

Chapter 3. Development Policy and Strategy

3.1. Objectives for Transport Development

The objectives for transport development of the Angonia region are established in line with the regional development objectives. Three objectives are defined to represent social, economic and environmental concerns. The dual structure of overall and sector objectives mutually supporting one another would ensure a better balance between these three broad concerns.

The transport development objectives for Angonia regional development are expressed as follows:

- a) To facilitate the delivery of basic social services to rural people,
- b) To support the outward-oriented production and marketing at local, regional and cross-regional levels for high economic growth; and
- c) To reinforce community-based resources and environmental management.

For the first social objective, the transport infrastructure shall improve the access by rural people to social services available in the community centers or other urban centers.

The second economic objective will be pursued at different levels with step-wise improvement of transport infrastructure. These infrastructure facilities range from rural access roads to international arteries. The third environmental objectives, the transport infrastructure may contribute in different way. Well-structured and maintained rural roads may be essential for monitoring and management of watershed and other resources by local communities. To pursue these objectives, a phasing strategy for short, medium and long term development is also taken into account as follows;

- Phase I: 2001~2005
- Phase II: 2006~2015
- Phase III: 2016~2025

The objective of the transport development for Phase I is to restore socio-economic development through removal of bottlenecks of the existing transport system. That for Phase II and Phase III is to support sustainable socio-economic development in the different regions of the country.

3.2. Strategy of Transport Development

3.2.1. Basic strategy

Transport development for Angonia region should be pursued under the following basic strategy with six components:

- a) strengthening international linkage,

- b) establishing multi-modal transport system,
- c) establishing rural transport system,
- d) financial and administrative improvement,
- e) encouraging private sector participation and community involvement,
- f) developing technical capability, and
- g) appropriate phasing strategy.

Each component is described below.

3.2.2. Strengthening international linkage

The existing spatial structure of the Study Area is characterized as follows.

- a) The Study Area is a land-locked region, about 500 km inland from the Beira port which is the major access point to international market. There is no mass transit system to Beira since the closure of the Sene railway line.
- b) The Study Area is surrounded by the neighboring countries, namely Malawi, Zambia and Zimbabwe.
- c) There are two international transport corridors running into the Study Area, defined as South-eastern Africa transport corridor and Beira corridor.

The market size of the neighboring countries and access from Tete City are presented as follows.

Profile of Neighboring Countries

	Malawi	Zambia	Zimbabwe
Population in 1997	10.1 million	8.5 million	11.7 million
GNP per capita (US\$), 1979	220	750	380
Distance from Major Towns from Tete	Lilongwe 370 km Blantyre 245 km	Lusaka 854km	Harare 380km
Distance from Major Towns from Ulongue	Lilongwe 115 km		

Sources: *Country Profile* and JICA Study Team.

At present, the northern districts of the Study Area, consisting of Angonia, Tsangano, Chifunde, and Macanga districts, are closely connected with Malawi's Kwacha economy. Most agriculture products in these areas such as potatoes, wheat, beans, tobacco, paprika, cabbages, maize, etc. are exported to Malawi formally or informally. Trade between Zimbabwe and Tete province, on the other hand, is not so active. This may be due to low agriculture production in the Mozambican areas adjacent to the Zimbabwe border, while Zimbabwe has a great demand for agricultural products as well as the long distance between the border and the populated areas on both sides of the border. In future, however, formation of a golden triangle by Mozambique, Malawi, and Zambia, a growth concept proposed by UNDP, might bring about an increase in trade between the Study

Area and Zambia.

The two international transport corridors could be defined as the South-Eastern African transport corridor and Beira corridor as shown in Figure 1.9. The South-eastern African transport corridor, which could be defined as international trade route in the South African countries with rapidly increasing traffic volume in the recent years, links the northern part of Zambia, Malawi, Tete, Zimbabwe, and extends to South Africa. The Beira corridor links the northern part of Zambia, Malawi, Tete, and extends to Beira, the international trade gateway.

Taking into account geographical conditions and marketability, it is necessary to strengthen international linkages between Zambia, Malawi, Tete, Zimbabwe and South Africa.

3.2.3. Establishing multi-modal transport system

The present transport in the region provides only road-based transport system since the Sena Railway line stopped to operate in the early 1980's. Consequently, incoming and outgoing cargoes to/from the Study Area and import and export cargoes to/from Malawi are transported by road-based transport system. As a result, agriculture products have not been produced in sufficient volume for export because of high transportation cost of farm products to international markets. Similarly coal has not been produced in a large amount because of high transport cost to Beira port. Consumer prices in the area are comparatively higher than other areas in Mozambique due to higher transport cost.

Non-existence of mass transport system has, thus, been constraining socio-economic development in the region.

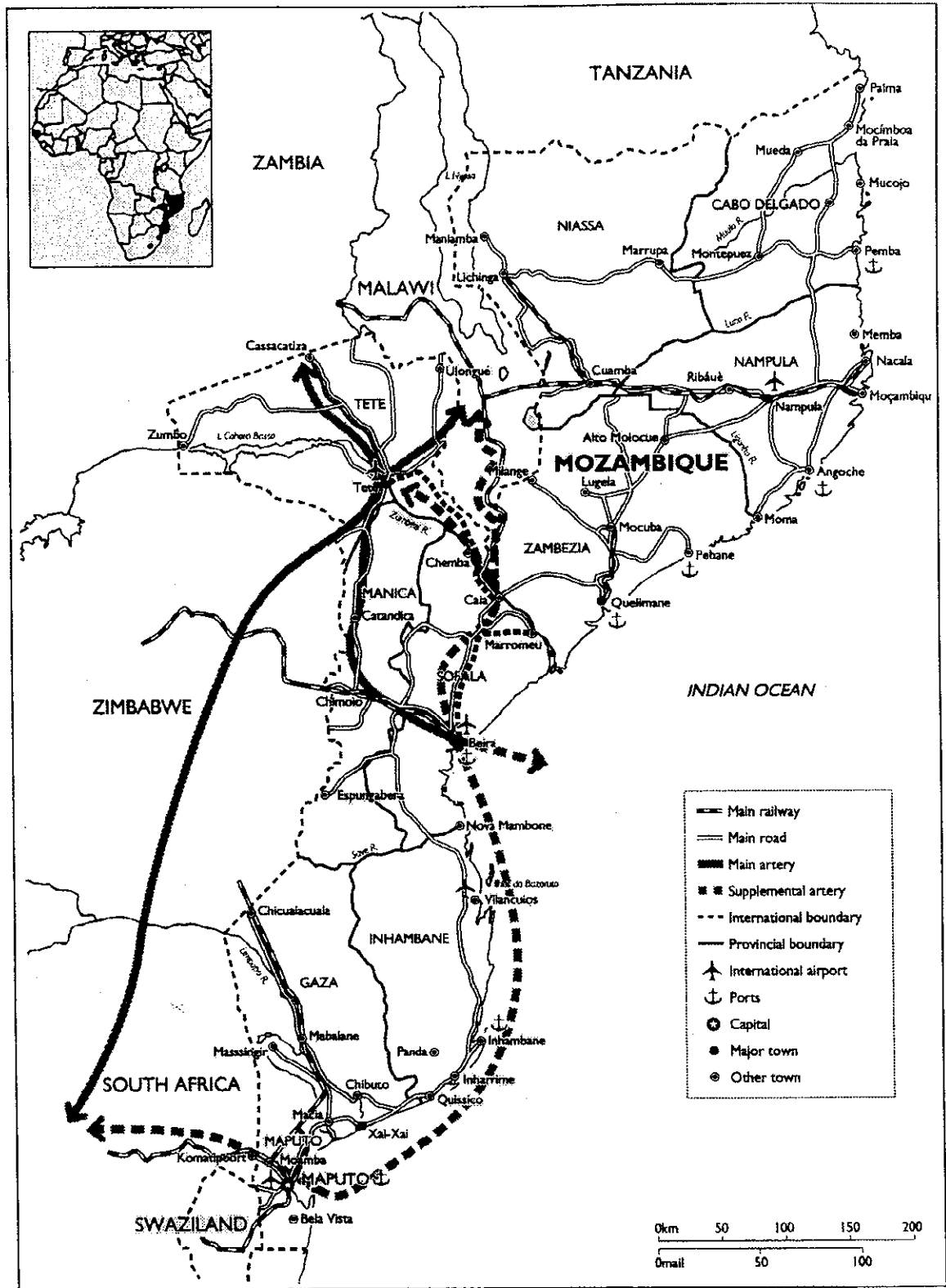
In order to improve this situation, a multi modal transport system needs to be created. Two possible transport systems are considered. One is to re-open the Sena Railway Line, and the other is to rely on water transport system using the Zambezi river. These options are discussed below.

(1) Sena railway line

The Sena railway runs between Beira and Moatize via Dondo, Inhaminga and Caia. Branches exist towards Marromeu and Villa Nova. The total length of this line is about 580 km. Since the Sena railway line was abandoned in 1984, there have been no trains operating. The Sena Railway is the key factor to accelerate sustainable socio-economic development in the Study Area. The railway line is expected to promote development in agricultural, mining, industrial and trading sectors.

Regarding the re-opening of the Sena line, the Sene Line Program (SLP)¹, initiated by GPZ, proposed the following three scenarios:

Figure 1.9. Multi-modal Transport System



¹GPZ, Sera Line Programme, *Summary of the Development Strategy*, July 2000, Prepared by DIWI-SOGIR JV.

- Scenario I: High-level development including Moatize line
- Scenario II: Low-level development including Moatize line
- Scenario III: Minimum-level development excluding Moatize line

The SLP study has evaluated the three scenarios and recommended to adopt the most realistic vision: "A low-level rehabilitation starting within two or three years is preferable over a high level rehabilitation that starts in ten years." When the Sena Railway line with Moatize line is rehabilitated, a multi-modal transport system in the region would be established as shown in Figure 1.9. The Study Area would enjoy great benefits not only in terms of domestic and international trade, but also in terms of creation of job opportunities, especially in relation to coal production in Moatiz. Malawi also would greatly benefit from increased international trade.

(2) Fluvial transport

One of the candidate alternative transport modes is fluvial transport using the Zambezi River. In the early part of the 20th century, the river was used as the main transport route from the sea to Tete province. After the Sene Railway was constructed between Beira and Malawi and Moatize, however, the waterway between Malawi or Tete and Beira has been in almost no use. Furthermore, since the Cahora Bassa dam upstream on the Zambezi River was built, fluvial transport for commercial purposes was not used because of the effect of the dam on the water flows in the river system. It has been reported that Austral Coal, one of the potential investors in the Moatize coalmines, investigated the use of 3,000 tons per annum with a 2.7 draft as a means of exporting coal. According to the study, the river would require extensive dredging to facilitate this. If coal transport on a barge is restricted to a one-meter draft, and including loading and unloading facilities needed, transporting coal by water would not be competitive compared with other transport modes. It is concluded that the fluvial transportation is considered less beneficial than rail and road transportation. As a long-term prospect, it may be possible to introduce the Zambezi River cruising as a tourist attraction service.

(3) Nacara corridor versus Beira Corridor

There is a debating point that the Nacara Corridor could be preferably used for transporting cargoes incoming and outgoing to/from the Study Area and Malawi instead of the Beira corridor. This is because the Nacara Port can accommodate very large "Cape Size" vessels, whereas Beira is currently restricted to the order of 25,000 dwt commonly known as "handy size". The discussion accrues from the fact that the cost of sea transport is much lower in larger vessels.

As for coal export, the Rose report made a comparative analysis of coal export from Moatize. The analysis shows that in case of coal export below 1.2 million tons per annum,

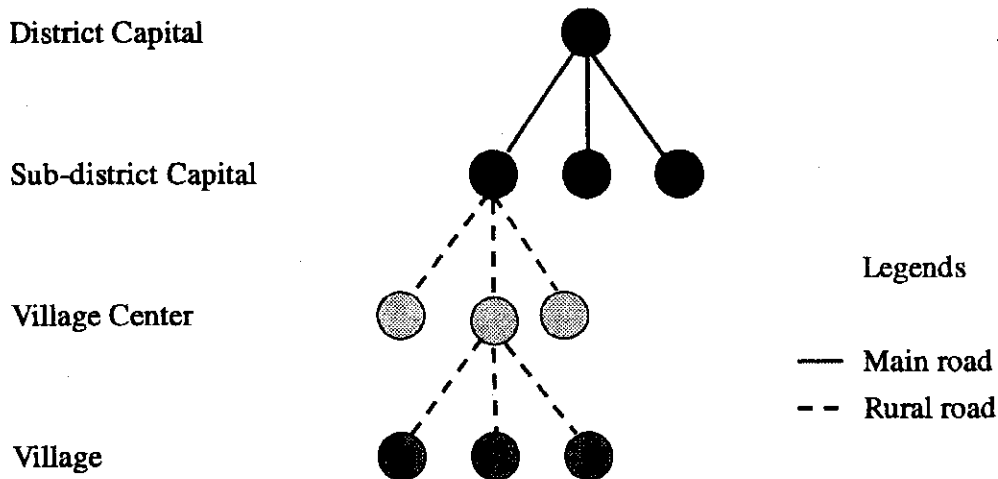
the CIF cost via the coal of Beira route is much lower than that of Nacara route.

As for the cargo export and import from/to Malawi, the transport cost using Beira route may be much lower than Nacara route. This is because the railway distances from Blantyre in Malawi to Beira and Nacara are about 500km and 690km, respectively. Judging from these findings, the Nacara route is not considered in the present study.

3.2.4. Establishing rural transport system

According to the social surveys conducted in the Study, most villagers in the Study Area had complaints on rural transport system as too poor. The rural transport system, which includes access roads to the principal roads, access roads to community centers, and farm to market roads, and public transport system to provincial capital and/or district capitals, has been deteriorating. This is because of adverse effects of the civil war and lack of maintenance and rehabilitation activities for more than a decade. In most villages in the Study Area, there are no bridges, resulting in many roads becoming impassable during rainy season. Rural roads are under the responsibility of district management. District administrations have limited financial and human resources.

The district administrative structure can be generally illustrated as below.



District administrative structure and road network

Each district has usually two or three sub-district centers, which are facilitated with markets, hospitals and other social facilities. Each sub-district has several local centers with low-level markets and other social facilities. To be able to access sub-centers and local centers from village centers or villages is essential for villagers in leading their lives.

Rehabilitation of rural roads should be promoted under a concept of low-cost and labor

force based method, supporting self-help efforts of communities.

The policies and strategies for providing transport infrastructure for rural area are summarized as follows.

- a) Social sustainability of transport shall be increased and poverty reduction made possible.
- b) The objective of providing transport infrastructure for the inhabitants in the rural areas should stress "access" rather than "mobility".
- c) Providing access for rural communities should be promoted by a low-cost and labor intensive method with local community's participation considering limited resources.
- d) It is necessary to include capacity building at community level as well as district administration level.

3.2.5. Financial and administrative improvement

The Mozambique government is faced with administrative and financial constraints in improving its transportation system. It is necessary to allocate limited financial and administrative resources properly for regional development and national integration. Improvement of non-classified roads would become more important for internal integration of any region through strengthening financial and administrative resources to such fields.

Community participation involving the transport sector is only sporadic and in small scale at present. Capacities to manage non-classified roads at the district and local levels should be expanded by community participation in a more institutionalized way.

3.2.6. Private participation and community involvement

Private sector participation should be promoted in the field of transport service provision but also in the infrastructure investment. The first type of participation is particularly relevant to the road transport industries. The Government should give incentives to private operators in the forms of tax exemption, finance at lower interest rates and appropriate fare structure. In addition to general measures, special schemes such as giving concessionaire loan arrangements to purchase vehicles, should be introduced to promote the provision of better transport services to the Study Area. The Government may call private investor for prospective transport infrastructure projects. The projects may include rehabilitation and operation of the Sene Railway line project and the second Zambezi River Bridge project.

As for the road rehabilitation and maintenance industry, capable private contractors for road rehabilitation and maintenance works are very limited. The private contractors should be encouraged to take up rehabilitation and maintenance works of national and

regional roads.

A regulatory framework for privatization of public transport operations may be made more effective.

3.2.7. Development of technical capability

The technical capability in the transport sector in Mozambique should be upgraded for Mozambican organizations to be able to carry out rehabilitation and maintenance works more properly. The issues concerned are design standards for roads, hierarchical systems for ports and airports to serve local, regional and national needs, and user charges for public transport operations. These are not immediate issues yet, but may need be looked into in the subsequent stage of the Study as they may relate to the Angonia regional development and planning.

3.2.8. Phasing strategy of transport development

The basic strategy is to shift the emphasis on different strategic components and their application to different areas in short, medium and long terms. The strategies in the short to medium term and in the medium to long terms are presented as follows.

Short to medium term

A two-pronged strategy may be taken for the transport development in the Study Area in the short to medium term with the following emphasis:

- a) improving non-classified roads to promote outward-oriented production at the local level, and
- b) upgrading international artery roads and transport infrastructure for Tete City and vicinities to support limited outward orientation at the regional and the cross-regional levels.

Medium to long term

The following should be undertaken side by side to promote both the regional integration and the export drive in the medium to long term:

- a) establishing the hierarchical structure of transport infrastructure in line with the urban hierarchical system, inter-linking areas and activities of different levels for regional integration, and
- b) strengthening international terminal facilities to support the export drive.

3.3. Transport Development Plan and Program

3.3.1. Future economic activities and transport network

- (1) International and regional artery system

The artery system in the Study Area could be defined within the framework of the international artery system in the south-eastern Africa region and the one in central Mozambique.

Two international artery systems could be defined as the north-south African and east-west arteries as shown in Figure 1.10. The former artery may be called the north-south African corridor in the south-eastern Africa region, while the latter is called the Beira corridor.

The north-south African corridor, functioning as international trade route in the South African countries and with rapidly growing traffic volume in the recent years, links the northern part of Zambia, Malawi, Tete, Zimbabwe, and extends to South Africa. The Beira corridor links the western part of Zambia, Malawi, Tete, and extends to Beira, the international trade gateway.

As for the regional artery system, two artery roads could be defined as the north-south and the east-west arteries as shown in Figure 1.9. The north-south artery links Zambia in the north and Tete City with ER548, EN221, and EN222, and extends to the south with EN 103 and 102. The east-west artery links Malawi in the east and Tete city with EN103, which goes through Changara to Zimbabwe to the west.

(2) Urban system

The spatial framework of the Study Area is characterized by the following hierarchical structure of urban centers.

- a) Tete City is and will remain the functional capital of the region. Tete would enhance its role as administrative, social and urban service center.
- b) Moatize is a complementary town of Tete city. This town would be developed to specialize in resources-based industries.
- c) The second tier of the urban system would be at Ulongue, Manje, Furancungo, Tsangano, and Chifunde. These settlements would serve respective rural hinterland for basic services. Among these settlements, Ulongue and Manje are to function as agricultural distribution and trade centers with the road infrastructure in a higher hierarchy.
- d) The third tier of urban system is sub-regional settlements.

(3) Agricultural development

- a) The agricultural sector in the region would continue providing the majority of the total production by all the economic sectors. The agricultural development areas in the Study Area may be around Angonia plateau, consisting of Angonia, Tsangano, and parts of Macanga and Moatize districts.
- b) The other agricultural development areas may be in the lowland areas along the Zambezi and Luia rivers in Chifunde and Chiuta districts.

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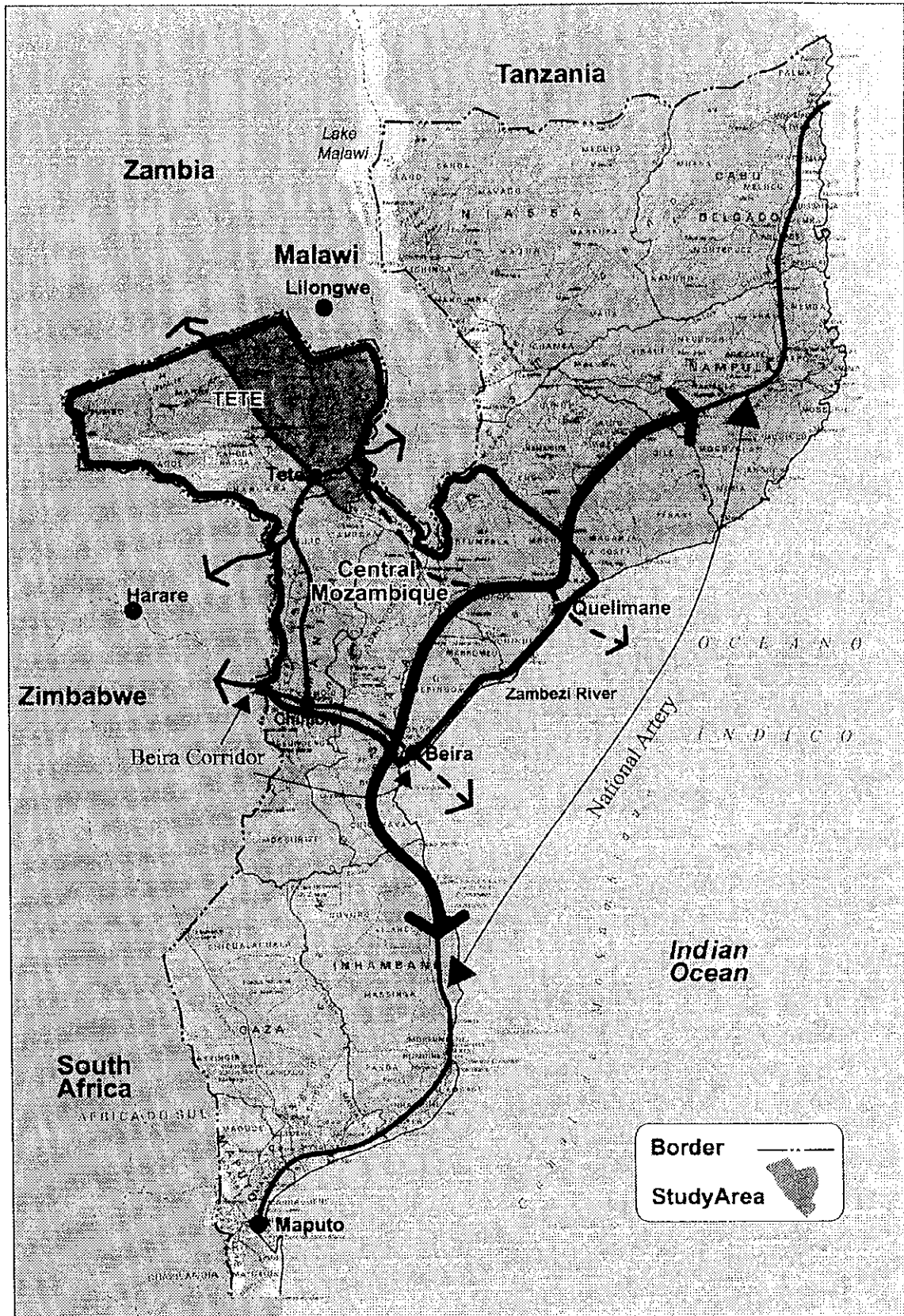
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Figure 1.10. International and Regional Artery Systems



- c) The study may propose irrigated agricultural schemes along the Luia and Mavuzi rivers. These areas would introduce large-scale agriculture.

The transport infrastructure shall function to support promotion of these developments, to ensure access to agricultural areas to produce its crops and to ensure access to markets from agricultural areas.

(4) Mining development

Mining sector is one of the prospective sectors in the Study Area. Coal development in Moatize is the highest priority action for promoting economic development. Coal was once produced successfully with the peak production of 600,000 tons per year. As a result of the investigations made by the Study Team, it may be possible to produce up to about 6 million tons of coal or more per year. Magnetite and copper are other promising minerals in the Study Area.

Major problem faced in the mining sector is the lack of economical transportation means to transport these mineral products for export and access to markets. It would be necessary to re-open the Sena Railway line in this regard.

(5) Industrial development

The following are the promising type of industries and activities in the Study Area.

- Food processing
- Import substitution industry
- Coal related industries
- Distribution center
- Investment promotion zone

The transport infrastructure will function to bring in raw materials to these factories and to ship their products to markets with lower transport costs.

(6) Proposed principal road network

With the artery system, urban system, and economic developments mentioned above, the principal road network in the Study Area could be proposed. Under two artery roads, the following sets of roads could be defined to support the socio-economic and regional development in the Angonia region. Taking into account these development plans and program, an appropriate future structure of regional transport network could be proposed as illustrated in Figure 1.11.

The functions of roads in different tiers in a road system hierarchy can be defined as follows.

Hierarchy of Road System

Road Classification	Function
Artery roads	to provide linkages between provincial capitals, major ports, and international countries
Supplementary artery roads	to provide access to regional core areas
Secondary roads	to provide linkages between district and sub-district capitals and alternative access to district capitals
Feeder roads	to provide linkages between villages or production places and main roads
Village service roads	to provide linkages between villages or production places and feeder roads

3.3.2. Strengthening rural transport system

One of the fundamental problems in the region is poor transport system in the rural area. Insufficient infrastructure has been a reason for subsistence agricultural system in the region for a long period. The proposed rural transport system is required to overcome this situation and transform the rural economic structure into a developed one. These would be achieved by:

- a) provision of feeder roads from village centers and distribution centers to main roads,
- b) provision of public transport system to transport passengers and agricultural products to the district capital and sub-capitals, and
- c) provision of village service roads between villages, production centers, feeder roads and village centers.

The rehabilitation of rural roads should be carried out with a concept of low-cost and labor intensive method, while supporting self-help efforts by communities.

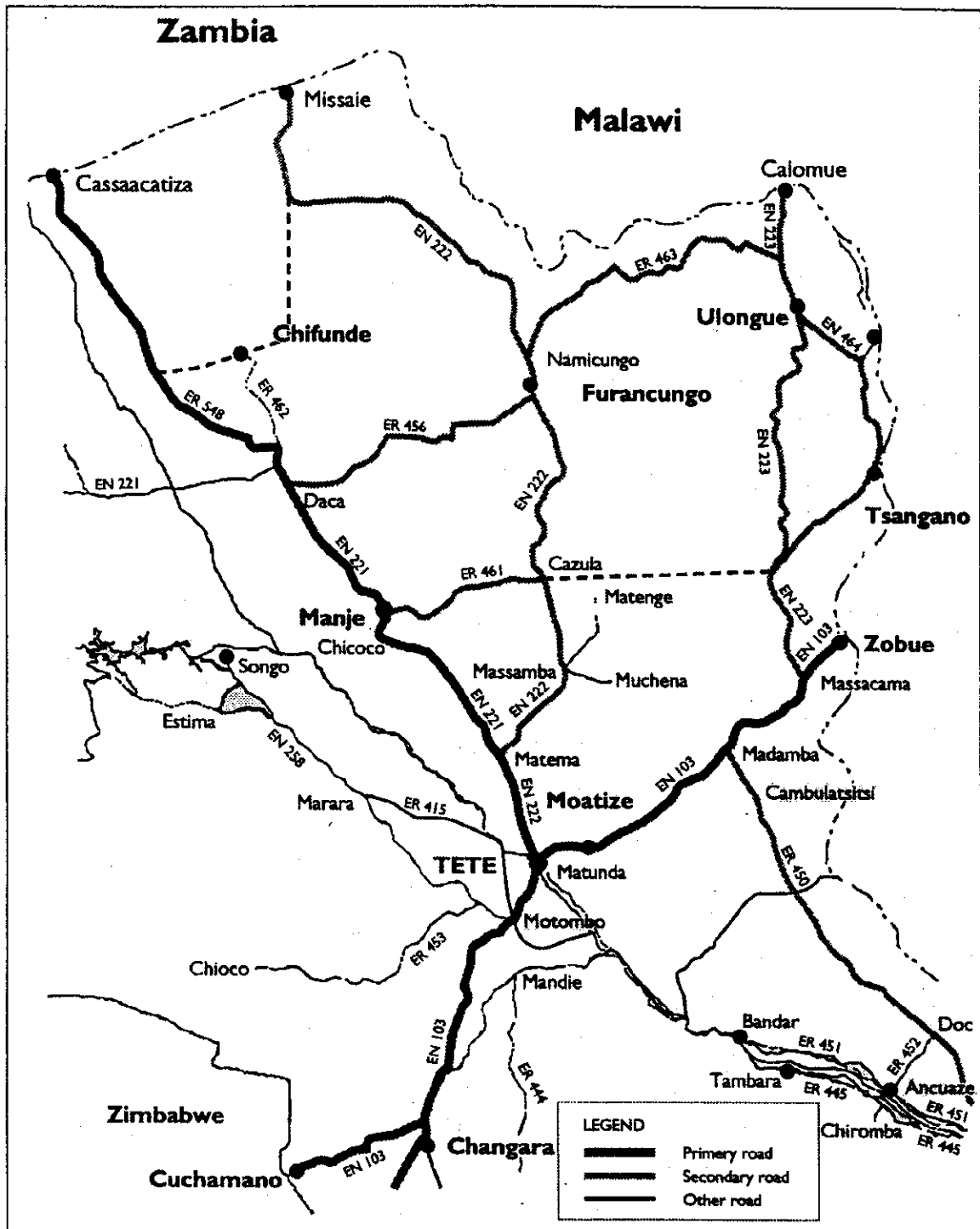
3.3.3. Transport facilities in Tete-Moatize core urban area

The Study proposes that Tete city would be the functional capital of the Study Area as well as for the central region of Mozambique. The Tete-Moatize area would provide various social, economic and urban services for local people as well as to function as the major node to link the hinterland and the two international trade and transport corridors.

In the year 2025, it is expected that Tete City would be a major town of 500,000 inhabitants with Moatize. As such, it would necessary to develop the urban transport network in Tete and Moatize twin city area. In this area, the following transport would be needed.

- Urban road network within Tete and Moatize twin city area, and
- New Zambezi river bridge.

Figure 1.11. Proposed Transport Network in the Study Area



3.3.4. Other transport facilities

(1) Expansion of Bus transport system

Taking into account increasing per capita income in the region, mobility of the people in the region would drastically increase. In such a situation, the public bus transport system needs to be expanded in the following aspects:

- expansion of inter-provincial bus services,
- expansion of intra-provincial bus services, and
- provision of bus terminals in major towns.

(2) Airport facilities

The facilities of the Tete airport is generally tolerable to handle air passengers and cargoes at present. In order for the Study Area to attract more foreign investments in the region, however, it would be necessary to improve the airport terminal facilities and its service, especially in the following aspects:

- improvement of Tete airport passenger facilities,
- expansion of Tete airport cargoes terminal facilities, and
- privatization of Tete airport services.

(3) Freight terminal facilities

As mentioned already, Tete is importantly located at an intersecting point of two the international transport corridors of the north-south African transport corridor and Beira Corridor. Many international freight traffic and passenger traffic pass through the Study Area. There is, however, no opportunity to take advantage of this locational advantage due to the lack of economical transportation means aiming at international market at present. Freight terminal facilities will become necessary to handle increasing commodities, once the Study Area is linked to the world market through the rehabilitated Sena railway.

(4) Immigration and customs facilities at the cross-border points

The international roads in the Study Area are generally at an acceptable level for accommodating international traffic. Immigration and customs facilities at the border points, however, are in a very poor condition. At present, there exist no appropriate offices and equipment. Taking into account an increase in international trade and passengers, it would be necessary to provide appropriate immigration and customs facilities, especially those at the cross-border points at Zobue, Cuchamano, Calomue, Biri Biri and Cassacatiza.

Chapter 4. Measures and Projects

4.1. Institutional Measures

4.1.1. Strengthening the existing transport administration

(1) Technical capability upgrading program

The present transport administration lacks well-trained and experienced engineers. For instance, a new bridge on ER 250 (Madamba – Mutarara) was washed away in January 2001 by flooding. Floods in 2001 were heavier than previous years. The Study Team's field survey clarified two faults: one is the bridge design itself and the other is the fact that such a faulty bridge design was approved and the bridge constructed based on it without a proper review and modification by the administration and engineers. This kind of technical mismanagement arising from low technical capability is observed not only in bridge and structural design, but also in all the road engineering aspects.

It is proposed that the rural roads and feeder/access roads from villages to village centers, sub-district centers, and/or district center be rehabilitated in order to promote rural development. These tasks should be basically undertaken by engineers in charge of public works. Most district administrations have no qualified engineers. Even if there are some capable engineers in some administrations, their number is limited.

To solve this problem, it would be necessary to train transport engineers continuously by the following programs.

- a) Engineers in the transport sector should be upgraded by training in Mozambique periodically, with an emphasis on practical training.
- b) Engineers in charge of public works in all the district administrations should also be trained in Tete city periodically, using appropriate manuals and textbooks.
- c) Foreign voluntary engineers should be invited to carry out the feeder road projects and access road projects.

(2) Lack of planning and programming

The present transport administration lacks planning, programming, and coordination. For instance, many bus operators set up their bus terminals anywhere within Tete city by themselves. There is no public bus terminal in Tete city despite the availability of plenty of land. The Department of Transport and Communication of Tete Province does not seem to have any idea to construct bus terminals. Planning function of government departments should be upgraded through periodical training on relevant issues.

Common phenomena in the transport sector is the lack of coordination among transport departments, i.e., road, public transport, rail (if Sena railway opens), etc. GPZ should play a lead role in promoting better coordination among relevant organizations and

departments with a clear and systematic transportation policy.

4.1.2. Private sector participation

To promote private investment in the transport sector, the Government should establish clear investment regulations, procedures, and policy toward private participation. The Government should also nurture close public-private relationship to assist the private sector to grow and mature. As for bus and freight transport, private operators may play a dominant role while the public sectors is responsible mainly for preparing and publicizing policy and guidelines and leading transport business toward safe, orderly and efficient operation.

As for the Sena line, the Government has already announced that the line be privatized for implementation and operation. The Government should pay attention to possible formulation of a joint investment company initiated by a public and private consortium. It will reduce the risk of private investors and contribute to attracting private investments into the Sena line.

4.1.3. Community involvement

There are two types of community involvement: one is for communities to contribute to feeder road construction by providing labor force based on an appropriate contract with the contractor, and the other is to construct small roads and paths for villagers under the community's initiative.

In case of the rural road improvement, communities should be involved with construction and maintenance works. Though temporary, communities would obtain job opportunities periodically in case of routine and periodical maintenance works. Motivation of communities for road construction and maintenance is expected to increase drastically.

In case of village service roads improvement such as small roads and paths, district government provides communities with basic tools such as shovels, hoes and bush cutters. Some community members receive basic training to supervise maintenance and construction of service roads. Under the leadership of community leaders and the trainees, other community members are mobilized to help maintain existing paths, clear bushes, and install steps using locally available gravel and materials. Such road works may be made by self-help road construction.

4.2. Transport Development Projects

4.2.1. List of proposed transport projects

Based on the transport development policy and strategy proposed and the development constraints and potentials of transport systems in the Study Area, the transport projects as

listed in Table 1.19 are proposed. The transport development proposals consist of the followings. A separate volume 8, "Project Report" describes these projects in detail.

- a) Road projects
- b) Railway projects
- c) Water transport project
- d) Airport projects
- e) Road transport projects
- f) Transport terminal projects
- g) Immigration and customs facilities

4.2.2. Road projects

(1) Secondary road rehabilitation project

The main road network in the Angonia region consists of primary roads, and secondary roads. These roads together serve all the district capitals and provide links between district and sub-district capitals. The projects will improve secondary roads by stage.

In Phase 1, urgent measures should be undertaken to rehabilitate certain sections of the secondary roads to make them passable under all weather conditions. In particular, the following are covered.

- Rehabilitation of four bridges, and
- Rehabilitation of EN 223 (Mussacama-Calomue); and

The following roads will be improved in stages over Phase 2-Phase 3;

- Rehabilitation of EN 222 from Matema to Missaie,
- Rehabilitation of access road to Tsangano (from EN223 to ER464 via Tsangano), and
- Rehabilitation of ER 463 from Furacungo to EN 223, and

The following network deficiencies will be resolved in Phase 3;

- Construction and improvement of the road from Cazula to EN 223 (total length 68 km), and
- Construction and improvement of the road from EN 222 to ER 548 via Chifude.

(2) Rural road improvement project

The present condition of the classified roads in the Angonia region is generally good. That of non-classified roads, rural roads in the districts, however, is very bad during dry season and impassable during rainy season. Improvement of these roads are essential for villagers to access to district capital, sub-capitals, village centers and villages in order to receive social services and reach markets.

Table 1.19. Transport Infrastructure Strengthening with 12 Projects (1/2)

No.	Project Title	Location	Implementation Agencies	Objectives
TR-1	Secondary Roads Improvement	Region-wide	ANE	<p>a) To rehabilitate sections of secondary roads to make them passable under any conditions</p> <p>b) To improve some secondary roads in steps to ensure access to all the district capitals, and</p> <p>c) To resolve network deficiencies to establish efficient secondary road system.</p>
1	Rehabilitation of four bridges	Angonia, Macanga, Chiuta	ANE	
2	Rehabilitation of EN 223 (Mussacama-Calomue)	Angonia, Tsangano, Moatize	ANE	
3	Rehabilitation of EN 222 from Matema to Zambia Boder	Moatize, Chiuta, Macanga, Chifunde	ANE	
4	Rehabilitation of access road to Tsangano	Tsangano	ANE	
5	Rehabilitation of ER 463 from Furancungo to EN 223	Angonia, Macanga	ANE	
6	Construction and improvement of the road from Kazula to EN 223	Tsangano, Macanga,	ANE	
7	Construction and improvement of the road from EN 222 to ER 548	Chiuta	ANE	
TR-2	Feeder road Improvement project	Region-wide	District administration, ANE	To maintain and repair feeder roads of all the districts in Angonia region with labor force based improvement
TR-3	Village Services Roads Self-help Improvement Program	Regional – wide	District administration, ANE	To maintain and repair village services roads of all the districts in Angonia region with self-help improvement
TR-4	International Highway Upgrading Project	Tete, Moatize, Chiuta, and Chifunde	ANE	<p>a) To upgrade international roads as international standards, and</p> <p>b) To provide traffic safety devices in order to avoid traffic accidents.</p>
TR-5	Sena rail rehabilitation project	Sofala, Manica and Tete province, Malawi	CFM Central, Private firms	<p>a) To provide driving force for Zambezi Valley and Angonia region development</p> <p>b) To facilitate export of Moatize coal and other local products, and</p> <p>c) To contribute multi-modal transport system linking with neighboring countries</p>

Table 1.19. Transport Infrastructure Strengthening with 12 Projects (2/2)

No.	Project Title	Location	Implementation Agencies	Objectives
TR-6	Rural Bus Services Improvement Project	Region-wise	MOT, private firms	<ul style="list-style-type: none"> a) To provide bus services to rural areas to access them social services, and b) To improve bus services by encouraging competition among private bus companies
TR-7	Inland Freight Terminal Project	Tete city and/or Moatize	MOT, private firms	<ul style="list-style-type: none"> a) To establish a freight terminal in Tete city/ to facilitate storage and distribution function of agriculture products. b) To provide dry port function of Beira port and neighboring countries for international freight traffic
TR-8	New Zambezi River Bridge Project	Tete city	ANE, private firms	<ul style="list-style-type: none"> a) To meet future traffic demand on international artery across the river, and b) To establish a symbol of regional and national integration in new era.
TR-9	Tete and Moatize Municipal Road Improvement Project	Tete and Moatize	Tete and Moatize Municipalities	<ul style="list-style-type: none"> a) To meet future traffic demand both of Tete city and Moatize municipalities, and b) To promote Tete and Moatize core urban development concept.
TR-10	Tete International Airport Project	Tete city	Dept. of Civil Aviation, private firm	<ul style="list-style-type: none"> a) To upgrade facilities and services of Tete Airport, and b) To establish a international air services network linkaged with neighboring countries.
TR-11	Border Facilities Improvement Project	Zobue, Calomue, Biri-biri, Cuchamano, Cassacatize, Missasale	Customs and immigration office	<ul style="list-style-type: none"> a) To upgrade facilities and services of customs and immigration office b) To meet future entry and exit traffic and establish efficient customs and immigration systems
TR-12	Zambezi River Transport Development	Zambezi River	Private firms	<ul style="list-style-type: none"> a) To utilize the Zambezi river as in expensive means to transport local goods, and b) To introduce river cruising for tourism.

Source: JICA Study Team

District administrations are responsible for non-classified roads. At present they do not have sufficient financial, administrative and technical capabilities even for routine maintenance. Resource allocated to districts may increase in line with rural transport improvement policy. To implement rural road rehabilitation projects, it would be essential to involve communities alongside the rural roads not only for rehabilitation works, but also for routine and periodic maintenance works.

In Phase 1, urgent measures should be undertaken to rehabilitate certain roads of the rural feeder roads to make them passable under any weather condition. In Phase 2 and 3, feeder roads should be improved based on a priority ranking.

(3) Village service road self-help improvement program

Village service roads are a network of small paths linking small villages and feeder roads and community center where basic social services, such as schools and health posts are provided. Most village service roads are mainly for pedestrians and bicycles. These roads are very difficult to pass during dry season and are not passable in wet season because these roads have not been maintained regularly and some deeply eroded. Under the program, the government provides communities with basic tools such as shovels, hoes and bush cutters. Under the leadership of community leaders and the trained villagers, villagers construct and maintain small roads and paths using locally available gravel and materials.

(4) New Zambezi River Bridge

The existing Zambezi river bridge, constructed some 35 years ago during Cahora Bassa construction period, cannot hold much traffic expected to increase on the international artery linking Malawi, Zambia, Zimbabwe and the port of Beira. A new bridge will be required during Phase 3, if not earlier. Considering the long lead time for project preparation and construction, a feasibility study may start in early part of Phase 2.

The existing bridge represents the state-of-the-art technology at the time of its construction, and the new one should not be a cheap substitute. The new bridge should be an embodiment of international cooperation among all the riparian countries that should be promoted through the coming decade. It should be designed and constructed by mustering technological and financial capacities of the riparian countries as a peaceful symbol of cooperation, supported by international aid society.

(5) Urban Roads Improvement in Tete City and Moatize Municipality

Among the urban environmental problems emerging in the Angonia region due to the population pressure are inadequate urban road systems, squatters, and traffic accidents. At present, these are observed in Tete city and its vicinities. As Tete city and the town of

Moatize are expected to grow into a regional center for the central Mozambique, they should be served with adequate urban road systems respectively.

The project is to improve the conditions of urban roads in Tete city and Moatize, covering newly developing areas as well. It will be implemented during Phase 2-Phase 3 following the urban planning to be conducted under Project No. 4.2.

4.2.3. Railway project – Sena line rehabilitation project

A careful review was made on the existing studies related to the Sena Railway Line, including the most recent Sena Line Programme (SLP) by GPZ (July 2000), and has examined three scenarios. Forecast traffic demand under the alternative scenarios is summarized as follows.

Summary of Forecast Traffic Demand of Sena Line

(Unit; 10³ tons/year)

Domain	Scenario 1 High level development	Scenario 2 Medium level development	Scenario 3 Low level development
1 Moatize coal and minerals	6,500	3,000	1,000
2 Traffic to/from Malawi	655	546	546
3 Traffic from Tete province	167	139	139
4 Domestic traffic	654	380	380
Total	7,476	4,065	2,065

Source: JICA Study Team.

Through the evaluation of the alternative scenarios and field surveys, a stage-wise development of the Sena line has been planned as follows:

Phase 1: 2001-2005

- confirmation of alignment and right of way,
- clearing of mines and other obstruction,
- preparation of a detailed stage restoration plan, and
- determination of concession company including financial arrangement, and carrying out F/S and D/D of medium cost rehabilitation from Dondo to Vila Nova (335 km) and Dona Ana to Moatize (245 km)

Phase 2: 2006-2015

- implementation of medium cost rehabilitation from Dondo to Vila Nova (335 km) and Dona Ana to Moatize (254 km)
- expansion of a high grade railway link from Dondo to Moatize(552km)
- introduction of passenger services,
- F/S of new line from Moatize and Tete city and Cambulatsisi to Blantyre,

Phase 3: 2015-2025

- D/D and of new line from Moatize and Tete city and Cambulatsisi to Blantyre, and
- construction of new lines.

Potential traffic demand for the Sena railway may exceed 2 million tons per year by 2005, which may increase to 4 million tons per year by 2010, once the line is provided.

4.2.4. Other transport projects

(1) Rural bus services improvement

Bus transport in Tete province serves to carry not only passengers but also cargo traffic. Provision and improvement of the rural bus service should be planned with this condition in mind. In Tete province, there are only 10 bus routes, all originating in Tete City. 60 bus companies are registered with only 88 buses in total. Frequent services are available only between Tete city and Moatize. Bus fares are determined proportional to distance. Unit cost in Tete province is Mt 250 per km on tarred roads and Mt 270 per km on non-tarred roads, both higher than the national standard of Mt 220 per km due to higher petroleum costs.

The project will provide incentives to private bus operators to encourage competition on new routes and for more frequent services in the forms of tax exemption, provision of concessional loans, and introduction of an appropriate fare structure. The incentives should be applied to bus operators expanding service routes to rural areas. Some incentives should be proportional to the length of service routes so that the bus operators would be encouraged to extend their routes to unpopular areas. Concessional loans may be applied to purchase of vehicles.

A bus terminal should be established in Tete city to serve not only inter-provincial buses but also intra-provincial buses. The terminal includes an international bus passenger terminal, inter-provincial bus terminal, intra-provincial bus terminals, restaurants, related service facilities and parking area.

(2) Inland freight terminal

International freight traffics pass through the Angonia region, as it is located on the crossroad between the two international arteries linking Malawi, Zambia and Zimbabwe. Transit traffic at present accounts for about 60% of the total cargo traffic volume in the region. As the economy develops in the Angonia region and neighboring regions and countries, the region would have to accommodate much larger cargo traffic volume. Moreover, the region should increasingly take advantage of its strategic location to process goods to be imported for export in line with the outward-oriented production strategy of the Master Plan. Production for export based on indigenous resources should be

expanded as well.

The project will establish a freight terminal in Tete city to facilitate long haulage freight transport. The terminal initially includes international and domestic freight terminals, restaurants, related services facilities, and parking area. Subsequently, container yards with handling facilities would also be provided to establish an inland container depot or dry port. This would serve as important terminal facilities in the multi-modal transportation system where transfer of cargoes among different transport modes would take place efficiently.

(3) Tete International Airport Upgrading

The existing airport facilities at the Tete airport are generally tolerable to handle air passengers and cargoes at present and would be so in the near future. To attract more foreign investments to the Angonia region, however, their facilities and services need to be upgraded over the medium to long term.

In the early part of Phase 2 (2006-2015), passenger terminal facilities should be improved and cargo terminal facilities newly constructed. In parallel with these, a study may be undertaken to improve the airport operation, especially in view of establishing a local air services network linked with neighboring countries. New institutional arrangements and service facilities would be required for such an expanded operation, including immigration, customs and quarantine. Airport operation should be privatized within Phase 2 to upgrade services.

(4) Border Facilities Improvement

Cross-border transportation of goods and people will become increasingly a norm in and around the Angonia region. As the international traffic increases many folds in the coming decade, immigration and customs clearance will become a serious constraint to smooth flow of traffic. The project will provide improved facilities for immigration and customs. Some existing facilities may be rehabilitated initially, but new immigration and customs facilities will be constructed in Phase 2 at all the border points together with related service facilities.

At present, border trade is dominantly undertaken as informal activities. An exception is a municipal market in Zobue, where some 110 stalls are established. Each small trader installs a stall of its own and pays a fixed price per day for sales activities, while security and cleaning are ensured by the local administration. This market should be upgraded, and similar facilities installed in other border areas. This will formalize the border trade and increase income for local administrations. At the same time, better security and sanitation will benefit traders...

(5) Zambezi River Transport Development

At present, the Zambezi river is hardly used even for local transport of goods. Reasons include low level of economic activities and low needs for local transactions, and shallow and unstable flow of the Zambezi water. The river, however, is navigable with a small ship of up to 100 ton with one meter draft. As the economy develops, particularly with more outward-oriented production and services as envisioned by the Master Plan, local and inter-regional transactions will expand rapidly. The river may be used for local transport of some goods and, to a limited extent, inter-regional transactions. Goods to be transported may include logs and lumber, bamboo products, coal briquettes, construction materials, some agricultural products and daily necessities.

A small river port should be provided in Tete city, since it is the center of regional and inter-regional transactions, to facilitate embarking and disembarking of various goods. Shipping services should be provided by private operators to be registered for commercial transactions. Small private ships to transport personal goods may also use the facilities.

In the medium to long term future, river cruising may be introduced to serve domestic and international tourists. Short excursions up and down the magnificent Zambezi river would be an additional attraction for international tourists as well. Port facilities may be upgraded to accommodate pleasure boats, and waterfront development undertaken in the port area as part of amenity creation.

Appendix
Sector Report 4
Infrastructure
Part 1: Transportation

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (1/11)

Overall

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	16,808	28,755	45,563	66,623	7,493	0	0	119,678
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	51,840	0	0	3,645	55,485	227,813	0	3,645	7,493	294,435
Other Mozam.	15,998	0	0	0	15,998	0	0	0	0	15,998
Sub Total	67,838	0	16,808	32,400	117,045	294,435	7,493	3,645	7,493	430,110
Malawi	0	0	103,275	2,633	105,908	0	26,933	317,723	2,835	453,398
Zimbabwe	27,135	0	0	0	27,135	203,108	0	0	0	230,243
South Africa	47,385	0	0	1,418	48,803	202,703	0	0	0	251,505
Zambia	0	0	0	0	0	0	0	405	0	405
Total	142,358	0	120,083	36,450	298,890	700,245	34,425	321,773	10,328	1,365,660

Source: Estimates by JICA Study Team.

Tobacco

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	23,299	39,861	63,161	80,862	9,292	0	0	153,315
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	71,863	0	0	5,356	77,219	293,533	0	4,809	9,608	385,168
Other Mozam.	22,176	0	0	0	22,176	0	0	0	0	22,176
Sub Total	94,039	0	23,299	45,217	162,556	374,394	9,292	4,809	9,608	560,660
Malawi	0	0	133,068	3,392	136,460	0	30,995	366,543	3,176	537,175
Zimbabwe	33,654	0	0	0	33,654	233,748	0	0	0	267,401
South Africa	58,909	0	0	1,870	60,779	233,849	0	0	0	294,629
Zambia	0	0	0	0	0	0	0	465	0	465
Total	186,602	0	156,367	50,479	393,449	841,991	40,288	371,817	12,785	1,660,330

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (2/11)

Coffee/Tea

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	1,418	0	1,418
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	0	0	1,418	0	1,418
Malawi	0	0	3,038	0	3,038	0	2,228	44,955	0	50,220
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	3,038	0	3,038	0	2,228	46,373	0	51,638

Source: Estimates by JICA Study Team.

Sugar/Salt

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	6,683	0	6,683	0	0	0	0	13,365
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	4,253	0	0	0	4,253	0	0	0	0	4,253
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	4,253	0	6,683	0	10,935	0	0	0	0	10,935
Malawi	0	0	83,835	0	83,835	0	0	3,038	0	86,873
Zimbabwe	0	0	0	0	0	33,210	0	0	0	33,210
South Africa	0	0	0	0	0	6,278	0	0	0	6,278
Zambia	0	0	0	0	0	0	0	0	0	0
Total	4,253	0	90,518	0	94,770	39,488	0	3,038	0	137,295

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (3/11)

Rice/Sago/Maize/Cotton/Wheat/Beans/Fish/Banana

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	1,013	10,733	11,745	0	2,025	0	0	25,515
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	18,630	0	0	0	18,630	0	0	0	0	18,630
Other Mozam.	4,860	0	0	0	4,860	0	0	0	0	4,860
Sub Total	23,490	0	1,013	10,733	35,235	0	2,025	0	0	37,260
Malawi	0	0	2,025	0	2,025	0	3,443	15,188	2,835	23,490
Zimbabwe	0	0	0	0	0	18,023	0	0	0	18,023
South Africa	0	0	0	0	0	36,855	0	0	0	36,855
Zambia	0	0	0	0	0	0	0	0	0	0
Total	23,490	0	3,038	10,733	37,260	54,878	5,468	15,188	2,835	115,628

Source: Estimates by JICA Study Team.

Beverages

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	1,013	0	0	0	1,013	0	0	0	0	1,013
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	1,013	0	0	0	1,013	0	0	0	0	1,013
Malawi	0	0	0	0	0	0	0	6,683	0	6,683
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	1,013	0	0	0	1,013	0	0	6,683	0	7,695

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (4/11)

Petroleum products

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	19,035	0	0	0	19,035	165,038	0	0	0	184,073
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	19,035	0	0	0	19,035	165,038	0	0	0	184,073
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	2,835	0	0	0	2,835
Zambia	0	0	0	0	0	0	0	0	0	0
Total	19,035	0	0	0	19,035	167,873	0	0	0	186,908

Source: Estimates by JICA Study Team.

Fertilizer

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	5,670	0	0	0	5,670
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	0	0	0
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	5,670	0	0	0	5,670
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	51,030	0	0	0	51,030
South Africa	43,133	0	0	0	43,133	44,550	0	0	0	87,683
Zambia	0	0	0	0	0	0	0	0	0	0
Total	43,133	0	0	0	43,133	101,250	0	0	0	144,383

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (5/11)

Other chemical products

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	608	0	0	0	608	0	0	0	0	608
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	608	0	0	0	608	0	0	0	0	608
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	10,530	0	0	0	10,530
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	608	0	0	0	608	10,530	0	0	0	11,138

Source: Estimates by JICA Study Team.

Mineral products

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	52,448	0	0	0	52,448
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	11,543	0	0	0	11,543
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	63,990	0	0	0	63,990
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	63,990	0	0	0	63,990

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (6/11)

Wood/Wood products

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	7,088	0	7,088	0	0	0	0	14,175
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	0	0	0
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	7,088	0	7,088	0	0	0	0	7,088
Malawi	0	0	0	0	0	0	1,418	0	0	1,418
Zimbabwe	0	0	0	0	0	1,620	0	0	0	1,620
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	7,088	0	7,088	1,620	1,418	0	0	10,125

Source: Estimates by JICA Study Team.

Textile products/Clothes

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	2,025	0	0	3,645	5,670	18,225	0	0	4,050	27,945
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	2,025	0	0	3,645	5,670	18,225	0	0	4,050	27,945
Malawi	0	0	0	0	0	0	0	16,200	0	16,200
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	1,620	0	0	0	1,620
Zambia	0	0	0	0	0	0	0	405	0	405
Total	2,025	0	0	3,645	5,670	19,845	0	16,605	4,050	46,170

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (7/11)

Leather/Shoes

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	0	0	0
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	0	0	0	0	0
Malawi	0	0	1,418	0	1,418	0	0	0	0	1,418
Zimbabwe	0	0	0	0	0	2,228	0	0	0	2,228
South Africa	0	0	0	0	0	0	0	0	0	0
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	1,418	0	1,418	2,228	0	0	0	3,645

Source: Estimates by JICA Study Team.

Consumer goods

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	3,848	0	0	0	3,848
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	3,848	0	0	0	3,848
Malawi	0	0	0	2,633	2,633	0	1,418	2,835	0	6,885
Zimbabwe	0	0	0	0	0	31,995	0	0	0	31,995
South Africa	4,253	0	0	0	4,253	41,715	0	0	0	45,968
Zambia	0	0	0	0	0	0	0	0	0	0
Total	4,253	0	0	2,633	6,885	77,558	1,418	2,835	0	88,695

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (8/11)

Construction materials

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	5,670	0	0	0	5,670	0	0	0	0	5,670
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	5,670	0	0	0	5,670	0	0	0	0	5,670
Malawi	0	0	0	0	0	0	0	1,418	0	1,418
Zimbabwe	27,135	0	0	0	27,135	29,565	0	0	0	56,700
South Africa	0	0	0	0	0	30,578	0	0	0	30,578
Zambia	0	0	0	0	0	0	0	0	0	0
Total	32,805	0	0	0	32,805	60,143	0	1,418	0	94,365

Source: Estimates by JICA Study Team.

Construction equipment

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	4,658	0	0	0	4,658
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	4,658	0	0	0	4,658
Malawi	0	0	0	0	0	0	0	8,910	0	8,910
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	1,418	1,418	1,013	0	0	0	2,430
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	1,418	1,418	5,670	0	8,910	0	15,998

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (9/11)

Automobile parts and goods

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	3,038	0	0	0	3,038
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	3,038	0	0	3,443	6,480
Other Mozam.	6,683	0	0	0	6,683	0	0	0	0	6,683
Sub Total	6,683	0	0	0	6,683	6,075	0	0	3,443	16,200
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	2,835	0	0	0	2,835
Zambia	0	0	0	0	0	0	0	0	0	0
Total	6,683	0	0	0	6,683	8,910	0	0	3,443	19,035

Source: Estimates by JICA Study Team.

Other manufactured goods

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	2,025	18,023	20,048	5,468	0	0	0	45,563
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	608	0	0	0	608	19,440	0	0	0	20,048
Other Mozam.	4,455	0	0	0	4,455	0	0	0	0	4,455
Sub Total	5,063	0	2,025	18,023	25,110	24,908	0	0	0	50,018
Malawi	0	0	3,240	0	3,240	0	203	5,670	0	9,113
Zimbabwe	0	0	0	0	0	10,530	0	0	0	10,530
South Africa	0	0	0	0	0	22,073	0	0	0	22,073
Zambia	0	0	0	0	0	0	0	0	0	0
Total	5,063	0	5,265	18,023	28,350	57,510	203	5,670	0	91,733

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (10/11)

Livestock

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	0	0	0
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	2,228	0	0	0	2,228
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	2,228	0	0	0	2,228

Source: Estimates by JICA Study Team.

Scrap

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	0	0	0	0	0
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	0	0	0	0	0
Malawi	0	0	0	0	0	0	0	2,025	0	2,025
Zimbabwe	0	0	0	0	0	0	0	0	0	0
South Africa	0	0	0	0	0	203	0	0	0	203
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	203	0	2,025	0	2,228

Source: Estimates by JICA Study Team.

Appendix 1.3. Estimated Freight Traffic Volume by Cargo Content, 2000 (11/11)

General goods

Unit: '000 tons/Year

	Study Area	Tete Prov.	Beira & Sofala	Other Moz.	Sub Total	Malawi	Zimbabwe	South Africa	Zambia	Total
Study Area	0	0	0	0	0	0	0	0	0	0
Tete Prov.	0	0	0	0	0	0	0	0	0	0
Beira & Sofala	0	0	0	0	0	2,025	0	2,228	0	4,253
Other Mozam.	0	0	0	0	0	0	0	0	0	0
Sub Total	0	0	0	0	0	2,025	0	2,228	0	4,253
Malawi	0	0	0	0	0	0	0	0	0	0
Zimbabwe	0	0	0	0	0	11,543	0	0	0	11,543
South Africa	0	0	0	0	0	9,923	0	0	0	9,923
Zambia	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	23,490	0	2,228	0	25,718

Source: Estimates by JICA Study Team.

Appendix 1.4. List of References

No.	Name of Information/Reports	Published by and Date of Publication
1	Development Study of Moatize Coal Fields and Transport Infrastructure	CFM
2	First technical and Financial Coordination Conference - Rehabilitation and Reconstruction of Sena Line	CFM, April 20, 1998
3	Mozambique: Development Study of Moatize Coal Fields and Transport Infrastructure	Giersing Rose A/S
4	Report on the Potential for Undergrnd Mining of the Moatize Coalfield in Mozambique	International Mining Consultants Ltd. (IMC), March 1997
5	Sena Line Programme - Strategy Assessment Report	DIWI - SOGIR JV May 2000
6	Sena Line Programme - Summary of Development Strategy	DIWI - SOGIR JV July 2000
7	Sena Line Programme - Project Identification Report	DIWI - SOGIR JV April 2000
8	Sena Line Programme - Draft Strategy Report	Giersing Rose A/S, June 2000
9	Trafeco nas estradas de Mozambique, 1998	DNEP, June 1999
10	Statistical Yearbook, 1998	INEA, 2000
11	Transportation and Communication Statistics 1997	INEA, 1998
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14	Transport and Communications Integration, The Catalyst for Economic Development in Southern Africa, Volume 1:	May 1998
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22	Employment Intensive Infrastructure Programmes: Capacity Building for Contracting in the Construction Sector	ILO, 1999
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