for Nampula Municipality and its Surroundings

Being the capital city of Nampula Province, the city of Nampula has attracted economic investment in the commercial and manufacturing industries. This will continue to be so as the city has the third largest population in the country, and thus, will attract consumer oriented services and industries. In addition to the city's already strong economic base, overall economic activities will inevitably be stimulated by the start of full-scale operation of the Nacala Corridor. This will lead to the further expansion and integration of the Nampula economy to the surrounding areas, not limited to the neighbouring road-side communities, but also to the rural communities.

It is pointed out by the representatives of the local administration that there is a need for preparation of a Structure Plan for the city, which covers areas adjacent to the municipal boundary. It has already been identified in the course of the formulation of the Partial Urbanization Plans that at least three neighbouring towns along the national road are under the strong influence of the urbanization of Nampula Municipality Area.

As shown in Figure 6.3.4, a ring road is proposed in the partial urbanization plan and widely accepted among the stakeholders in and around the city. On the other hand, there has been no discussion on the significance of the traffic load on the existing railway which is running across the city dividing the major built-up areas of the city. The major planning issue in the formulation of the Structure Plan for the wider Nampula area will be the realignment of the railway which matches the proposed ring road.

6.4 Cuamba Municipality

6.4.1 Present Situation in Cuamba Municipality

Cuamba is located at the junction of the railways from Nampula Nacala to the east with the one to Lichinga to the north-west and the other to Malawi to the south-west. The national roads also follow the railway, thus making the city strategically important.

The urbanization of Cuamba has been generally calm until now but it is expected to experience a drastic change soon after the completion of the road improvement project between Cuamba and Nampula. The start of operation of the coal industry will also affect the shape of urbanization as the traffic movements will dramatically increase.

There is a Structure Plan that was prepared to serve until 2008, which is still in effect as the revision

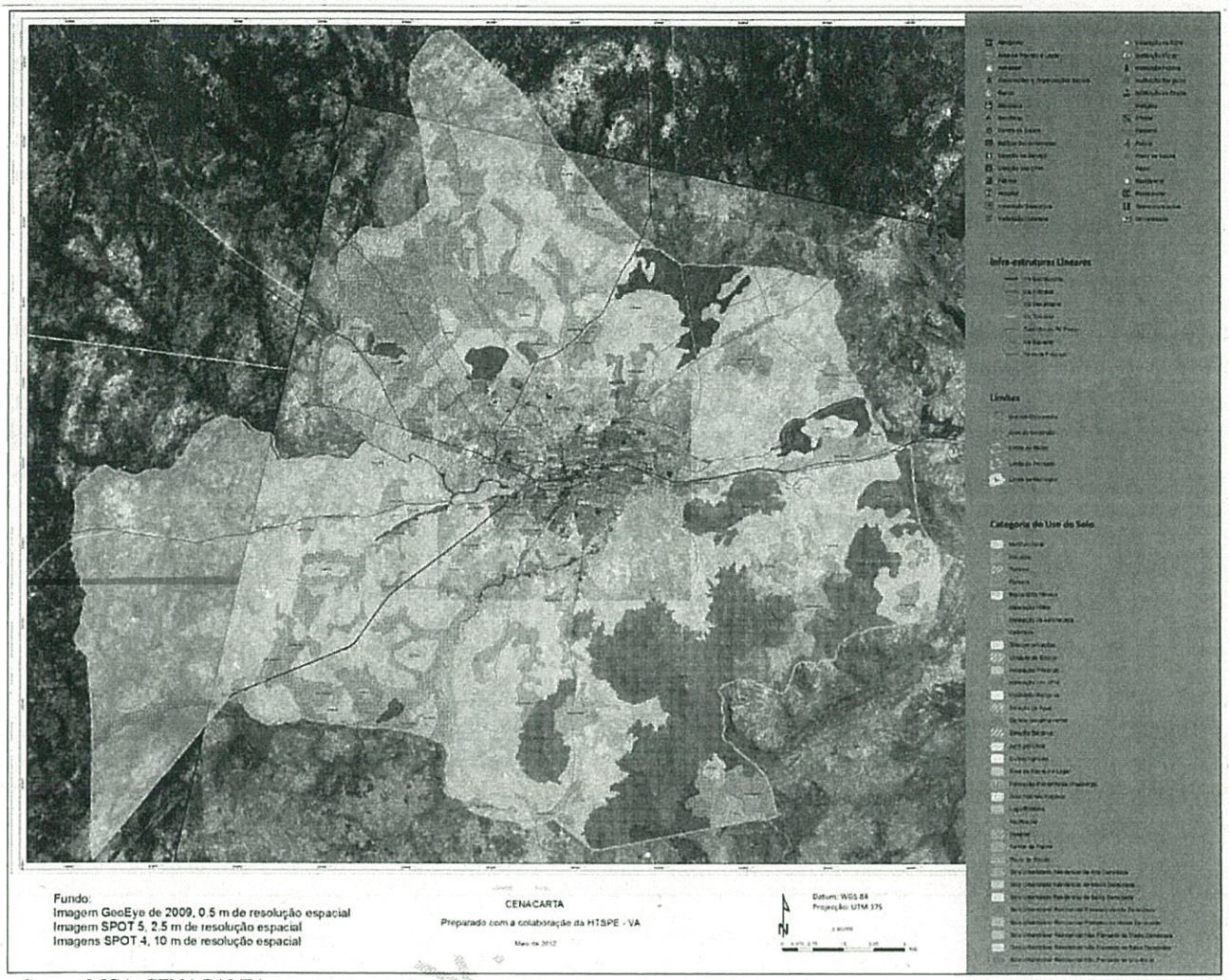
the Land Inventory Map.

6.4.2 Urban Structure and Transport System for Cuamba Municipality

The city area is divided into the north side and the south side by the national road together with the railway. The city centre is located in the planned area on the north side. There is an airport located on the south side where density is lower than the north side built-up area. Despite the low density, the south side is mostly covered by private land occupation. The overall conditions of the south area are not ideal for housing use as it is located close to a swamp area. The expansion of the north side has been blocked by the river running in the north. The area beyond the river is mostly vacant with scarce private land occupation.

There is a road connecting to Marrupa branched from the one to Lichinga shortly after passing the built-up area to the north-west. This road will form a part of the Lichinga-Marrupa-Cuamba triangle, which has a large potential for agricultural development.

There are several unplanned settlements along these main roads, but they are not yet contiguous with the main urban area of Cuamba.



Source: MCA, CENACALTA

Figure 6.4.1 Cuamba Land Inventory Map with Satellite Images

6.4.3 Utilities for Cuamba Municipality

The current water supply service coverage in Cuamba is low at only 18% with a service time of about 6 hr/day, which is lower than the case for both Nampula (coverage 68% with 10-hr/day service time) and Nacala (coverage 50% with 15-hr/day service time). As of November 2012 the total number of domestic connections was 1397. The total number of institutional, industrial, municipal and commercial connections was 71. Total number of public stand pipes was 21. Overall unaccounted for water was 37%. There is no sewerage system developed in the city yet.

The current source of water in Cuamba is Mepopole River. Water is sourced from a weir intake located on the river and by the side of the hydroelectric power plant. There is also the Mepeope Dam located high up in the mountains in the upstream river reaches of this weir intake that was constructed for the hydro-electric power plant. This hydroelectric power plant is practically no longer operational except in case of emergency power requirement. This weir intake source is located about 30 km from the city and at an elevation of about 85m above the elevation of the city facilitating a gravity transmission main.

This water source at Mepopole dam has adequate capacity to meet the short-term water demand

with some improvement works and such improvements are already planned in the just completed D/D (detailed engineering design) tendered (May 3013) for start of construction by 2014. The period of construction of the short-term improvement project is planned as 18 months. The maximum available capacity of this existing water source (Mepopole Dam) was determined to be about 8,000 m^3/day according to the D/D. No particular project component for distribution system expansion is included in the tendered project for construction.

6.4.4 Planning Issues for Cuamba Municipality

The urbanization of Cuamba has been rather calm. However, it is highly expected that the city of Cuamba will face rapid urbanization led by the business and services investment once the road improvement work between Cuamba and Nampula completes. There are many factors that attract investments in Cuamba as it is located in a strategic location. The city is a centre of farming areas with high productivity, which will become an important source of food for the cities of both the

likely to change to a distribution and processing centre for the region.

6.5 Other Major Urban Centres

6.5.1 Lichinga Municipality

Lichinga Municipality is the capital of Niassa Province, which is located 50 km from the eastern shore of Niassa Lake. The urban area is on a high land with an altitude between 1,000 m and 1,400m. The annual temperature is 23℃ and the maximum annual temperature is 26℃, a comparatively cool climate in Mozambique.

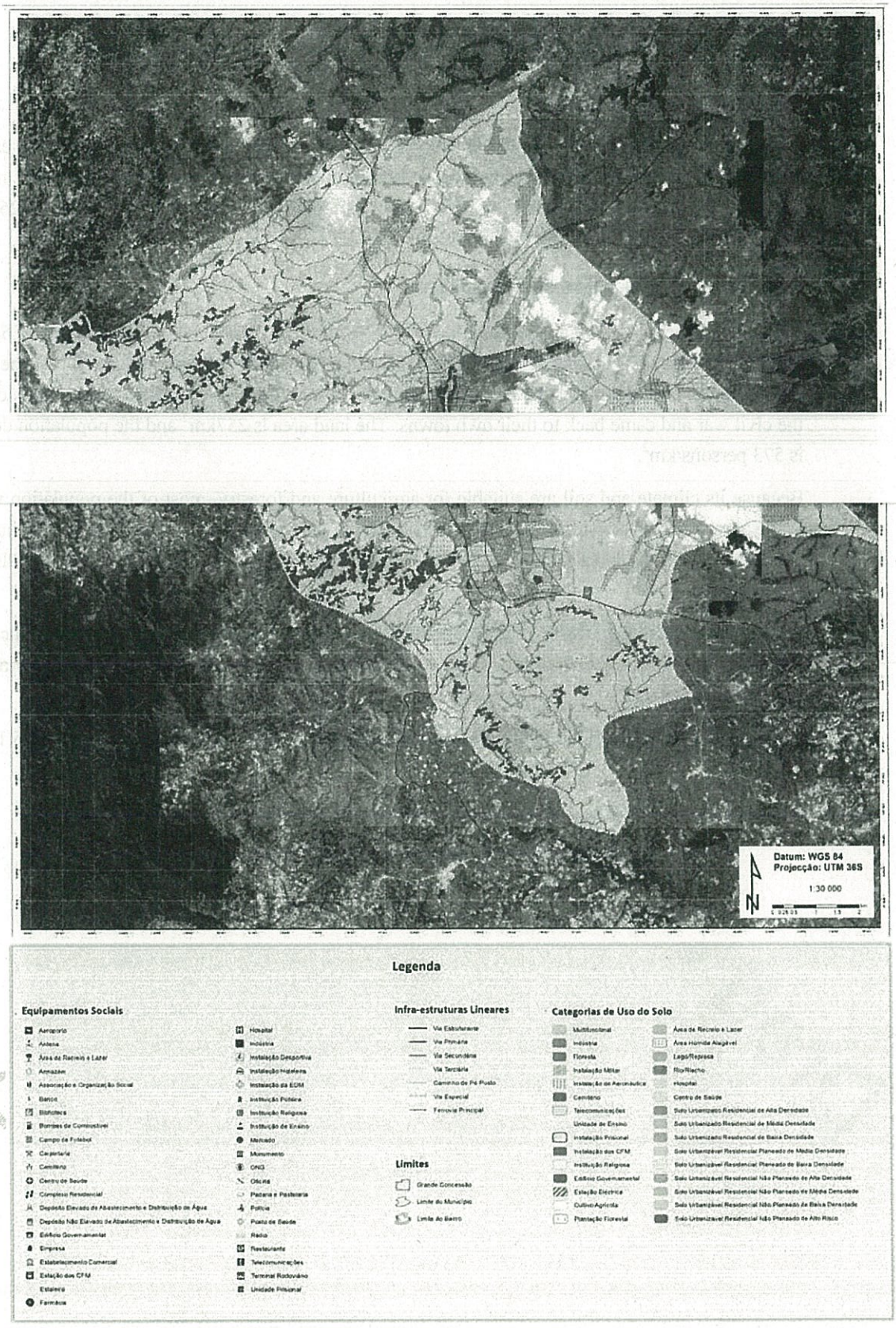
(1) General Situation in Lichinga Municipality

Lichinga Municipality had a population of 142,331 as of 2007; it has a rapid growth rate of 6.60 % annually (average, 1997-2007). Although the population growth rate was moderate up to the early 1990's, it became rapid after the end of the civil war. Many people had escaped and hidden during the civil war and came back to their own towns. The land area is 257km^2 and the population density is 573 persons/km^2.

Because its climate and soil are suitable for agriculture and forestry, most of the population works in the agro-forestry industry (cultivating corn, beans, potatoes, vegetables, livestock, and plantation). The agro-processing industry is not developed yet because of lack of fertilisers, farming skills, and facilities.

Niassa Lake and Niassa Reserve have a potential for tourism development in Niassa Province, but the industry is still underdeveloped. The city administration has plans to develop an industrial area north of the airport.

MCA developed an Inventory and Land Use Map from 2009 to 2013, as shown in Figure 6.5.1.



Source: MCA, 2013, "Report on Inventory and Land Use Map"

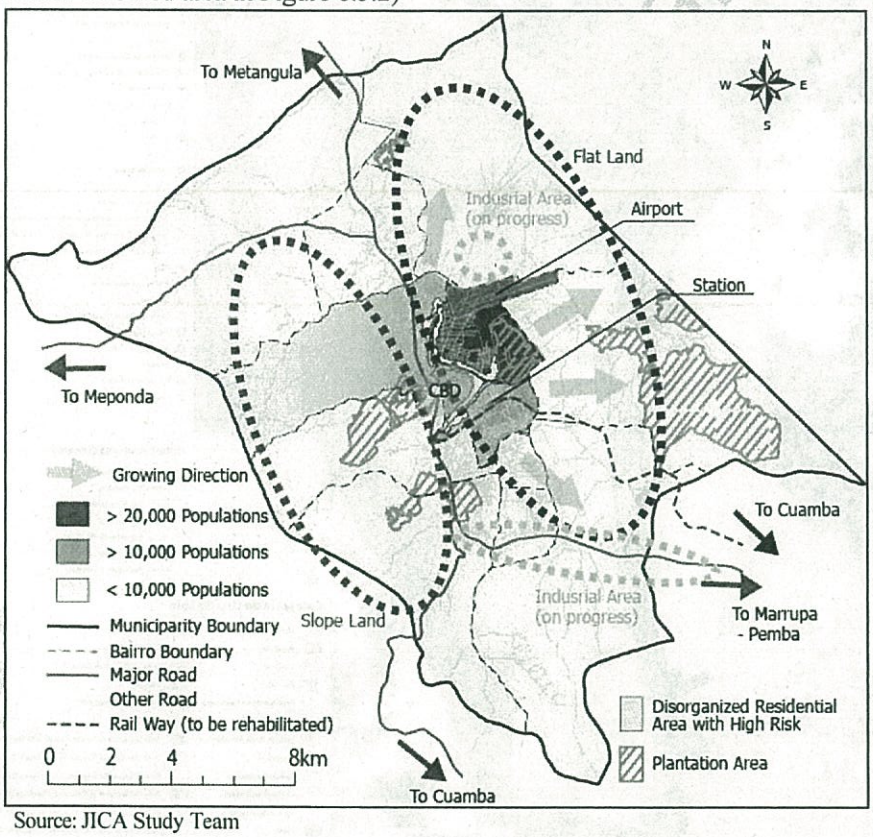
Figure 6.5.1 Inventory and Land Use Map in Lichinga

(2) Urban Structure and Planning Issues for Lichinga Municipality

Lichinga is an inland city on a hill, and its west side is on a slope, on the other hand, the east side is flat. Two provincial roads pass through the city area and almost all houses and buildings are located along these roads. There is a railway to be rehabilitated by concession of Vale in the near future. There are many unplanned houses around the railway station. The residential area may grow toward the east if there is an area with secondary road network.

The Issues and problems regarding urban development are summarized as follows:

- The current growth of population is much faster than experienced in this decade
- There is no revised structure plan to cope with the current urbanization pace
- The road network and railway network are not well organized for the growing transportation demand
- The industrial base has not been developed but has potential for hotels and services for tourism and processing for agriculture and forestry products
- There is a disorganized residential area with high risk in the lower areas around the city centre (Yellow coloured area in Figure 6.5.2)



Source: JICA Study Team

Figure 6.5.2 Current Basic Urban Structure of Lichinga

6.5.2 Pemba Municipality

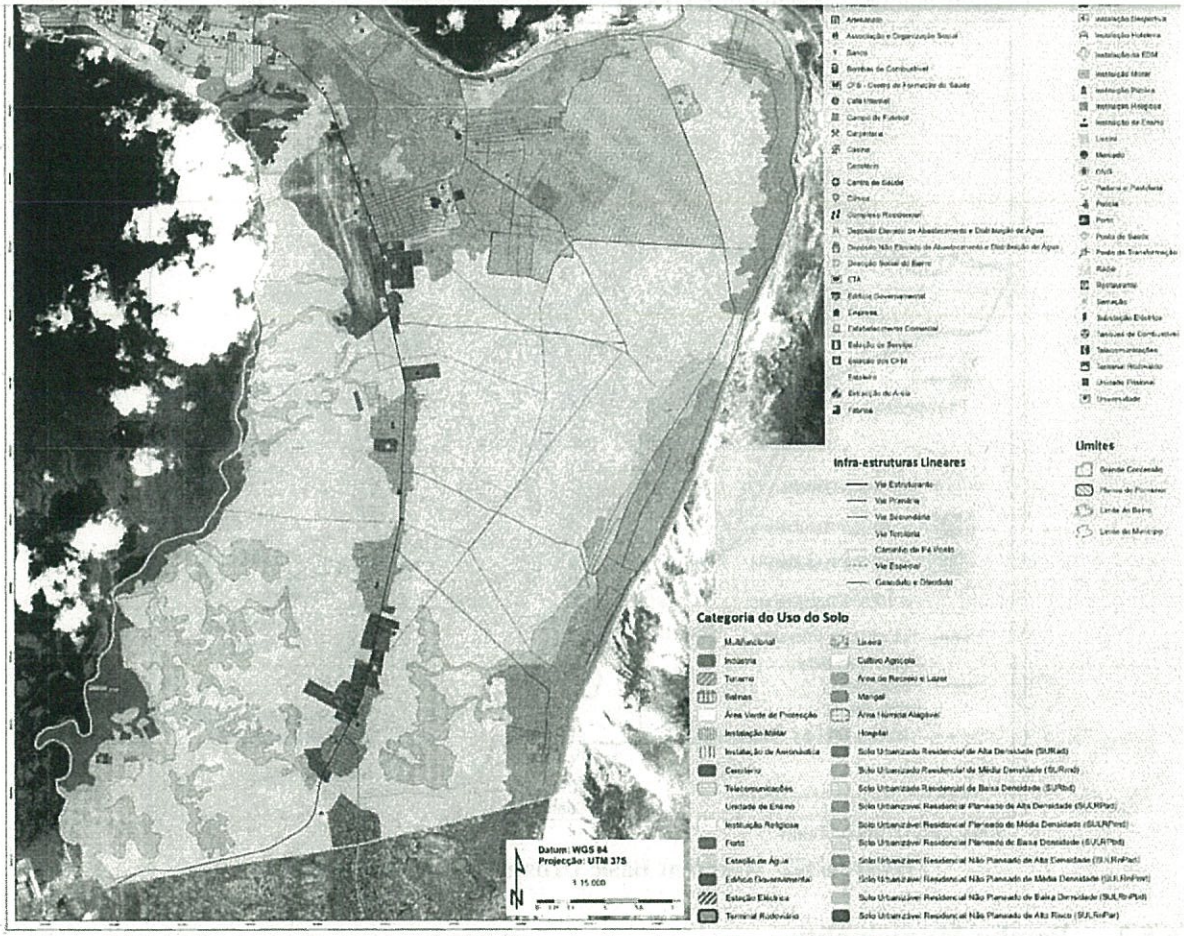
(1) Present Situation in Pemba Municipality

Pemba Municipality is the capital of Cabo Delgado Province, located at the entrance of Pemba Bay. The population of the municipality was 138,716 in 2007 with an average annual growth rate of

6.34 % between 1997 and 2007. The main economic activities are fishery, tourism, and agriculture. The rural families produce cassava and corn for self-consumption, and sell at the local market when the crops are more than sufficient for their families. Fishing is also for self-consumption. The shipbuilding and cashew processing are growing as manufacturing industries. Residents have some sources of income from activities of small-scale commercial production sold in informal markets. These goods are mostly imported from Senegal, Malawi and other African countries. It is important to mention that they produce and sell the famous Makonde sculptures (black wood).

The tourism industry is currently in good shape, and some tourism facilities have been developed on the north and south-eastern coasts. Arco-Norte has a plan to develop a tourism complex in the south-eastern part of Pemba (see the section regarding the tourism sector).

MCA has developed an Inventory and Land Use Map from 2009 to 2013, as shown in Figure 6.5.3.



Source: MCA (millennium challenge account), 2013, "Report on Inventory and Land Use Map"

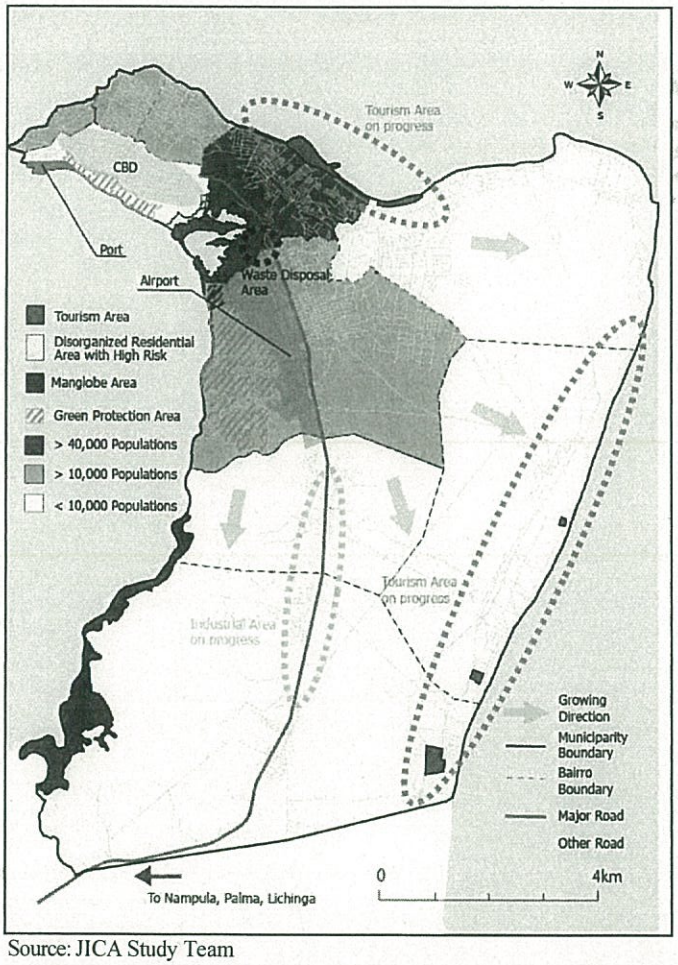
Figure 6.5.3 Inventory and Land Use Map for Pemba

(2) Urban Structure and Transport System for Pemba Municipality

The current basic urban structure is illustrated in Figure 6.5.4. Pemba fronts onto the Indian Ocean

to the North, East, and West, and thus, the residential area may extend toward the south. The sea port of Pemba is one of the main points connecting the cities to the outside world. There is insufficient flat space behind the port. The airport has become an international airport. There is a limitation on expansion because it is blocked by the slope. There is a plan to construct a new airport near the southern part of Pemba bay (25km from the city) to attract more international visitors.

Regarding the land access to the municipality, there is a road connecting with the national road network, which runs in a north to south direction through the peninsula. The city centre has a well-structured paved road network. In other areas, however, roads are not paved and have sandy layers, which are in poor condition in the rainy season.



Source: JICA Study Team

Figure 6.5.4 Current Basic Urban Structure of Pemba

Chapter 7 Existing Conditions of the Environment

7.1 Present Situations of the Environment

7.1.1 Forest Reserves and Deforestation

According to the FAO, 49.6% or about 39,022,000 ha of Mozambique are forested and, among those, 62,000 ha are classified as planted forest. Following are major forest-related statistical data of Mozambique (as of 2010).

According to this statistical data, it can be said that the nation-wide forest cover is almost 50 %, but it is on a gradual decline. It is noted that no primary forest exists in Mozambique. Also it is noted that Mozambique is home to at least 5,692 species of vascular plants, of which 3.8% are endemic, and 4.2% of Mozambique is protected under IUCN categories I-V.

Deforestation is a serious problem in Mozambique, which is mainly caused by fuel wood collection shifting agriculture, forest fires, timber exports, and lack of land use plans. Fuel wood consumption is estimated to be 250 times the amount extracted by logging operations. Though commercial logging is reported to be less than 25% of the legally permitted capacity, it is expected to be under-estimated. Major environmental impacts caused by deforestation can be: land degradation, exacerbated flooding, coastal erosion (mostly from loss of mangroves) and sedimentation.

Although the Forest Reserve Network of Mozambique was established for production of timber in the late 1950s, its objectives are already outdated. The current Forest Reserve Network offers a platform for establishing a forest conservation network to protect the biological diversity of the forest ecosystem.

7.1.2 Degradation of Marine and Coastal Resources

Major challenges in this field are coastal erosion, loss of mangroves, and declines in the marine resources including fish. Significant bottlenecks for sustainable fisheries are reported to be as follows: fishing by unlicensed operators, encroachment by industrial fishing vessels into inshore areas for semi-industrial and artisanal fishers, insufficient recording and reporting of catches, difficulties in controlling and monitoring the artisanal fisheries, and shortage of human resources and infrastructure for enforcement of fisheries laws and regulations. In addition, tankers which carry crude oils are reported to be causing sea contamination.

7.1.3 Land Degradation

The land degradation, especially of agricultural soil, due to soil erosion and desertification is a major problem in Mozambique. Poor land use practices such as burning the fields for land clearance for cultivation and other purposes are said to be the main cause for land degradation. Forest fire is a

serious issue with approximately 40% of the country affected each year; whereas the effect in the northern, western and central parts of Mozambique are the most serious with 74% of these areas burned annually.

7.1.4 Inadequate Management of Water Resources, Water Pollution and Sanitation

Mozambique has abundant surface water resources. However, since the distribution is uneven, regional cooperation is necessary. Although the resources are abundant, the major challenges of the country are to provide adequate water for agricultural and industrial use. In addition, water pollution can be a problem in certain areas because of industrial and agricultural activities, sewage and waste which is mostly discharged without treatment. Artisanal mining is recognized to cause large-scale erosion and silting in some areas. In urban settings, agricultural sewage treatment is not sufficient, exposing people to potential outbreaks of disease.

declined during the civil war. Many areas in the country have outstanding ecosystems, and they should be treated with attention while the county develops. Within the Nacala Corridor Region, degradation of the ecosystem stands out in Nampula.

In the rural areas of Mozambique, people depend on wood for fuel. Mangroves are being removed and changed into rice farms or housing land. Offshore, corals are threatened by destructive fishing practices.

7.1.6 Air Pollution (indoor and outdoor air pollution)

Indoor air pollution is mostly caused by wood fuels, and it affects especially women and children working indoors. In some areas, outdoor air pollution is occurring due to mining activities (dust, SO_2, lead, arsenic and other smelter gas substances).

7.1.7 Chemical Load

Releases of chemicals and heavy metals are caused by industrial and artisanal mining activities and agricultural activities with chemicals and fertilizers, which are mainly commercial. Rivers are the main pathways for these chemicals to reach the coastal environment. Water samples collected in Monapo River tested positive for various pesticide residues, including DDT, lindane, and hexachlorobenzene.

7.1.8 Illegal and Unsustainable Wildlife Use, and Human Wildlife Conflict

In Mozambique, the loss of habitat is causing humans and wildlife to share smaller living spaces more than ever. Both sides are losing in the conflicts, such as in and around the Delta of the Zambezi River, where crocodiles and hippos are frequently coming face to face with humans, while poaching and other illegal activities put wild species in danger. There are also concerns that the current extent of resources use may not be sustainable, and harvest of, for example, fish and other resources is already diminishing (such as sand oysters in Quirimbas National Park), which will lead to decline of local people's income.

7.1.9 Desertification due to Drought and Land Clearing Practices

The causes of drought and desertification are both natural and anthropogenic. The natural causes are climate driven, deriving from reduction of precipitation or change in the precipitation regime. The anthropogenic (or human) causes are excessive use of soil for agriculture, over-grazing, bush fires, fire wood collection, charcoal production and industrial forestry. Poverty of communities can cause the excessive dependence on the land resources, leading to expansion of human-caused factors.

7.1.10 Agriculture

Small-scale farmers' extensive farming practices and charcoal making for cash income cause deforestation. Furthermore, such deforestation causes sedimentation of rivers that flow into the sea, degrading sea grasses and coral reefs.

7.1.11 Disaster Risks

Mozambique is regularly affected by tropical cyclones, drought and other disasters every year. Rural people and natural resources there are especially vulnerable to disasters such as flood and drought. In addition, the country's long coastline makes the country vulnerable to the change in sea level.

Mozambique's Action Plan for the Reduction of Absolute Poverty (APRAP 2006-2009) has identified natural disaster management as a cross cutting objective of poverty reduction in the country. The government's action plan for reducing the impact of disasters includes various means for risk reduction, such as advance warning systems for floods and cyclones. Table below summarizes the overview of the natural disaster events that have occurred during the past 30 years in Mozambique.

In the Nacala Corridor Region, Cyclone "Nadia" struck Nacala in March 1994 with maximum waves as high as over 6 m, and it damaged the berth walls of Nacala Port due to a ship's surging caused by the waves.

Table 7.1.1 Overview of Natural Disasters in Mozambique (1980 -2010)

No. of events:	75
No. of casualties:	104,840
Average killed per year:	3,382
No. of people affected:	23,317,164
Average affected per year:	752,167
Economic Damage (US$ X 1,000):	802,650
Economic Damage per year (US$ X 1,000):	25,892

Source: UNISDR (http://www.preventionweb.net/english/countries/statistics), 2014

7.2 Institutional Framework for the Environment

7.2.1 Administrative Structures of the Ministry for Coordination of Environmental Affairs (MICOA)

In the early 1990s, many policies and laws concerning environmental protection and natural resource management were recognized as outdated. Since the creation of the National Environmental Commission (NEC) in 1990, environmental issues began to attract higher attention. In order to ensure sustainability in the country's economic growth, Ministério para a Coordenação da Acção Ambiental (MICOA, the "Ministry for Coordination of Environmental Affairs" in English) was established from the NEC in 1994. Since its establishment, MICOA has developed legal frameworks for environmental management. The figure below shows the organisation structure of MICOA. In 2012, a new institution, named the "National Agency of Environmental

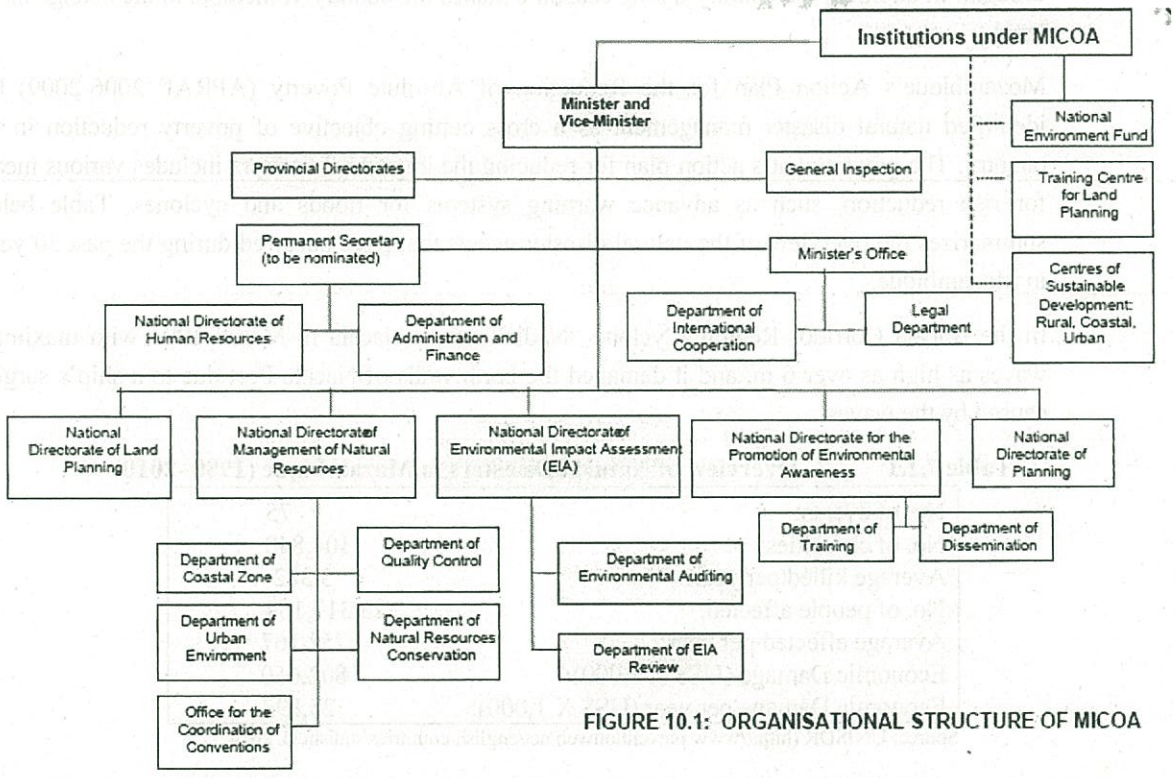
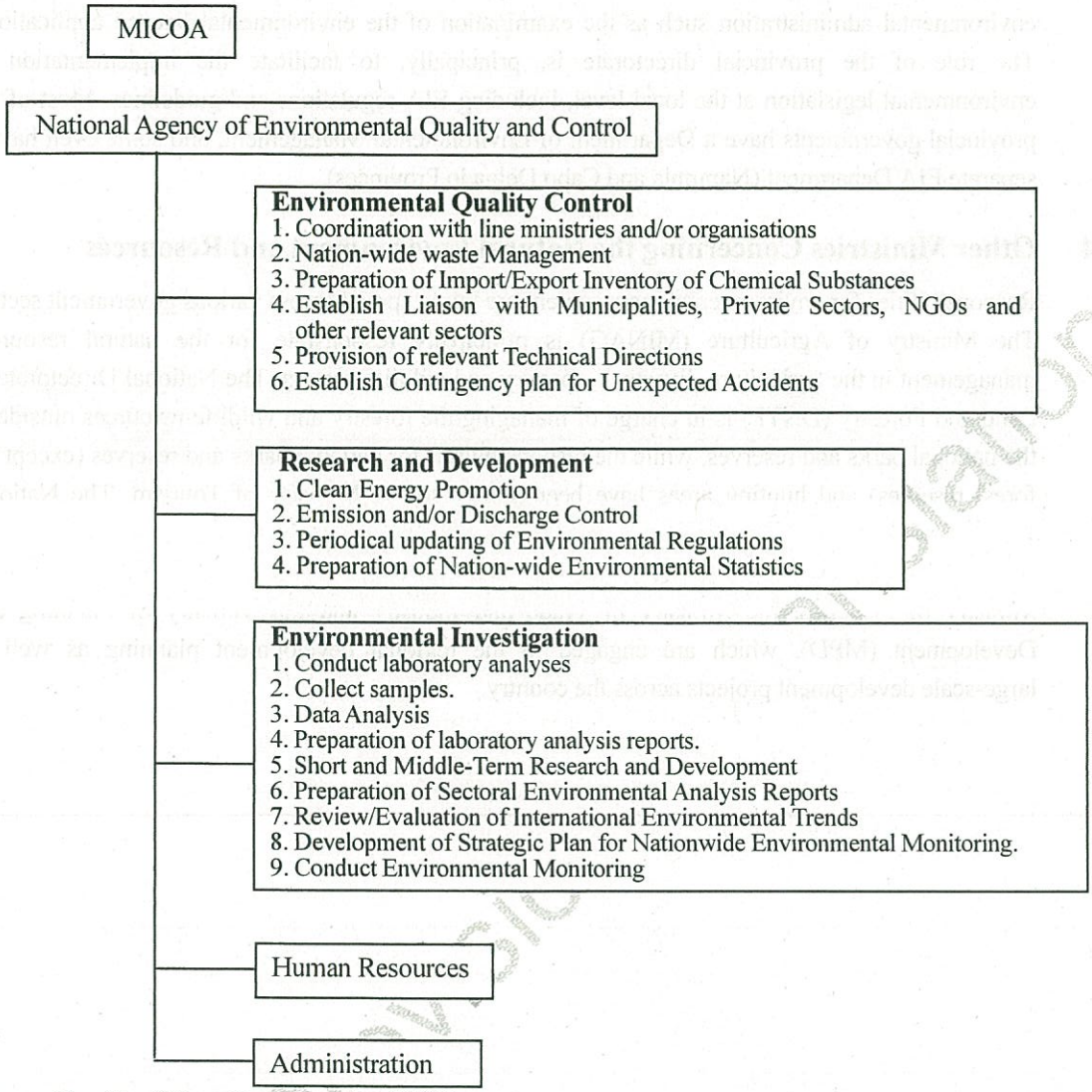


FIGURE 10.1: ORGANISATIONAL STRUCTURE OF MICOA

Source: DBSA (Development Bank of Southern Africa), 2012, Environmental Legislation Handbook, SADC

Figure 7.2.1 Organisation Structure of MICOA



Source: Republic of Mozambique, Resolution#5/2012

Figure 7.2.2 Organisation Chart of National Agency of Environmental Quality and Control

7.2.2 National Commission for Sustainable Development

In addition to MICOA, the National Commission for Sustainable Development is one of the key environmental administrations. This Commission, linked to the Council of Ministers, was created in October 2000 by a provision in the Framework Environmental Act. This Commission seeks to ensure effective co-ordination and the integration of sectoral policies and plans related to environmental management at the highest level.

7.2.3 Administrative Structure of Provincial Directorates

In order to enhance its mandate more effectively, and in line with the Government's decentralization policy, MICOA has been establishing an increasing institutional presence at lower government levels since 1995 and Provincial Directorates for the Co-ordination of Environmental Affairs (DPCAs) have been set up in all ten provinces. Usually, 40 to 50 permanent staff are working at each provincial directorate, and approximately half of them are engaged in substantial

environmental administration such as the examination of the environmental licence applications. The role of the provincial directorate is, principally, to facilitate the implementation of environmental legislation at the local level, including EIA regulations and guidelines. Most of the provincial governments have a Department of Environmental Management, and some even have a separate EIA Department (Nampula and Cabo Delgado Provinces).

7.2.4 Other Ministries Concerning the Natural Environment and Resources

Responsibilities for environmental management are thinly spread across various government sectors. The Ministry of Agriculture (MINAG) is principally responsible for the natural resources management in the agriculture, livestock, forestry and wildlife sectors. The National Directorate of Land and Forestry (DNTF) is in charge of managing the forestry and wildlife resources outside of the national parks and reserves, while the responsibilities for national parks and reserves (except for forest reserves) and hunting areas have been shifted to the Ministry of Tourism. The National Ministry of Fisheries, the Ministry of Trade and Industry and the Ministry of Planning and Development (MPD), which are engaged in the regional development planning as well as large-scale development projects across the country.

7.3 Legal and Policy Frameworks related to the Environment

7.3.1 Legal Frameworks and Policies on the Environment

(1) Constitutional Requirements for Environmental Protection in Mozambique

The Constitution of the Republic of Mozambique address matters on the environment and quality of life in its articles 90, 98, 102 and 117. Article 90, which is part of Chapter V (economic, social and cultural rights and duties) of Title III (fundamental rights, duties and liberties), assure humans the right to live in a balanced environment, and commits "the State and local authorities, in collaboration with other appropriate partners, to adopt policies for the protection of the environment and care for the rational utilisation of all natural resources".

(2) The Framework Environmental Act (Act 20 of 1997)

The Framework Environmental Act provides a legal framework for the use and management of the environment, and aims to assure the sustainable development of the county. Chapter 4 of this Act refers to the 'Prevention of Environmental Damage.' Under this clause, all development projects and/or activities that could potentially cause significant environmental negative impacts shall apply for an environmental licence. The issuance of an environmental licence is determined based on the appropriateness of the EIA report after examination by MICOA. Essentially, all sectoral legislations which deal with environmental management are obliged to be reviewed and revised in order to conform to this Act (Article 32).

Participation of the local communities is assured by this Act in the process of developing policies and laws for natural resource management, management of protected areas, and policing environmental norms and regulations. This Act also addresses the implementation of the strategic environmental assessment (SEA) for all national and/or regional master plan studies. However, no specific law and/or regulation specifying the SEA procedure has been issued yet (MICOA, personal communication, 2012).

(3) EIA Act (Decree 45 of 2004)

The EIA Act defines the framework to manage the environmental effects deriving from developments. All sectoral legislations in Mozambique are required to be revised so that they will conform to the Act. Although EIA regulations follow the internationally accepted processes on paper (screening, scoping, consultation, assessment of impact, review, and monitoring and evaluation), various problems occur in practice, such as inconsistencies in contents and format across ministries and departments involved in environmental management, since roles, responsibilities and methods of cooperation have not been properly defined. Following are the major institutional problems concerning the EIA practices:

- There is a potential conflict of interest, as EIAs are mostly prepared by a consulting firm that was hired by the company which is to conduct the development project.
- Limited human resources and institutional capacity, especially at the provincial level, where many of the responsibilities for environmental management have been transferred.
- Insufficient communication and information sharing between related institutions
- Constraints in terms of planning, operation and human resources for linking environmental

monitoring activities at the provincial level to the national level

- Shortage of technical expertise for evaluating environmental impacts

The problem is that the rate of development is so fast that it produces an increasing number of EIAs and licences to be granted and the capacity of MICOA is not adequate to catch up. It is also reported that the requirements for public participation are not sufficient. In addition, although it is MICOA's obligation to inspect and control project activities on a regular basis, with its current resources its implementation is limited.

(4) Land Law

The Land Act, its Regulations (Decree No. 66 of 1998) and Technical Annex (Ministerial Diploma No. 29-A of 2000) defines the legal framework for land ownership and control, as well as those of natural resources. The Act provides an additional legal basis for allocating areas for protection and conservation (Article 5) and the creation of totally and partially protected zones (Article 6)

In 1997, Policy and Strategies for Management of Wildlife and Forestry were adopted. Specific exploitation of the forest resources is regulated in the Policy of Forests and Wildlife Development Strategies, Forestry and Wildlife Law 10/99 and its Regulation was approved by Decree 12/2002, and its revised version was approved recently. The new law requires private operators for more commitment in their activities with preparation of management plans. Moreover, the new law also defines fines and penalties for illegal logging.

(6) Summary

Legislation and policy making in the field of the environment is of reasonable quality. The Government of Mozambique appears to be aware of the importance of the environment, as well as of natural resources. However, its implementation and follow-up monitoring are weak and uncoordinated.

Currently, the Government of Mozambique is trying to include appropriate environmental and social considerations for development policies and plans at an earlier stage by establishing a Strategic Environmental Assessment (SEA) System.

The coordination, the coherency and consistency between different policies and strategies will become increasingly important when Mozambique begins to embark on massive development initiatives including coal and natural gas extraction. To address this concern, it will be important to establish a proper system and organisation for Strategic Environmental Assessment (SEA).

Also, it is reported that the link between policy statements and budget allocations is weak. Although environmental considerations began to be well integrated within development projects as much as possible, the actual budget allocation to the environment was a small fraction of GDP.

7.3.2 The Environment in National Development Policies/ Plans and Sector Policies

Since adopting the constitution, the Government of Mozambique has produced and adopted a wide range of legal instruments that provide protection for the natural resources as follows:

(1) The Agrarian Policy

The Agricultural Policy and Implementation Strategy (PAEI), approved in 1995, is the umbrella policy for subsectors, which aims to "develop agricultural activity with a view to achieving food security through the diversified production of goods for consumption, provisioning domestic industry and export, based on the sustainable use of natural resources and the guarantee of social equity (mission statement)." Sustainable use of natural resources is taken as one of the means to achieve the objective above, and the Policy argues matters on the decentralization of land use and community-based management of natural resources to achieve sustainable development.

(2) The Land Policy

The National Land Policy was approved in 1995, which became the base for the Land Law in 1997. The objective of this policy was to entrench the rights of the population over the land and other natural resources, while promoting investment and sustainable and equitable use of these resources. The Policy underlines that investments have to be done in a manner that local populations can directly benefit from, and the role of the communities in land and natural resources management are regarded as important means to achieve this.

(3) The Environmental Policy

The National Environmental Policy was approved in 1995 in order to provide an umbrella legal framework for preparation of other national plans and legislations in the environmental sector. The objectives of this policy are: to ensure the sustainability of the functioning and productivity of environmental and natural resources, as well as to ensure consideration of the environment in socioeconomic planning.

(4) The Environment in the Poverty Reduction Action Plan (PARP), 2011 - 2014

The Poverty Reduction Action Plan (PARP) 2011-2014 established the medium-term strategies of the Government, in order to implement the five-year government programme "Programa Quinquenal do Governo para 2010-2014". While the five year government programme aims to reduce poverty, improve social development and foster the key sectors, the PARP is a bit narrower, and focuses on enhancing the productivity of agriculture and fishery, increase employment, and improve human and social development while maintaining a focus on governance, macroeconomic affairs and fiscal management. Improving fishery and land administration, as well as access to markets, are given priorities.

7.3.3 Environmental Sector Plans

(1) National Environmental Management Programme (NEMP), 1995

In its initial period, MICOA formulated the NEMP in 1996 in order to promote and implement sound environmental policy, which is composed of an 'Environmental Policy,' 'Framework Environmental Act,' and 'Environmental Strategies.' Under this programme, MICOA is working on: firstly, the development of inter-sectoral policies in sustainable development, secondly, the development and promotion of integrated planning of resource use, thirdly, the promotion of sector legislation and standards for environmental protection as well as natural resource use, and finally, creation of conditions for the law enforcement and the environmental monitoring.

(2) National Environmental Sector Strategic Plan (2005 – 2015)

NEMP was developed in 1995, and has been revised or updated by MICOA periodically. The latest revision was done in 2004 (strategic plan for 2005-2015). There, several nation-wide policies were developed on the following issues: the management and protection of natural resources, urban environment, atmospheric pollution, and public health. In addition, key principles and guidelines to implement the above plans are described. Although provincial level environmental management strategies must be developed based on these nation-wide strategies, no province-wide strategies have been developed so far.

7.3.4 Pollution Control System

(1) Overall Current Situation

The environmental management is hampered by insufficient institutional capacity for enforcing the environmental monitoring (see the Table below).

Table 7.3.1 Environmental Monitoring and Evaluation Capacity

Elements of monitoring environment	Assessment		
Data gathering capacities	Strong	Fair	Weak
Quality of recent survey information	Strong	Fair	Weak
Statistical tracking capacities	Strong	Fair	Weak
Statistical analysis capacities	Strong	Fair	Weak
Capacity to incorporate statistical analysis into policy, planning and resource allocation mechanisms	Strong	Fair	Weak
Monitoring and evaluation mechanisms	Strong	Fair	Weak

Source: Republic of Mozambique and UNDP, 2005, p. 41.

As of June 2013, no major progress regarding the nation-wide environmental monitoring and control system has been achieved. However, a new department, called the Quality Control Unit, was established within MICOA last year and several preparatory works have been started [MICOA, personal communication, 2013].

(2) Environmental Audit and Inspection for the Pollution Source

Environmental auditing and inspection control are required for all development activities implemented since the enactment of the Environmental Act, whether or not an environmental licence is required. Monitoring mechanisms are generally developed by the EIA Review Department and the Environmental Inspection Department of MICOA, and the sectoral ministries are responsible for monitoring of activities in the implementation phase. However, lack of human resources is a critical bottleneck for implementation.

(3) Environmental Standards

Regulations on standards for environmental quality as well as effluent emissions were published in the Government Bulletin on 2 June 2004 (Decree No 18/2004) in order to control the levels of pollutants, which are to be applied to all new public and private activities. Penalties between 20 million and 200 million MT will be imposed on non-compliance with any standards or failure of reporting.

7.3.5 Nature Conservation System

(1) General Profile

Several sites in Mozambique have rich biodiversity, such as Gorongosa Mountain, the Archipelago of Quirimbas, and the Chimanimani Massif. It is estimated that the country has 685 species of birds, 195 mammals, 228 reptiles, 59 amphibians, and nearly 5,700 species of plants, many of which are endemic.

Mozambique has six categories of protected areas, covering 147,345 km^2, which is 18 per cent of the country's total surface area (see the Table below).

Table 7.3.2 Category of Environmental Reserves in Mozambique

	Category	Number	Area (km^2)	Share of area in the country (%)
1	National Park	6	37,476	4.68
2	National Reserve	6	47,700	5.95
3	Game Controlled Area	2	2,700	0.34
4	Hunting Area	12	50,017	6.24
5	Forest reserves	26	9,452	1.18
6	Zones of use and of historic and cultural value	0	0	0
Total			147,345	18.38

Source: Ministry of Agriculture, 2013, Current Status of Biosafety in Mozambique

The management of protected areas is under the jurisdiction of two government institutions: the Ministry of Tourism for all National Parks, Reserves and Hunting Areas, and the Ministry of Agriculture for Forest Reserves. Protected Areas can also be entitled under the Historical and Cultural Heritage Law (Ministry of Education) and under the Fisheries Law (Marine Reserves).

(2) Environmental Reserves around the Nacala Corridor Region

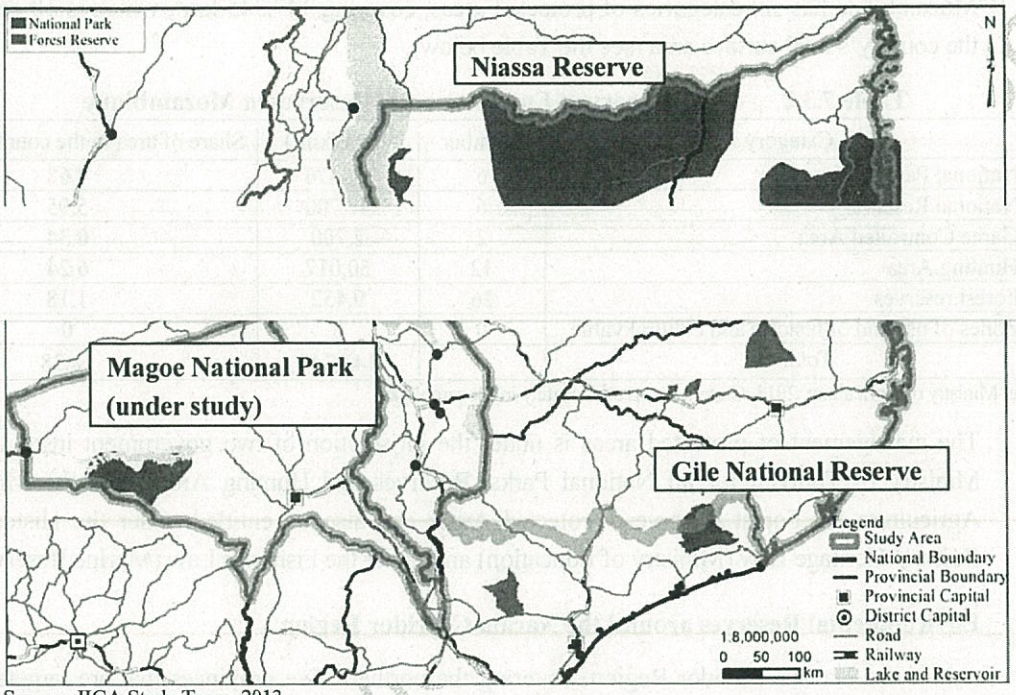
Across the Nacala Corridor Region, covering the northern five provinces that are targeted within this study, there are three environmental reserves (see Table 7.3.3 and Figure 7.3.1). Currently, the registration of a new national park, named "Mágoè National Park", located in Tete Province, is being examined.

Table 7.3.3 Summary of Environmental Reserves around Northern Mozambique

Name	Location & Area (km^2)	Main Features
Niassa Reserve (NR)	Niassa and Cabo Delgado Provinces. A = 42,000 km^2	This is one of the world's major natural reserves and the biggest in Mozambique. NR was proclaimed by Decree # 2884 of 1960, and created in 1964. At present, NR is the conservation area with the widest range of wild species in the country, with the population of elephants estimated at 13,000. NR is part of the Eastern Miombo woodlands, which also cover parts of Tanzania and Malawi, and is one of the largest Miombo woodland preserves in the world, with coverage of half of the area. The remaining area is mostly open savannah with some wetlands and isolated patches of forest. Approximately 95% of the preserve's biomass is vegetation, including 21 types of plants and 191 species of trees and shrubs. NR possesses an African wild dog population of over 350, a sable antelope population of over 12,000, an elephant population of 13,000, over 400 bird species, and large populations of Cape buffalo, impala, wildebeest, zebra and leopards. The area has three endemic species: the Niassa wildebeest, Boehm's zebra, and Johnston's Impala. Recently, a new species of lizard was found in the NR.
Quirimbas National Park (QNP)	Cabo Delgado Province A= 7,506 km^2	This national park covers six provincial central districts and 11 islands in the Archipelago of Quirimbas. It was created in 2002, and has a great potential for ecotourism activities. The region was isolated for decades during the Mozambique civil war. On land, there are populations of elephants, lions, leopards, crocodiles and even wild dog. Habitats include mountains, forests, woodland, savannah, mangroves, beaches, coral reefs and sea grass beds. QNP contains a rich variety of marine life such as sea turtles, dugongs and variety of fish. Three hundred and seventy-five species of fish have been identified, including threatened pipefish and seahorses.

Gilé National Reserve (GNR)	Zambézia Province A = 2,860 km^2	GNR was declared at first as a Partial Game Reserve of Gile in 1932. Major areas of the reserve consist of miombo forest, dambos, reforested savannah and riverine vegetation. The granitic Kopjes exist either inside or around GNR. There are 95 mammal species listed, including elephants, lions, leopards, wild dogs, spotted hyenas (crocutacrocuta), pala-palas, kudos, and impalas. There are also 114 bird species listed.
Mágoè National Park[*1]	Tete Province A = 3,559 km^2	A baseline flora/fauna study is completed already, and currently, the registration of this national park is being conducted in the cabinet, and it will take about one year for its ruling (MITUR, personal communication, 2013).

Source: MICOA(2009) "4th National Report on Implementation of the Convention on Biological Diversity in Mozambique."
*1: MITUR, Personal Communication, 2013



Source : JICA Study Team, 2013

Figure 7.3.1 Location of National Parks and Reserves across the Northern Part of Mozambique

(3) Forest Reserves

Across the Nacala Corridor Region, there are five forest reserves (all five in Nampula Province as in the Table below).

Table 7.3.4 Forest Reserves in the Nacala Corridor Region

	Name	Area (ha)
Nampula		
1	Mecuburi	240,457.56
2	Baixi Pinda	20,263.8
3	Matibane	11,109.85
4	Ribáuè	12,955.93
5	Mupalue	27,575.33

Source: Ministry of Agriculture, 2012

7.3.6 Environmental Impact Assessment System

(1) EIA Procedure

The EIA process is defined in the Regulations on the EIA Process, Decree No 45 of 2004, which

replace those of No 76 of 1998. They are applied to all public and private activities which may have possible environmental impacts. Further, particular regulations can be prepared for projects concerning prospecting, exploration and production of petroleum, natural gas and mineral resources. A list of activities which may require EIA or Simplified Environmental Report (SER) as well as list of sensitive environments are also provided.

Based on Article 15 of the Environmental Law, licensing and registration of activities which may potentially have significant impact on the environment have to be done in accordance with the EIA regulations. Moreover, an Environmental Licence must be issued based on the approved EIA of the concerned project. Importantly, the Environmental Licence is a pre-requisite for any other legal licence or permit.

The activity must start within two years from the date when the Environmental Licence was issued. The licence for an activity will be valid for five years and is renewable for another five years. Applications shall be sent to MICOA, and category A and B projects require a fee of 10,000MT and 5,000MT respectively. The licence will be updated depending on the submission of an updated Environmental Management Plan for Category A and B projects, or a report on environmental performance concerning the items defined in the authorization document for Category C activities. The renewal application must be submitted at least 180 days before the licence expiration.

(2) Environmental Management Plans

Following the approval of the EIA by MICOA with an Environmental Licence for the activity, the investor shall prepare an Environmental Management Plan (EMP), which gives guidelines on how to mitigate the predicted negative impacts, and the investor is responsible for the implementation. Also, it is claimed that more strict regulation is needed to define a company's responsibilities in implementing EMP, including penalties for noncompliance.

(3) Inspection and Audit

According to Article 24 of the EIA Regulations, it is MICOA's responsibility to make regular inspections. If a complexity is seen or it is justified, MICOA can request an environmental audit. Additionally, Category B projects shall provide an EMP to the auditors, which includes at least the items listed in the box below:

a) Impact monitoring schedule clearly indicating the mitigation measures and the accountability and frequency of respective actions of intervention;
b) Environmental education programme; and
c) Accident contingency plan.

However, lack of monitoring capacity of MICOA in terms both of human and material resources is leading to insufficient enforcement of EMP. This causes failure of imposing penalties for possible incompliance of the plan.

7.3.7 Strategic Environmental Assessment System

The Framework Environmental Act (Act 20 of 1997), which provides a legal framework for the use and correct management of the environment and its components in Mozambique, addresses the necessity to implement the strategic environmental assessment (SEA) for all national and/or regional master plan studies. However, no specific law and/or regulation specifying the SEA

procedure have been issued yet (MICOA, personal communication, 2014).

In the last decade, there are the following three case studies on SEA in Mozambique:

- SEA on Selection of Transport Methods for Heavy Sands in Gaza Province, MICOA/DANIDA, 2004 (Gaza Province)
- SEA for National Agricultural Development Programme II, MINAG/IUCN, 2005 (Mozambique)
- SEA for Sustainable Coastal Development Policy in Mozambique, MICAO, 2013 (41 coastal districts)

7.3.8 Carbon Market and Global Warming (CDM and REDD)

(1) Clean Development Mechanism (CDM)

(2) REDD (Reduced Emissions from Deforestation and Degradation)

REDD+, which is to develop financing mechanisms to compensate for developing countries' CO_2 emissions by measures to protect forests, is now encouraging a race for land in the country. A national consultative process was held to prepare REDD+ strategies and to determine the pilot areas. Recently, a Decree is under preparation which will establish the Technical Unit for the REDD+ Technical Group.

7.3.9 Sustainable Development Programme/ Projects

The Poverty Reduction Action Plan (PARP) for 2011-2014 proposes the following government programmes on sustainable development to be implemented. It can be said that intense focus is put on matters of use or management of natural resources at this stage of development, where economic development and resource exploitation occurs, rapidly exceeding the current capacity to manage the natural resources, and latest eco-friendly technologies are not broadly available either.

Table 7.3.5 Proposed Programmes in PARP on Sustainable Development

PARP Objective	Designation of the Government Programme	Objective of the Government Programme
Increase output and productivity in agriculture and fisheries	Management of natural resources for local development	Promote productive and sustainable management of natural resources and the environment
	Forestry	Define and implement a policy for sustainable exploitation of forest resources
	Climate change	Promote environmental quality and policies and strategies for mitigating and adapting to climate change
	Environmental education, communication and dissemination	Promote environmental education and raise the community awareness of the importance of preserving the environment
	Environmental management	Adopt and implement strategies and measures to combat erosion, deforestation, wildfires and pollution, and disseminate good environmental management practices
	Renewable energy and new energy sources	Create the capacity to use new and renewable energy sources in the country, encourage the development of technologies for producing and installing solar, wind and water-powered energy systems

Source: IMF (2011) Poverty Reduction Action Plan (PARP) 2011-2014

7.4 On-going Initiatives and Projects/ Programmes

7.4.1 Poverty and Environment Initiative (PEI)

(1) Outline of the Poverty and Environment Initiative (PEI)

The Government of Mozambique is implementing the Poverty Environment Initiative (PEI) under a joint programme developed by the United Nations Development Program (UNDP) and the United Nations Environment Program (UNEP). The first phase of the PEI (2005-2007) focused on capacity building and training on environmental policy and management in order to incorporate the environment into the national development plans, with a vision to achieve poverty alleviation and sustainable development. The second phase of the PEI succeeded the efforts in the first phase, and its focus was on poverty reduction and environmental mainstreaming into policies, planning and budgeting processes at the national, sectoral and district levels so that the implementation of the Action Plan for the Reduction of Absolute Poverty II (PARPA II) and Environmental Strategies for Sustainable Development can be supported.

(2) Major Achievements and/or Progress of PEI

According to UNDP-UNEP "PEI Annual Progress Report 2010," the following are the major achievements of PEI in Mozambique:

i. PEI supported the reflection group of the National Action Plan for the Reduction of Absolute Poverty (PARPA II) whose task was to define the sector needs to address the environmental issues within PARPA and the Strategic Development Plans at provincial level and to bring together all actors with an interest in mainstreaming in PARPA II. The group was successful in bringing together all actors with an interest in mainstreaming environmental sustainability in PARPA II, which helped the evaluation of PARPA II and oriented the next PARP to have environmental sustainability recognized as a main pillar.

ii. Improved understanding of the environmental mainstreaming status and needs based on a PEI-led study on the mainstreaming of environmental issues into the sectoral economic and social plans. This study identifies a number of recommendations on how agriculture, energy, health, mining, public works, tourism and fisheries sectors can improve environmental mainstreaming. The study was disseminated and these sectors were informed about how to better mainstream the environment into their annual plans.

iii. PEI has been a catalytic activity, embedded in many government processes. It has been able to influence national and district plans and budgets towards a better integration of the environment and poverty reduction through building the capacity of planning officers.

iv. Workshops for governments, civil society and journalists, combined with studies on poverty-environment linkages, have led to an improved understanding of the linkages and improved national capacities for mainstreaming. Training of teachers has also been undertaken to raise awareness of poverty-environment linkages in the national curriculum.

v. PEI has supported the MPD in the preparation and implementation of a unified planning and monitoring instrument (Mainstreaming Matrix) for mainstreaming cross-cutting issues in sector plans at the national and provincial levels.

vi. A greater level of coordination and dialogue have been achieved between the relevant institutions

involved in environmental mainstreaming, such as between MICOA and the sectors.

vii. Strengthened sector capacity for environmental mainstreaming. The Environmental Units are seen as key units to ensure environmental mainstreaming in sector plans. In 2010, PEI supported the exchange of information among the sector environmental units, including giving targeted technical support.

viii. Environment mainstreaming capacities strengthened at district level. Approximately 100 district planners from Cabo Delgado, Gaza and Zambézia have received capacity building and improved their skills for environmental mainstreaming in district development plans.

Source: UNDP-UNEP (2011) PEI Annual Progress Report 2010

7.4.2 Payments for Environmental Services (PES)

(1) Introduction

In 2007, the initiative to support the development of national strategies for sustainable financing for conservation areas was stated in Mozambique. Then, in 2009, the Conservation Policy of Mozambique was adopted which incorporates principles to encourage sustainable financing of conservation areas, including PES.

PES mechanisms vary, and in Mozambique, new approaches to mapping "natural capital" and valuing ecosystem services have been applied.

(2) Bio-Prospecting

Bio-prospecting is the process of discovering potentially beneficial biological substances from a country's traditional medicines. This scheme has attracted the interests of developed countries in finding these substances as well as developing them and patenting them. Yet, this scheme is sometimes termed as "bio-piracy," with disapproval of certain exploitive methods occasionally used by large companies.

A range of laws have been ratified for bio-prospecting: the Convention on Biological Diversity and the Carthage Protocol on Bio-security, as well as relevant national policies (Traditional Medicine 2001) and regulations (Decree N° 19/2007 of 8 August and the Industrial Property Code). MICOA is the responsible authority for the access and benefit sharing (ABS) related to the exploitation of genetic resources, which is currently participating in the ABS Capacity Development Initiative for Africa to support development and implementation of ABS policies. Currently, there are some domestic companies marketing natural products for cosmetics and other uses.

The Ministry of Science and Technology and the Ministry of Health have major responsibilities in formulating bio-prospecting programmes in Mozambique. MITUR plays a role in authorizing the access to conservation areas, drafting regulations on collection of species in conservation areas, and developing commercial bio-protecting partnerships with business and research organisations. A key bottleneck in implementation is the lack of a biodiversity inventory, limited efforts to market the country's rich biodiversity, and inadequate protection for the community rights to the traditional knowledge.

Chapter 8 Existing Conditions of Social Capacity

8.1 Education Sector

8.1.1 Present Conditions on the Education Sector

(1) Present Conditions of Mozambique

1) Organisations in the Education Sector in Mozambique

The Ministry of Education (MINED) is responsible for formulation of education policies, implementation of primary education, secondary education, non-formal and adult education, technical and vocational education (TVE)[1] and tertiary education. There are provincial directorates of education and culture and the district services for education, youth and technology. These entities are responsible for local management of the education system from the opening of primary schools to the placement and management of teachers. On the other hand, the Ministry of Labour (MINTRAB) provides non-formal vocational training through the National Institute for Employment and Vocational Training (INEFP).

2) Education System in Mozambique

The education system in Mozambique consists of primary, secondary, and higher education. Mozambique follows a 7-5-3~ 9 education system (7 years of primary education, 5 or more years of secondary and higher education). Compulsory education is not defined in the law in Mozambique. Since 2005, school fee for primary schools has been eliminated as one of the measures to attain MDGs and EFA.

3) Education Related Indicators

The education sector in Mozambique is highlighted by its low human development index with its rank at 185th out of 187 countries in the world in 2012[2]. The human development index (HDI) is composed of life expectancy, education and GDP index. Regarding the education sector, the low literacy rate of Mozambique, which was 47% in 2010 compared with 76% in sub-Saharan Africa, especially affected the HDI.

[2] UNDP (2013) Human Development Report 2013

Table 8.1.1 Education Related HDI Indicators of Mozambique in 2010

Indicators	Net Enrolment Rate (NER)	Literacy Rate	*Proportion of females to males in primary schools
Mozambique	76.3%	47.4%	95.4%
Sub-Saharan Africa	76.4%	71.9%	85.0%
Developing Countries	88.8%	87.2%	96.0%
Developed Countries	97.0%	-	100.0%

Source: MDG, 2012,Annual Report
*per 100 male students

Almost all of the indicators in the Table below show that both primary and secondary education have expanded. The primary education (EP) gross enrolment rate (GER)[3] is 116.5%, which means that there are some late entry students. Although secondary education has been improving as indicated by the increase of net enrolment rate from 10.5% in 2008 to 14.8% in 2011, its level is still low compared to primary education, for which the net enrolment rate was 74.1% in 2011. Gross enrolment rates show that there are a lot of late entry students. As mentioned in the previous section, primary school formally starts to secondary school.

Table 8.1.2 Number of Students, Teachers and Enrolment Rates

Item	2008	2009	2010	2011	Average Annual Growth Rate (%/year)
Primary Education					
Number of EP students	4,893,456	5,062,014	5,266,352	5,266,661	2.5
EP NER (%)	72.5	74.5	76.3	74.1	-
EP GER (%)	119.7	120.2	121.2	116.5	-
Number of classrooms in primary education	97,187	100,951	104,866	-	3.9
Number of teachers	58,120	62,680	67,707	-	7.9
Secondary Education					
Number of ES students	709,854	812,505	913,201	952,909	10.3
ES NER (%)	10.5	13.1	13.3	14.8	-
ES GER (%)	38.5	42.5	45.2	46.2	-

Source: MINED, Alguns Indicadores sobre Educação; Ensino Primário e Ensino Secundário Geral (2010)

(2) Present Conditions of the Nacala Corridor Region

1) Literacy Rates and Basic Educational Efficiency

Table below presents the major educational indicators of the five provinces related to the Nacala Corridor Region. The literacy rate of the five provinces was as low as 31%, less than half of that of the other provinces at 66%. While there were no significant differences between the five provinces and other provinces in primary school GER and classroom student ratio, there was a gap in teacher student ratio, 81.3% in the five provinces related to the Nacala Corridor Region and 65.2% in other provinces.

[3] Gross enrolment rate (GRE) is the proportion of actually enrolled students regardless of their age against the total number of children who are of their corresponding school ages. Net enrolment rate (NER) is the number of students who are enrolled in their appropriate grade according to their age divided by the total number of children who are of their corresponding school ages.

Table 8.1.3 Literacy Rates and Basic Educational Efficiency

Indicator	Literacy Rate (%) in 2008	Primary School GER (%)		Classroom Student Ratio (%)		Teacher Student Ratio (%)	
		2007	2010	2007	2010	2006	2010
Mozambique	47.2	89.1	93.9	50.1	49.7	72.5	60.4
Five Provinces related to Nacala Corridor Region	31.4	85.8	95.4	51.7	52.2	81.3	67.3
Other Provinces	65.6	91.9	92.7	48.8	47.6	65.2	54.6

Source: JICA Study Team based on MICS, 2008, and Alguns Indicadores sobre educação ensino primário e Ensino Secundário Geral, MINED

8.1.2 Existing Strategic Plans for Education

MINED has the Strategic Plan for Education targeted at 2012-16 which covers pre-primary education, primary education, secondary education, technical and vocational education, higher education and administrative and institutional development. Though the plan sets the highest priority to provide primary education to all the children, it also puts priority on the post-primary education, which contributes to the economic, social and political development of the country.

Table 8.1.4 Development Status in 2016

Sector Programme	General Purpose	Outcome Indicator		Baseline 2011	Goal Year 2016
Pre-Primary Education and Primary Education	To ensure complete primary education	Gross Completion Rate	Total	49%	54%
			Female	45%	51%
Literacy and Adult Education	To increase opportunities for youth and adults	Illiteracy Rate	Total	48.1%	30%
			Female	62.7%	45.0%
Secondary Education	To expand secondary education	Gross Enrolment Rate	Total	46%	50%
			Female	43%	47%
Technical and Vocational Education	To improve vocational and technical education	% of Graduates Absorbed by Labour Market according to their Training Programmes		27%	60%
Higher Education	To promote participation and access to higher education	Number of People with Higher Education by 1,000 Habitants		3	5
Administrative and Institutional Development	To strengthen professional management of education system at various levels	Index of Satisfaction of Population with Quality of Educational Services		n.a.	Satisfactory

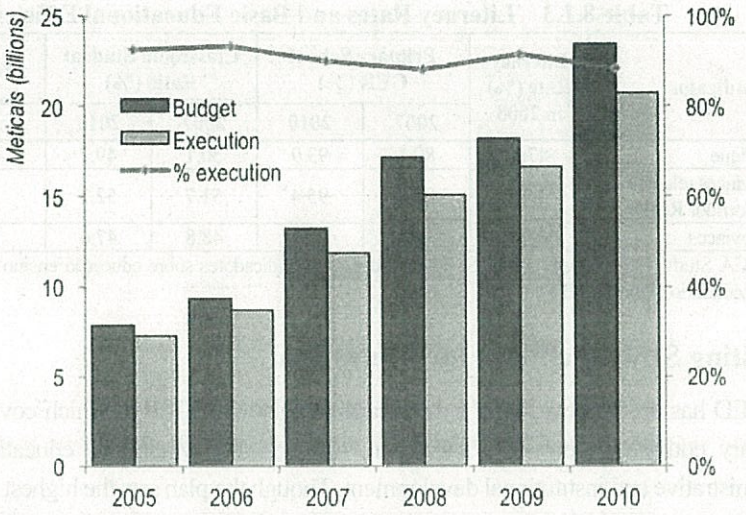
Source: JICA Study Team using data from the Strategic Plan for Education 2012-2016, MINED

8.1.3 Government Efforts and Budgeting to Education Sector

The government of Mozambique gives great importance to the education sector, especially primary education from the perspective of budget and efforts. The sector budget has increased to comprise around 20% of the State budget. As a result, some indicators related to access to school have improved, particularly with respect to the system's expansion and the increased levels of equity in participation.

These government's efforts, however, could not cover all areas. There has been a delay in educational development, peculiarly in the remote areas.

The figure below shows the evolution of the education sector's budget and its actual execution from 2005 to 2010.



8.2 Health Sector

8.2.1 Present Conditions on the Health Sector

(1) Present Conditions of Mozambique

1) Organisations Engaged in Health Service in Mozambique

The Ministry of Health (MISAU) is responsible for the formulation of health policies and implementation of projects. The health care activities in Mozambique are managed at three levels: central, provincial and district. The central level is an orienting organ engaged in political definitions, norms, laws, etc. The Ministry of Health prepares strategic plans for the sector and outlines principal strategies that provide orientation for district and provincial planning.

2) Health System in Mozambique

The Mozambican health system includes public centres and for profit private sector organisations. Of these, the public sector relies on the National Health Services (SNS) as the main service provider on the national scale. SNS is organised in four levels. There are 4 levels in the health system as below.

Table 8.2.1 Health System in Mozambique

Level of Health System	Description
Primary Level	The primary level (I) corresponds to the health sectors with the function of executing strategies on primary health care (CSP). The primary level constitutes the first contact of the population with the health centres. The health centres are responsible for the health of the population as well as the environment; they have to assure sanitary coverage of the population in a geographic zone well defined by the health area.
Secondary Level	The secondary level (II) is composed of district hospitals, rural hospitals and general hospitals and their function is to provide health care as a first-level reference to the patients who could not get to other health centres.
Third Level	The third level (III) is composed of the provincial hospitals and patients are referred there if they could not get all the help that they need from district hospitals or the health centres that are located near the provincial hospital.
Fourth Level	The fourth level (IV) is composed of the central hospitals, and the patients are referred there if they could not get all the help that they need from provincial, district or rural hospitals, as well as for patients who could not get all the help that they need from health centres and are transferred to the general hospital. In this level, there are also specialised hospitals that provide different care. These hospitals can only be created if it is proved to be the best way of providing certain special care excluding psychiatric hospitals.

3) Health-related Indicators

The health sector is still stagnated. The table below shows MDG indicators related to health. The rate of immunization of children is still only 77% although this rate has been increasing. In comparison to the sub-Saharan Africa region, the infant mortality rate and contraceptive prevalence rate are much worse. Of special note, the maternal mortality ratio is quite high as shown in the Table 8.2.2 (500 women died per 100,000 live births). This ratio is far higher than that of developed countries. Other social indicators are among the worst in sub-Saharan Africa. The current situation of disease in Mozambique is dominated by communicable, infectious diseases such as malaria, diarrhoea, tuberculosis, respiratory infections and HIV/AIDS. Mozambique is vulnerable to frequent outbreaks of cholera, dysentery and meningococcal meningitis. These outbreaks are more likely to occur in precarious environments, particularly urban areas, and are caused by over population in towns and cities by people who migrated in search of security. Other important factors are the repeated occurrence of calamities and lack of food security in some areas. Mozambique is one of the countries with the highest HIV incidence rate among sub-Saharan African countries as in the table below. Additionally, there are many tuberculosis cases per 100,000 people

among sub-Saharan African countries.

Table 8.2.2 Health Situation in Mozambique and the World in 2010

Indicators	Mozambique 2008	Sub-Saharan Africa	Developing Countries	Developed Countries
Children at 1 year old immunized against measles	58%	75%	84%	94%
Infant mortality rate/ 1,000 live births	93	121.0	63.0	7.0
Contraceptive prevalence rate	138	25.0%	62.0%	72.0%
Births attended by skilled health personnel	16.2%	45.0%	65.0%	_
Maternal mortality ratio/ 100,000 live births	55%	500	24	16
HIV incidence rates	500	5.0%	7.0%	4.0%
Tuberculosis cases per 100,000 population	58%	276	151	27

Source: UNDP (2012) MDGs Report, MPD (2010) Report on the Millennium Development Goals

The situation in Mozambique is worse than other countries in all the indicators expect births attended by skilled health personnel. Despite the unfavourable health situation in Mozambique compared with other countries, its MDG indicators have shown an improvement in the recent years as shown below.

Infant mortality rate/1,000 live births	158	147	124	100	93	67
Under-five mortality rate/1000 live births	235	219	178	145	138	108
Contraceptive prevalence rate	_	5.1%	17%	11.8%	16.2%	34%
Births attended by skilled health personnel	_	44.2%	47.7%	48%	55%	66%
Maternal mortality ratio/ 100,000 live births	_	1000	408	520	500	250

Source: MPD (2010) Report on the Millennium Development Goals

(2) Present Conditions of the Five Provinces related to the Nacala Corridor Region

1) Health Facilities

According to the table below, there were 673 health facilities in the five provinces related to the Nacala Corridor Region in 2003 including one central hospital in Nampula, four provincial hospitals, one each in Niassa, Cabo Delgado, Tete and Zambézia, two general hospitals in Nampula, 14 rural hospitals and 652 health posts and health centres. This indicates that a large portion of health facilities are health posts and health centres. Generally, only a few health workers work at health posts and health centres.

Table 8.2.4 Number of National Health Service Facilities by Province, 2003

Indicator	Central hospital	Provincial hospital	General hospital	Rural hospital	Health posts and health centres	Total	Hospital beds	Maternity beds
Mozambique	**3**	**7**	**5**	**26**	**1,179**	**1,220**	**16,086**	**4,815**
5 Provinces of Nacala Corridor Region	**1**	**4**	**2**	**14**	**652**	**673**	**7,120**	**2,042**
Niassa	_	*1*	_	*1*	*121*	*123*	*622*	*177*
Cabo Delgado	_	*1*	_	*3*	*85*	*89*	*1,007*	*317*
Nampula	*1*	_	*2*	*3*	*181*	*187*	*2,649*	*681*
Zambézia	_	*1*	_	*4*	*168*	*173*	*1,628*	*509*
Tete	_	*1*	_	*3*	*97*	*101*	*1,214*	*358*
Other Provinces	**2**	**3**	**3**	**12**	**527**	**547**	**8,966**	**2,773**
Manica	_	*1*	_	*1*	*75*	*77*	*1,005*	*315*
Sofala	*1*	_	_	*4*	*141*	*146*	*1,817*	*548*
Inhambane	_	*1*	_	*2*	*91*	*94*	*1,346*	*525*
Gaza	_	*1*	_	*4*	*108*	*113*	*1,321*	*528*
Maputo Province	_	_	*1*	*1*	*76*	*78*	*1,036*	*386*
Maputo City	*1*	_	*2*	_	*36*	*39*	*2,441*	*471*

Source: MISAU (2008) National Plan for Health Human Resource Development

2) Population per Health Worker

Health workers include public health, nursing, obstetrics, technicians for instruments, anaesthesiologists, and surgery and management staff. Population per medical personnel in the Five provinces related to the Nacala Corridor Region is strikingly low; 81,000 persons per doctor, 4,900 persons per nurse and 1,800 persons per health worker. According to WHO recommendations, the ideal standard is 1 doctor for 1,000 patients. Each nurse covers 4,900 people in the five provinces related to the Nacala Corridor Region. This ratio is higher than in other provinces.

Table below shows the shortage of health workers in Mozambique, especially in the five provinces related to the Nacala Corridor Region.

Table 8.2.5 Population per Health Worker by Province, 2007

Province	Population per Health Worker	Population per Doctor	Population per Nurse
Mozambique	**1,600**	**57,400**	**4,500**
5 Provinces of Nacala Corridor Region	**1,800**	**81,000**	**4,900**
Niassa	*1,200*	*78,000*	*4,000*
Cabo Delgado	*1,800*	*70,000*	*5,200*
Nampula	*1,900*	*76,000*	*4,800*
Zambézia	*2,300*	*110,000*	*6,000*
Tete	*1,600*	*70,000*	*4,600*
Other Provinces	**1,400**	**34,000**	**4,200**
Manica	*1,550*	*50,000*	*4,800*
Sofala	*1,250*	*30,000*	*3,600*
Inhambane	*1,550*	*65,000*	*5,500*
Gaza	*1,450*	*28,000*	*4,800*
Maputo province	*1,400*	*30,000*	*5,000*
Maputo city	*1,350*	*2,000*	*1,500*

Source: Estimated values from interviews and National Plan for Health Human Resources Development

3) Maternal Health

The conditions of antenatal care are also less favourable in the five provinces related to the Nacala Corridor Region as indicated by the ratio of the sources of antenatal care service; at 0.9% by a doctor, 33.2% by a nurse, 52.6% by a midwife and the remaining 9.0% by none, while the corresponding percentages in other provinces are 3.9%, 76.6%, 15.8% and 2.8% respectively.

4) Child Health

The infant mortality rate in the five provinces related to the Nacala Corridor Region was 117.7 per 1,000 live births in 2008, while that of other provinces was 81.9. The under-5 mortality rate in the five provinces was 164.3, whereas the rate was 133.6 in other provinces. The situations regarding vaccination and child malnutrition in the five provinces were much worse than in other provinces. 21.1% of the children in the five provinces related to the Nacala Corridor Region suffer from malnutrition, which is about 10% higher than the other provinces.

5) Disease Trend

In the five provinces related to the Nacala Corridor Region and Mozambique as a whole, common causes of death and illness are HIV/AIDS, malaria, tuberculosis, respiratory tract infections and diarrhoeal disease. This section explains the trends of HIV/AIDS, malaria and tuberculosis.

HIV/AIDS

The incidence of HIV has been worsening in the five provinces related to the Nacala Corridor Region. The number of HIV positive people increased from 1,013,000 in 2001 to 1,530,000 in 2009, which relates to 10.3% of the population of 15 to 49 years old in 2001 to 12.2% in 2009. The situation in the five provinces, however, was better than in the other provinces with the proportion of HIV positive people to the total population in the five provinces at 7.5% in 2009, while that in the other provinces was 16.9%. The rate was highest in Zambézia at 12.6% followed by Cabo Delgado (9.4%), Tete (7.0%), Nampula (4.6%) and Niassa (3.7%).

Malaria

Malaria is still one of the main diseases in Mozambique. The prevalence of malaria was still high (47%) in 2009 though the rate has decreased from 52% in 2003. Proper preventive actions such as spraying inside of homes and the use of mosquito nets are still inadequate.

100,000 people in 2009. The proportion of cured cases increased slightly from 81% in 2003 to 82% in 2009.

8.2.2 Existing Development Plans of the Health Sector

(1) Existing Policies and Plans for the Health Sector

A plan for health sector improvement is articulated in the Health Sector Strategic Plan, 2007-2012 (PESS). The National Health Plan is based on the principles of primary health care (PHC), equity and better quality of care. The objectives for the health sector are stipulated in the PESS, 2007-2012.

The objectives of PESS are defined as follows:

- Increased access to health services moving towards universal coverage principles
- Strengthened referral system and continuity of care
- Consolidation of the PHC approach and integrated service delivery
- Improved quality of services delivered at all levels
- Improved functioning and performance of health care facilities at all levels
- Guaranteed adequate and early response to emergencies and epidemics, strengthened community participation
- Promotion of a collaborative approach with other health providers
- Improved inter-sectorial collaboration

8.3 Human Resources Development for Economic Sectors

8.3.1 Present Conditions of Technical Education and Training

(1) Formal Technical Training and Vocational Education (Formal TVE)

The technical and vocational education and training (TVET) system in Mozambique can be classified into three types: (i) formal technical and vocational education, (ii) non-formal vocational training and (iii) informal training. Formal technical and vocational education (TVE) is provided by public or private schools according to the educational system of the Ministry of Education (MINED). The largest provider of TVE is the National Directorate for Primary Education (DINET) of MINED.

There are two levels of TVE, namely, post-primary TVE and higher education.

Post-primary TVE is mainly provided by DINET of MINED. Post-primary TVE is comprised of basic and intermediate levels. Basic level schools admit students who have completed the 2nd cycle of primary education (grade 7), while intermediate level schools admit students that have completed the 1st cycle of secondary education (grade 10) or basic level TVE schools. Durations of the courses of both levels are three years.

Apart from public schools and private schools, there are so-called community schools, which are developed by organisations such as churches and NGOs, but the government (DINET) dispatches teachers to the schools.

The total number of students of all TVE schools attending more than 145 public and private institutes increased from 32,000 in 2004 to 45,000 in 2011. Out of the 45,000 students, 36,000 were students of public institutes.

TVE schools under DINET provide training in agriculture, industry and commercial subjects. There are around 60 courses in the areas of industrial maintenance, agriculture, mining, hotel and hospitality, administration and management, etc.

There are 52 basic level schools in total in Mozambique, including professional schools, and 44 intermediate level schools, including those providing both basic and intermediate level education. Many intermediate level schools (16 out of 44) are concentrated in Maputo city, although each province has at least one intermediate level school. On the other hand, basic level schools are distributed equally among the provinces.

(2) Higher Education

Higher education is under the jurisdiction of the National Directorate of Higher Education (DICES) of the Ministry of Education. There are 42 higher education institutions in total in Mozambique; of these, 18 are public and 24 are private. Among the 18 public schools, 4 are universities, 4 are superior polytechnics, and the remaining 10 are superior institutes, colleges and academies. The main campuses of the universities are located in Maputo (Eduardo Mondlane University), Nampula (Lúrio University), and Beira (Zambeze University). Each of them has branch campuses in surrounding provinces. Pedagogical University has branch campuses in almost all provinces. Two superior polytechnics are located in Tete Province; one is located at Songo, offering courses in electronics and hydraulics, and the other at Tete, offering courses in mining, mineral processing and informatics.

The number of students in higher education increased greatly between 2004 and 2010. The number of students in public institutions increased from 15,113 to 72,636, and those in private institutions increased from 7,143 to 28,726.

(3) Non-Formal Vocational Training Education (Non-Formal VT)

The National Institute for Employment and Vocational Training (INEFP) of the Ministry of Labour (MINTRAB) is the largest provider of non-formal vocational training.

The INEFP have 13 Vocational Training Centres (CFP) in Mozambique. Almost all CFPs are located in the capital cities of the provinces. There are four mobile units providing training in rural areas. INEFP of each province is making an effort to provide training opportunities in rural areas and towns far from the capital city in different ways. Vocational training provided by INEFP focuses more on practical skills development in comparison with the TVE provided by DINET. Durations of training are three or six months for short courses, and twelve months for medium courses. Trainees are awarded professional

(QNQP), and the qualification for level 3–5 (equivalent to 11th and 13th grade graduate) has already been developed according to the QNZP. The INEFP is waiting for the qualifications of level 1 and 2 (equivalent to 7th and 10th grade graduate) since most INEFP courses (almost 80%) are incorporated in these two levels. INEFP is mainly conducting short courses (three months) for those who have completed grade 5–7 of primary education. INEFP is working closely and collaboratively with private companies in conducting training courses. The companies, mostly large foreign companies, send their employees to Vocational Training Centres and INEFP conducts training according to the needs and requests of the companies. The number of trainees has greatly increased, from 8,798 in 2006 to 101,726 in 2009, an increase of about 12 times.

Some large-scale foreign companies and large-scale projects such as Rio Tinto and Empresa Construtora Norberto Odebrecht from Brazil are also conducting non-formal vocational training for their employees.

(4) Government Policies, Strategies and Plans related to Human Resources Development

The government policies specifically focusing on human resources development include the following:

- Strategic Plan for Education and Culture 2006–2010 (ESSP II)
- Education Sector Strategic Plan 2012–2016
- Strategic Plan for Higher Education 2000–2010 (PEES I and PEES II)
- The Strategy for Technical and Vocational Education in Mozambique 2002–2011
- Employment and Vocational Training Strategy 2006–2015

The Education Sector Strategic Plan 2012–2016 stipulates the general objective and strategic objectives as follows:

a. General objective: Improve access, relevance, efficiency, effectiveness and quality of technical and vocational education (TVE), to develop the country
b. Strategic objectives:
    - Increase access and retention in the TVE, paying particular attention to geographical and gender disparities
    - Ensure the quality of TVE and its relevance to the requirements of the labour market (formal

and informal)
- Improve management and coordination systems

The Government of Mozambique designed the Professional Education Reform Programme (REP), a long-term TVET reform programme for the period 2006–2020. The objective of the REP is to improve the quality and responsiveness of the TVET system to labour market needs by providing training delivered in a sustainable, integrated, effective, and suitable manner.

The REP consists of the following three phases: pilot phase 2006–2011, expansion phase 2012–2016 and consolidation phase 2017–2021. PIREP is the pilot phase programme of REP (TVET Reform). It was planned to be implemented from 2006 to 2011, but was extended to 2014. PIREP has the following four components:

- Development of an institutional framework
- Standards-based qualifications and training system
- Quality improvements in TVET Institutions
- Skills development fund (FUNDEC)

Four economic areas were identified for the pilot projects: 1) industrial maintenance, 2) hospitality and tourism, 3) agriculture and agro-business, and 4) administration and management services.

Training institutions selected for the pilot project located in the Study Area, are listed below.

Table 8.3.1 List of Selected Training Institutions for the Pilot Project (only in the Nacala Corridor Region)

Institution	Province	Economic Sector for Provision of Training	Proprietor
Escola Agrária de Lichinga	Niassa	Agro Industry	MINED
Escola Industrial e Comercial de Pemba	Cabo Delgado	Tourism Services Administration and Management	MINED
Escola/instituto Industrial e Comercia13 de Fevereiro	Nampula	Administration and Management Industrial Maintenance	MINED
Vocational Training Centre (INEFP)	Nampula	Industrial Maintenance	MINTRAB
Escola Profissional Dom Bosco	Tete	Industrial Maintenance	Rede Salesiana

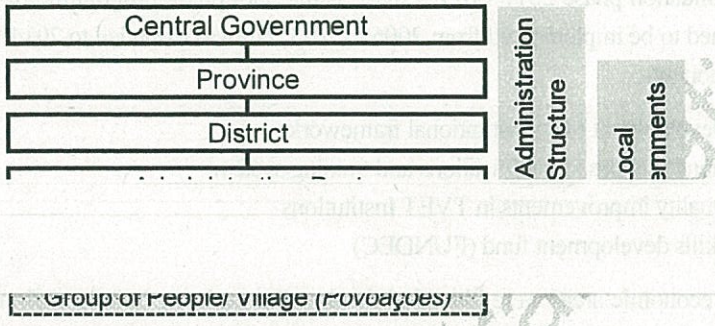
Source: Project Appraisal Document, World Bank

8.4 Institutions and Organisations

8.4.1 Present Conditions of Institutions and Organisations

(1) Government Administration Structure

There are five tiers of the state administration structure in Mozambique: central government, province, district, administration post, and locality.



Source: JICA Study Team based on the Ministry of State Administration

Figure 8.4.1 Government Administration Structure in Mozambique

There is another local government unit called a "municipality." A municipality is regarded as an upgraded unit from one of the administration posts with larger autonomies. Organisational structures are not controlled by the same regulations as for other local governments. While the larger level of autonomy would enable municipalities to provide services matched to local needs, it might create difficulties in coordination among local governments vertically and horizontally.

The head position of each state administration tier is appointed by the central government including a provincial governor as a representative of the central government as shown in the table below. An exception is the case of a municipality. Regarding this structure, the central government might have strong influence and control over the state administration structure.

Table 8.4.1 Key Position of Each Local Government

Unit	Position	Nominated by	Subordinate to	Appointed (or dismissed) by
Province	Provincial Governor	President of Mozambique	President of Mozambique	President of Mozambique
	Provincial Permanent Secretary	Minister of State Administration	Provincial Governor	Prime Minister
	Director of each directorate	Minister of each sector ministry	Provincial Governor	Minister of each sector ministry
	Head of each department	Provincial Director	Provincial Director	Provincial Governor
District	District Administrator	Minister of State Administration	Provincial Governor	Minister of State Administration*1
	Director of each district department	District Administrator	District Administrator	Provincial Governor
Administration Post	Chief of Administration Post	Provincial Governor	District Administrator	Minister of State Administration*1
Locality	Chief of Locality	District Administrator	Chief of Administration Post	Provincial Governor

Municipality	President of municipality	Local people (election)	Local people (election)	Local people (election)
	Municipal Director of each directorate	Municipal Council *2	President of Municipality	President of Municipality

Source: JICA Study Team based on the Ministry of State Administration
Note :
*1 The District Administrators and Chief of Administrative Posts are appointed by the Minister of State Administration under delegation of power from the President of Mozambique
*2 A municipal council composed of a minimum of five and a maximum of 11 councilmen (Vereador) who are responsible to specific area(s) of administrations. All of them are politicians. A Municipal Council helps the President of the Municipality with administration.

The Portuguese colonial rule created a highly centralised state administration system. After the long civil war (1977–1992), the Mozambique government has made an effort to modernise and democratise the state administration structure. Decentralisation was one of these efforts. The main tier of decentralised state administration structures is the district and municipalities.

(2) Coordination Mechanisms for Development

There are mainly two ways of development coordination. One is through the preparation of development plans under the National Planning System. The types of development plans at the central, provincial and district levels as shown below are prepared through coordination.

Table 8.4.2 Development Plans at Central, Provincial and District Levels

Target Period	Central Government	Province	District
Long-term (more than 5 years)	Agenda 2025 *(Agenda 2025)*		
	National Development Strategy *(Estratégia Nacional de Desenvolvimento: ENDE)*[*1]	Provincial Strategic Plan *(Plan Estratégio da Procíncia: PEP)*	
	Millenium Development Goals *(Objectivos de Desenvolvimento do Milénio)*[*2]		
5 years (for each administration)	Government Five Year Programme *(Programa Quinquenal do Governo: PQG)*		
	Poverty Reduction Strategy Paper *(Plano de Acção para Redução da Pobreza: PARP)*		
	Sector Strategies[*3]		
Medium-term (every 3 years)	Mid-term Expenditure Framework *(Cenario Fiscal de Medio Prazo: CFMP)*[*4]	Mid-term Expenditure Framework *(Cenario Fiscal de Medio Prazo: CFMP)*[*4]	Mid-term Expenditure Framework *(Cenario Fiscal de Medio Prazo: CFMP)*[*4]
Short-term (every year)	Economic and Social Plan *(Plano Económico e Social: PES)*	Economic and Social Plan and Budget *(Plano Económico e Social-Orçamento de Provincial)*[*5]	Economic and Social Plan and Budget *(Plano Económico e Social-Orçamento de Provincial)*[*5]

Source: JICA Study Team based on Ministry of State Administration
Note:
*1 National Development Strategy is under preparation as of August 2012.
*2 Millennium Development Goals (MDG) is not a development plan prepared by the government of Mozambique. However the government is following the directions of MDG for the preparation of the development plans of the country.
*3 Each sector ministry prepares sector strategies.
*4 CFMP covers 3 years. It is revised every year for the next 3-year term.
*5 At the province and district levels, usually an 'Economic and Social Plan' and 'Budget' are prepared together in one document.

The other way uses organisational coordination mechanisms such as meetings of stakeholders. The Provincial Forum of Economic Council, for example, is held once a year and all economic and social development issues are discussed with stakeholders including all district administrators and all the

presidents of municipalities in the province. Through this meeting, vertical coordination is attempted. For horizontal coordination, provincial governors have meetings every 15 days and discuss various matters. There are regional meetings called the Regional Forums of Governors that are held in each region.

There exist some coordination mechanisms at national level and provincial level such as follows.

- The Technical Planning Council is joined by all directors of planning of all ministries. The director of the National Directorate of Planning of MPD is the chair. The council is held once a month and discusses various issues in relation to planning.
- The Investment Council is held once a quarterly period. This is a council of all ministers where large investments are discussed.
- The Coordinating Agency for Integrated Development of Nampula (Unidade de Coordenação do Desenvolvimento Integrado de Nampula: UCODIN) manages all issues related to economic and social developments described in the Provincial Development Strategy (PEP) of Nampula Province.

chaired by the provincial governor at the province level. It takes place in response to requests from the people.

8.4.2 Challenges

The following are the challenges for the institution and organisation sector:

- The current administration and MPD have already recognised the necessity of strengthening sector-wide coordination mechanisms. To cope with the situation, the administration and MPD changed the structure of the poverty reduction action plan (PARP) from a sector-oriented approach to purpose-oriented ones. MPD is also working on the preparation of the first National Development Strategy (ENDE or NDS) as an important tool for attracting private investors by showing impacts and benefits of integrated projects. In addition to coordination through a planning process such as this, an organisational mechanism should be created that would provide both vertical and horizontal coordination among organisations of different tiers and of different sectors.
- Nampula Province established UCODIN as a coordination body for the economic and social development activities including planning processes. This is presumably a solution to improve coordination among development actors in different tiers and in different sectors at the provincial level. At the moment, only Nampula Province has such an organisation. The possibility of creating this kind of organisation in other provinces is worth consideration.
- The coordination function with neighbouring countries such as Malawi and Zambia needs to be strengthened as the Nacala Corridor development is embarking upon a new stage of realization. The existing initiatives such as Zambia-Malawi-Mozambique Growth Triangle (ZMM-GT) initiative should be made full use of, overcoming the differences in the development stage and policy priorities among the three countries.

8.5 Social Situation

8.5.1 Introduction

Recently, private investments as well as public investments through foreign official development assistance are seen as engines toward economic development in the target area. The PEDEC Strategies would also bring substantial changes in the society in the region when the plans are actually brought to implementation; realizing better transportation and logistics throughout the large target area, development of urban cities as well as urban industries, incoming of agricultural investments and change in the practices of farmers.

Though these investments should be regarded as an opportunity for the region, at the same time they would also cause various impacts to the region and the society, which can sometimes be negative. Therefore, this study will prepare strategies to tackle these issues, so that Nacala Corridor development can be realized while avoiding or minimizing adverse impacts on the society and the people.

This chapter will first describe the above mentioned changes deriving from private as well as official assistance projects in the Nacala Corridor Region, some of which have already been seen while others are expected to occur in the near future. Secondly, current situations of social structure of the area, economic activities and livelihood of the people in the Nacala Corridor Region as well as emerging problems regarding land and resettlement disputes in this region are summarized. Finally, legal frameworks prepared by the government to cope with these issues will be described. In the subsequent chapter (Chapter 18.5), issues deriving from the above mentioned projects' effects will be discussed.

8.5.2 Expected Effects of Nacala Corridor Regional Development

Expected effects of Nacala Corridor regional development, which will be relatively directly toward the local societies as well as people's livelihood, are listed below.

Table 8.5.1 Expected Effects of Nacala Corridor Regional Development promoted by PEDEC-Nacala

Development Activities in Nacala Corridor Region	Effects
1) Road and railway improvement	• Accessibility to major urban centres, sea ports and market places will be improved • Costs of transport will be greatly reduced • Market for agricultural crops will be expanded • Industries in major urban centres will be expanded due to better transport and logistics conditions • Acquiring jobs in urban areas will become easier for rural residents
2) Improvement of electricity and water infrastructure in major urban areas	• Private investments will increase in major urban centres • Commerce and logistics sectors will grow • Manufacturing industries will develop • Jobs will increase, especially in major urban centres
3) Incoming agricultural investment	• Investors will acquire DUAT for the areas farmers originally occupied • Resettlement of residents will occur • Employment in agricultural private firms will increase (farmers will be employed on the farms of private firms) • The number of contract farmers (out growers) will increase

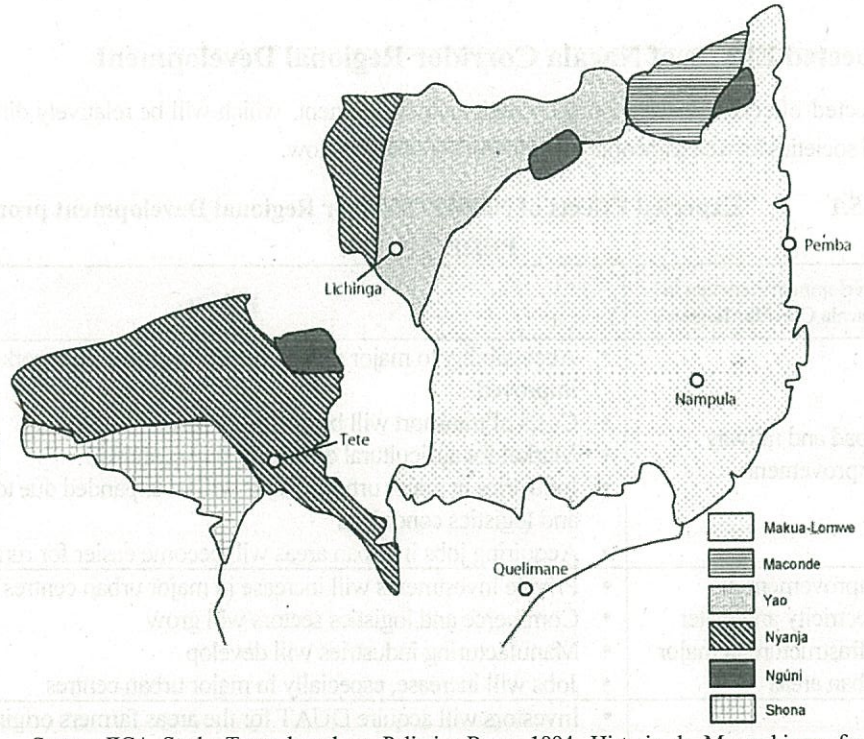
4) Shift to intensive agriculture	• The number of farmers conducting settled intensive agriculture will increase. • Need for lands to operate settled agriculture will increase • Investment for agricultural inputs (fertilizer, seeds, equipment, machinery) will be necessary • Production of cash crops will increase and food crop production may decrease
5) Regional development as a whole	• The majority of infrastructure projects, as well as those of commercial agricultural projects will be located along the major corridors, sub-corridors and feeder lines, while other areas will remain relatively untouched.

Source: JICA Study Team

Issues which will be caused by the above projects' effects are summarized in Chapter 18.

8.5.3 Present Conditions of Social Structure

and Nyanja. Makua-Lomwe is the largest ethnicity in the country consisting of 40% of the total population, and it is the majority of the Nacala Corridor Region as well. The map of ethnic distribution is shown in the Figure 8.5.1. Historically, people have moved around the region by group or individually, and it can be said that each ethnic group is not very strongly attached to any location of the country. Although opposition between Makua and Maconde was politically created in the time of the Civil War, currently there is no visible conflict among them.



Source: JICA Study Team based on Pelissier Rene, 1994, Historia de Mocambique: formação e oposição 1854-1918, Editorial Estampa

Figure 8.5.1 Ethnic Distribution in the Nacala Corridor Region

(2) Religion

According to the Census in 2007, Christians counted for 56.1% of the whole population, Muslims for 17.9%, other beliefs (mostly animism) for 7.3%, and other 18.7% had no religious beliefs. In the Nacala Corridor Region, the proportion of Muslims are larger than that of Southern Mozambique due to population incoming from the neighbouring countries in the North. Religious conflicts are not recognizable in the area; even cases of inter-religious marriage were heard in the course of interviews in Lichinga, and churches and mosques sometimes exist close to each other in a neighbourhood.

(3) Settlement[4]

Rural settlements are built along the roads (primary, secondary and tertiary roads), and most of the people walk to their cultivation land which is sometimes 10km far from their houses. In many cases, a settlement is consist of 10 to 30 households, and houses locate far from each other.

(4) Social Structure and Traditional Communities/ Leaders

Matrilineal system is dominant in Makua-Lomwe, and household's lands are also inherited through this matrilineal line. The minimum social unit of living is called erukulu, which is a matrilineal expanded stem-family, and includes grandmother generation, her child generation, and her grandchild generation. Male brother of the grandmother is the head of this unit called "atata," and has decision power on production activities and distribution etc. in the household.[5]

Traditional communities[6], which shall be distinguished from administrative systems though they exist in parallel with each other, consist of three layers, and each has a traditional leader who has a decision power. Regulo is the top of the three layers and controls the area called Regulado; Cabo controls natural villages in Regulado called Bairro; and Mwene regulates settlements in Bairro called Aldeai.

Traditional leaders have authorities in land management in the communities. Traditionally, the leaders are authorized by the community members for land use coordination in the community. Moreover, in the Land Law in 1997, the traditional leader is formally assigned to be community authorities, and roles of the leaders as well as community members were officially regulated. Traditional land use rights are allocated to groups, communities, clans, households or individuals, and the right holders are authorized to decide the purpose of land use with responsibility for the maintenance of the land plot.

Traditional leaders also have a significant roles in conflict settling. Public administration basically depends on the traditional leaders for settling of conflicts within the community, such as land conflicts, marital conflicts and matters on social welfare etc. Issues are first brought to Mwene, and if it is found for Mwene to solve them, then they are brought to Cabo or Regulo. Only the problems which could not be solved within the community will be delivered to administrative procedure.

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[4] Descriptions in this section rely on the Chapter 3 of ProSAVANA-PD Interim Report-1 (August 2012)
[5] Funada-Classen Sayaka (2007) "Origins of "Unity" and "Division" in Contemporary Mozambican Politics – Focusing in Maua District/ Niassa Province during the Liberation Struggle - " (English translated title), Ochanomizu Shobou.
[6] Descriptions in the following three paragraphs rely on the Chapter 3 of ProSAVANA-PD Interim Report-1 (August 2012)

(5) Mutual Assistance Institutions[7]

Though small and medium scale farmers operate family farming, in the busy farming season, mutual support system called "ganho-ganho" is practiced. Ganho-ganho is paid per work system, and it has existed since the colonial era to engage people in plantations. Currently, it is operated among community members. Payment depends on the area which one worked, and the amount is defined in an informal contract between the land owner and the worker. Ganho-ganho is also one of the main sources of income for the poorest in the rural area.

8.5.4 Present Conditions of Economic Activities, Agricultural Activities, People's Livelihood and Land Use

(1) Occupation and Wage

The table below shows the distribution of household members in each kind of labour activity, which only a few people are engaged in non-agricultural labour.

Table 8.5.2 Distribution of Household Members active in Each Kind of Labour Activity by Location

	Total	Along Corridor	100m North	200km North	100km South	200km South
Agriculture (own farming)	1,535	395	194	222	485	239
Agricultural Labour	73	33	22	7	9	2
Non-agricultural Labour	18	8	1	2	5	3
Self-employment	133	66	21	20	22	4
Total	1,759	502	238	250	521	248

Source: JICA Research Institute (2010) Household Survey: Northern Development Corridor.

Note: This survey targeted households located in Post Administratives with more than 5% of agricultural land use over their total land, totalling 40, and divided these areas into five categories as below: 1) Along the corridor (11 Post Administratives): Mitande, Ribaue, Iapala, Lurio, Namina, Rapale, Mutuali, Cidade de Cuamba, Mandimba, Malema and Cidade de Nampula; 2) Up to 100 km North of the Nacala Corridor (6 Post Administratives): Nipepe, Chihulo, Meti, Metarica, Milhana and Mecuburi; 3) Up to 100 km South of the Nacala Corridor (11 Post Administratives): Calipo, Etatara, Nihessiue, Also Ligonha, Lioma, Mepuagiua, Alto Molocue, Insaca, Cidade de Gurue, Namaita and Nauela; 4) From 100 km to 200 km North of the Nacala Corridor (6 Post Administratives): Muembe, Namuno, N'cumpe, Machoca, Hucula, Balama; 5) From 100 km to 200 km South of the Nacala Corridor (6 Post Administratives): Mulumbo, Munhamade, Lugela, Ile, Namarroi, Milange. Therefore, the target area of this study does not exactly match that of PEDEC-Nacala.

Major non-agricultural rural occupations includes transport driver, construction worker, hotel/hostel worker, restaurant staff and domestic servant. Though their cash income is relatively higher than that of agricultural employees, their median wage ranges around 200 to 875 MT per month as of 2002/2003[8].

(2) Agriculture and People's Livelihood

The majority of farmers in the target area are operating small-scale farms on non-irrigated land of less than 10ha, which make up approximately 97% of the cultivated lands of the target five provinces. The average household farming size by province is: 1.82ha in Niassa, 1.45ha in Cabo Delgado, 1.25ha in Nampula, 1.29ha in Zambézia (including districts outside PEDEC target area), and 1.66ha in Tete

[7] FAO (2003) "Working with Local Institutions to Support Sustainable Livelihoods" and ProSAVANA Draft Master Plan.
[8] Joseph Hanlon & Teresa Smart (2008) "Do Bicycles Equal Develoopment in Mozambique?" Boydell & Brewer Ltd.p.196

(Agriculture Census in 2009-2010, INE). It can be assumed that farmers with lands of 1-2 ha mostly depend on subsistence farming, meaning that, at present, the majority of farmers do not have surplus to be changed into cash. In addition, farmers or farmers associations cannot expect buyers to come to rural villages and therefore small-scale farmers do not have markets to sell their agricultural products even if they have any surplus. According to the survey conducted by JICA Institute mentioned above, most of farmers who have surplus sell crops at local market, then next major answer was selling at their farm gate. Travel distance of farmers to the markets varies greatly.

Shifting cultivation prevails in the Nacala Corridor Region which requires vast fallow lands, leaving the agricultural productivity low. The small number of labour force in a family is the limitation for expanding the land, due to the nuclear family system which is dominant in the Nacala Corridor Region.

(3) Land Use

The Land Law of Mozambique (Law No. 19/97) regulates that land use rights (DUAT: "Right of land use and benefit") can be declared if the local resident occupied the land in accordance with customary norms or he has used the land at least for 10 years. If the above items are proved, farmers will be entitled with DUATs.

However, most farmers practice agriculture without having registered DUAT, since it is not compulsory to register DUATs acquired through good faith occupation by national individuals. Farmers also do not recognize necessity and benefit of DUATs and the land law itself. In addition, the application fee for DUAT is too expensive for small-scale farmers to register lands. As a result, few small-scale farmers apply for DUAT registration. Therefore, investors could come in to find these occupied but un-registered lands as available, and this has caused a conflict between local farmers and outside investors. In the last several years, even without issuance of DUAT, the occupants' land use has not been disturbed. However, if an outsider comes and tries to acquire DUAT for the land, the original occupants without DUAT cannot negotiate as title holders but they can only negotiate as members of the community, since the land without DUAT can be regarded as belonging to the whole community[9].

In some areas of the Nacala Corridor Region where population density is relatively high and is expected to be higher in the future as well, land will be insufficient for all the farmers' cultivation. In reality, land disputes between community members have actually happened as well in some densely populated areas, when for example a new comer tries to expand his land and cultivate someone's fallow land. Additionally, land conflicts between investors and communities are also seen, which will be described more in the below section.

8.5.5 Present Conditions of Land Disputes

Many cases of land disputes between investors and communities are reported, and these problems are regarded as negative social impacts. The JICA Study Team conducted interview surveys with investors, community representatives and related government officers who were engaged in four investment projects in Nampula and Zambézia Provinces. The questions of the interview surveys in theses provinces were designed in such a way as to clarify the problems encountered from the three different perspectives of the community, the investor and the local government. The results are summarized as below.

[9] Based on JICA Study Team's interview with an ex-officer of DNTF in 2013.

Table 8.5.3 Problems Identified in Communities

Category	Problems Raised
1. Disagreement in the contents of built consensus	• Investors pulled out crops which the residents cultivated without any permission and started planting their crops (Community). • In the acquired land there are illegal occupants, and they would not move even if they get paid. (Investor) • Since local residents will not relocate, the project is being delayed. (Investor)
2. Default of compensation	• Compensation for land acquisition has not been paid. (Province) • Some of the compensation items which had been negotiated in the process of consensus building have not been realized yet. (Community) • Compensation money for crops has not been paid. (Community) • None of the compensation promised in the process of consensus building was provided (Community)
3. Anxiety for coming changes in the living environment	• Residents are feeling anxious about what will become of their residential area (Community). • Faced with relocations of other people, residents are worried that their lands

8.5.6 Existing Legal Frameworks

(1) Existing Legal Frameworks on Land Rights

In this section, the procedure for investors to acquire DUAT is explained according to the description of the Land Law. In addition, the process of community consultation will be summarized, which is an essential process to avoid conflicts regarding land rights.

All the land of Mozambique belongs to the state according to the Land Law of Mozambique. Therefore, in order to use a certain piece of land, a land use right is required. The Law regulates that land use rights can be declared in the following cases:

- Occupancy by individual persons and by local communities, in accordance with customary norms and practices which do not contradict the Constitution;
- Occupancy by individual national persons who have been using the land in good faith for at least ten years;
- Authorisation of an application submitted by an individual or corporate person in the manner established by this Law.

If the above items are proved, DUAT ("Right of land use and benefit") will be registered upon application fee and annual fee payment.

In order for investors from outside to acquire DUAT for conducting economic activities, application for DUAT must be submitted to the Provincial Geography and Cadastral Service (SPGC). Once application has been submitted, SPGC sends a copy of the application to the district administration, and participatory consultation processes are held by the local cadastral service, district administration and local community (Article 27, Land Law Regulations). Consultation with local communities shall comprise two phases: the first phase consists of a public meeting with a view to announce to the local communities the application for acquisition of DUAT and the tentatively identified boundaries of the concerned parcel, and the second phase is for the pronouncement by local communities regarding the availability of the concerned land area (Ministerial Diploma No. 158/2011, MINAG). The areas will be finally identified after the discussion in the public consultation process. If both sides reach an agreement as a result, the investor and community leader visit the administrative office to conclude contracts.

After the process of public consultation, the application will be sent to the central level (DNTF) for final verification, and finally authorized by competent entities (Provincial Governor, Ministry of Agriculture or Council of Ministers) according to the size of the concerned land.

(2) Existing Legal Frameworks on Resettlement

1) Process of Resettlement

Resettlement is defined as "the displacement or transfer of the affected population from one point of the national territory to another, accompanied by the re-establishment or creation of conditions equal to or above their previous standard of living" in Regulation of Resettlement (Chapter 1, Article 1), and the process begins with preparation of a Resettlement Plan once the DUAT has been provided to the investors. Preparation of a Resettlement Plan consists of the following phases.

- Collection and analysis of physical and socioeconomic data
- Preparation of the Resettlement Plan
- Preparation of the Action Plan for the implementation of the resettlement project

The resettlement plan shall be approved by the District Government, preceded by an opinion of conformity issued by the sector supervising the Territorial Planning area, after having heard the Agriculture, Local Administration, Public Works and Housing sectors (Article 9). After approval of the plan, resettlement will be implemented based on the Action Plan mentioned above.

Public Participation is guaranteed during the entire preparation and implementation process of the resettlement plans (Article 13), and at least four public consultations shall be organized during the period (Article 23). Details will be described in the section below.

The District Government is responsible for monitoring the implementation of the plan, together with the supervision by the Technical Resettlement Monitoring and Supervision Committee.

2) Process of Consensus Building

The process of public participation is defined in the regulation. Public participation comprises a) requests for clarification, b) formulation of suggestions and recommendations; and c) interventions in public meetings. Public consultation is composed of Public Consultations to analyse the local dimensions of the environmental planning and national-level strategies, and Public Hearings for the affected parties to express their opinions regarding proposals. Preparation of a record of the process of consensus building is mandated, and it shall be approved by the affected parties (Article 13, Regulation of Resettlement). Preparation of the minutes is an obligation of the "competent bodies", which could be interpreted as any or a combination of the three parties, the investor, the community or the government, according to Article.13 of Regulation of Resettlement.