

REPUBLIC OF MALAWI
MINISTRY OF TRANSPORT AND PUBLIC INFRASTRUCTURE (MOTPI)

**PROJECT
FOR THE STUDY ON
DEVELOPMENT OF THE SENA CORRIDOR
IN THE REPUBLIC OF MALAWI
FINAL REPORT**



FEBRUARY 2012

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

**CENTRAL CONSULTANT INC.
NIPPON KOEI CO., LTD.
YACHIYO ENGINEERING CO., LTD.
TOSTEMS, INC.**

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PREFACE

In response to a request from the Government of the Republic of Malawi, the Government of Japan decided to conduct a study on Development of the Sena Corridor in the Republic of Malawi and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched a study team headed by Mr. Hikaru NISHIMURA of Central Consultant Inc. and consists of Central Consultant Inc., Nippon Koei Co., Ltd., Yachiyo Engineering Co., Ltd., and Tostems, Inc. between October 2010 and February 2012.

The team held discussions with the officials concerned of the Government of the Republic of Malawi and conducted studies to prepare the Master Plan for Development of the Sena Corridor and carry out the Pre-Feasibility Study of selected priority projects. Upon returning to Japan, the team conducted further studies and prepared this final report.

I hope that this report will contribute to the promotion of this project and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to the officials concerned of the Government of the Republic of Malawi for their close cooperation extended to the study.

February 2012

Kiyofumi KONISHI
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

LETTER OF TRANSMITTAL

February 2012

Mr. Kiyofumi KONISHI
Director General
Economic Infrastructure Department
Japan International Cooperation Agency

Dear Sir,

We are pleased to submit herewith the study report on Development of the Sena Corridor in the Republic of Malawi.

This study was conducted by Central Consultant Inc., in association with Nippon Koei Co., Ltd., Yachiyo Engineering Co., Ltd., and Tostems, Inc. between October 2010 and February 2012. During the course of the study, we examined the present condition of the transportation network in Malawi and Mozambique, and prepared the Master Plan for Development of the Sena Corridor, as a transport corridor in the Southern Region of Malawi, and conducted the Pre-Feasibility Study on selected priority projects.

We wish to take this opportunity to express our sincere gratitude to the officials concerned of JICA and the Embassy of Japan in the Republic of Malawi. We would also like to express our gratitude to the officials concerned of the Ministry of Transport and Public Infrastructure (MoTPI) and other relevant authorities in the Government of the Republic of Malawi.

We hope this study will help promote the development of the international transport corridor in the Republic of Malawi.

Yours faithfully,



Hikaru NISHIMURA

Team Leader

Project for the Study on Development of Sena
Corridor in the Republic of Malawi

EXECUTIVE SUMMARY

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1. Introduction

Malawi is a land locked country, and due to long transport distances to ocean ports in neighbouring countries, transport costs to ports are very high, reducing the sustainable international competitiveness of domestic products. The Sena Corridor defined in the Study connects the Southern Region of Malawi and Beira Port by road, railway and inland waterway, which presently suffers obstacles such as disconnection at the Chiromo Washaway and deteriorated conditions of the roads and railway in Mozambique.

The objectives of the Study are as follows:

- To prepare a Master Plan for the development of the Sena Corridor in order to secure multiple international corridors for national security.
- To carry out a Pre- F/S for the projects selected based on the results of the Master Plan. The following projects have been selected for the Pre-F/S:
 - Reconstruction of the S151 road between Makhanga and Bangula (9 km).
 - Rehabilitation and reconstruction of the railway between Limbe and Border (Marka) (201 km).

The Study Area in Malawi covers nine districts in the Southern Region of Malawi and four provinces in Mozambique.

2. Outline of the Study Area

(1) Sena Corridor and Regional Coordination

- The Sena Corridor is defined as a traffic route connecting Blantyre to Beira Port and an additional southern gateway to Malawi in view of its historical background.
- It is necessary for Malawi to coordinate with other member countries of SADC and COMESA to strengthen international transport corridors to secure transport routes for export and import products.

(2) Economic and Social Conditions in Malawi and the Study Area

- The GDP per capita has remained lower in Malawi (US\$ 343 in 2010) than in neighbouring countries.
- Foreign direct investment (FDI) into Malawi is very low (US\$ 140 million in 2010) compared with the three neighbouring countries.
- Land use in the Study Area is mainly agriculture, with widespread cultivation of tea, nuts, pigeon peas, food crops, sugar, cotton and bananas, and cattle breeding.
- The population in the Study Area is mainly distributed in highland districts, owing to the higher proportion of arable land for cultivation and plantations, while the population distribution in the Lower Shire is limited.

- The poverty ratio is highest in the Southern Region with 64.4% below the poverty line¹. The ultra poverty ratio in the Southern Region is also the highest at 31.5%, compared with 22.4% for the whole of Malawi. Nsanje District has both the highest poverty ratio (76.0%) and ultra poverty ratio (44.3%).
- Water overflowed into Elephant Marsh when backwater of the Shire River washed away the embankment of the railway and S151 road near Bangula in March 1997. Problems caused by the regional disconnection at the Chiromo washaway are 1) Additional burden of transport cost by boat, 2) Longer travel time between origin and destination, 3) Impassable conditions during the rainy season, 4) Risk to life and 5) Decrease of monthly income for people living in Chiromo and Makhanga. The Chiromo washaway also affects people living along the railway line between Luchenza and Sankhulani who lost the opportunity to sell products at markets because the train now runs only weekly instead of daily.

(3) National Development Policy and Programmes

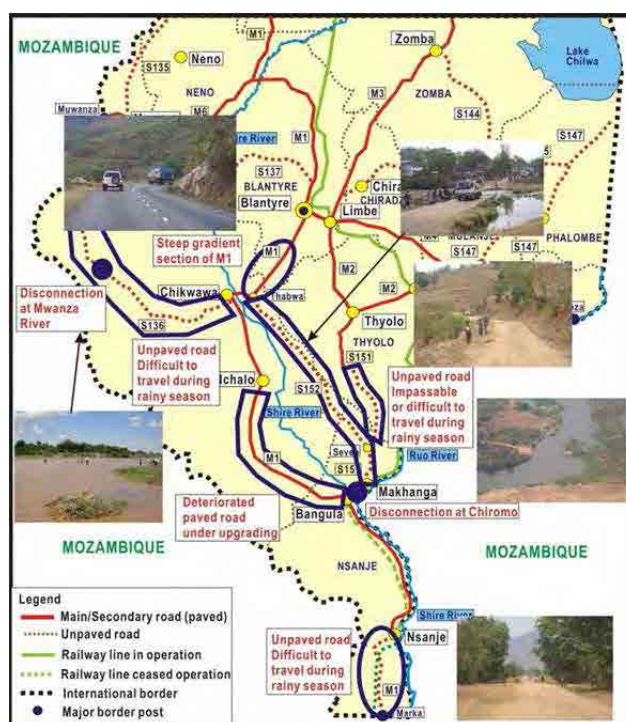
- Sustainable economic growth is one of the main targets of MGDS. Sustainable economic growth is central to Malawi's ability to reduce poverty, achieve the MGDS and gain food self-sufficiency.
- The selected projects listed in PSIP are those identified programmes and projects that are consistent with the GoM's strategic objectives and priorities as aligned with the MGDS and that are linked to available financing mechanisms.

3. Present Situation of Transport System in the Study Area

(1) Present Situation of the Road Sub-sector

In the south of the Study Area including Thyolo, Chikwawa and Nsanje Districts and part of Blantyre and Mwanza Districts, the length of the arterial road network is 528 km, of which 45.7% is paved, 4.5 points lower than the national level.

M1 is one of the most important arterial roads as both a domestic and international corridor in Malawi; it links the northernmost Tanzania border and the southernmost Mozambique border, forms the north-south axis between Blantyre and Marka border post, and links major towns in the Study Area. M2 and M4 connect Blantyre with the Muloza border post. M6 connects Blantyre with Mwanza



Source: Study Team

Figure 1 Major Problems of Road Sub-sector

¹ Poor: MWK 16,165 per annum, Ultra poor: MWK 10,029 per annum

border post.

There are two transportation routes between Blantyre and Bangula, the latter being a town north of Nsanje District. The main route in the Study Area is M1 passing through Chikwawa District and a potential alternative is the secondary road S151 passing through Thyolo District. S152, which runs along the district's boundary between Chikwawa and Thyolo districts, links M1 and S151 which form the arterial road network in the Study Area.

The major problems of the road sub-sector are summarised in Figure 1.

(2) Present Situation of the Railway Sub-sector

CEAR currently operates 706 km of single-track line by the concession agreement signed in 1999. The railway network of Malawi is a non-electrified single-track line of narrow gauge (1,067 mm).

Vale signed a MoU and a concession agreement with the GoM on the construction/rehabilitation and operation of a railway line from Moatize to *Nacala-á-Velha* Port in Mozambique, through Malawi.

The major problems of the railway sub-sector are summarised in Figure 2.

(3) Inland Waterway Transport Sub-sector

At present, the SADC Secretariat is preparing to select a consultant to carry out the feasibility study of the Shire–Zambezi Waterways Development Project, which will be financed by AfDB. The results of this

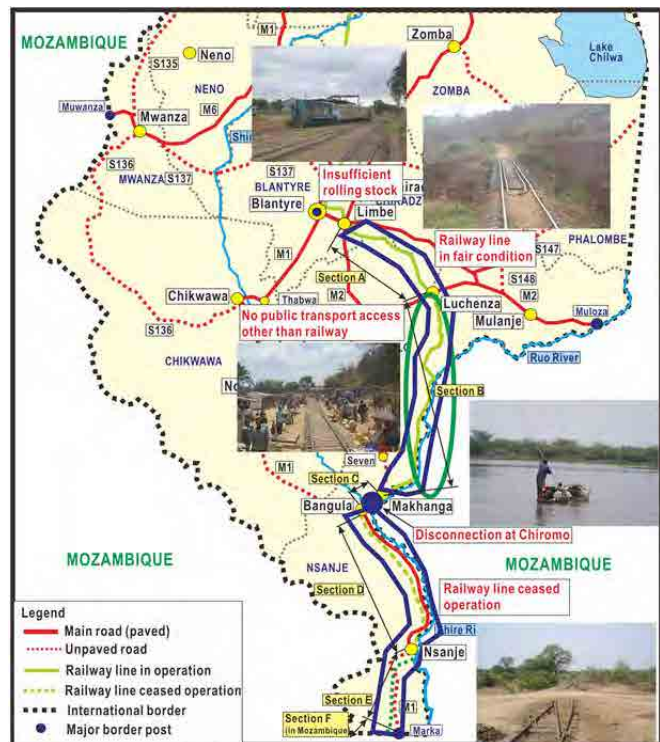
feasibility study will form the basic policy of the GoM and the GoMZ for developing the Shire–Zambezi Waterway Corridor and international cooperation for its operation.

(4) Transport Corridor Development in Neighbouring Countries

The existing transport corridor networks connecting with Malawi are the Beira, Durban, Nacala and Dar es Salaam Corridors. The Durban Corridor carries 51% of Malawi's international cargoes by value, and the Beira Corridor carries 41% by volume.

The major issues for both the Beira and Nacala Corridors are summarised below.

- To develop domestic transport networks which will strengthen export routes to Nacala Port.
- To promote a modal shift to change the transit system.
- To establish an efficient logistics system by developing a modern railway system and minimising transshipment time and cost.
- To build alternative routes to secure and strengthen access to Beira Port.



Source: Study Team

Figure 2 Major Problems of Railway Sub-sector

-
- To strengthen and improve internal access to border posts.
 - To communicate and formulate a comprehensive Sena Corridor co-development programme for the development of the Sena routes.

4. Future Traffic Demand Forecast

(1) Results of Traffic Surveys

Freight traffic trips are spread over a wide area. Especially, trips to Nacala and Beira Ports as well as to RSA are predominant. This means that freight traffic in the Southern Region of Malawi extends over a wide area.

(2) Results of Logistics Survey

- The value of exports and imports for Malawi from 1994 to 2010 has been increasing in line with economic growth. The value of imports is almost twice that of exports in Malawi.
- Tobacco has been Malawi's leading export for over 30 years and the situation has not changed. Sugar and tea occupy second or third place by value every year. Regarding imports, fuel is always in top place by volume.
- The main transportation mode is by truck/trailer with containers taking almost 90%. Railway accounts for less than 10%.
- The transport cost of import and export commodities is higher on the Durban and Dar es Salaam Corridors; in particular, the import transport cost from Durban Port is the highest.
- Products are mainly placed in containers at Blantyre or Limbe (logistics centre).
- Sugar is mainly transported to Nacala Port by railway, except exports to Zimbabwe by truck (bulk).
- Pigeon peas are transported to Nacala (by railway), Beira and Durban Ports (by road).
- Longer transport routes to Durban and Beira Ports (tea, tobacco, cotton, pigeon peas).
- Steep gradient sections between Blantyre and Thabwa hinder transportation by limiting the loading capacity.

(3) Future Traffic Demand Forecast

- Approximately 80% of export cargo uses the Beira Corridor to Beira Port and the Durban Corridor to RSA and Durban Port at present.
- Approximately 64% of import cargo uses the Beira and Durban Corridors from Beira Port and RSA, while 14% of import cargo uses the Nacala Corridor at present.
In 2030, about 51% of export cargo will use the Nacala Corridor, while the share of the Beira and Durban Corridors will decrease to 43%.
- The huge demand for coal from the Moatize coal mine and copper from Zambia will consume most of the capacity of the Nacala Railway with only the remaining capacity available for freight to/from Malawi.
- The Beira Corridor carries 41% of Malawi's international cargo at present, which will decrease to less than 17% in 2030. The Nacala Corridor accounts for 18% at present, which will increase to 44% in 2030. The Sena Corridor will account for at least 19% by 2030.

- The results of assignment of future freight volume and vehicular traffic to alternative transport networks indicate that 1,648 million tonnes/year of freight will go through the Sena Corridor if every transport network is connected to Beira Port (see Figure 3).

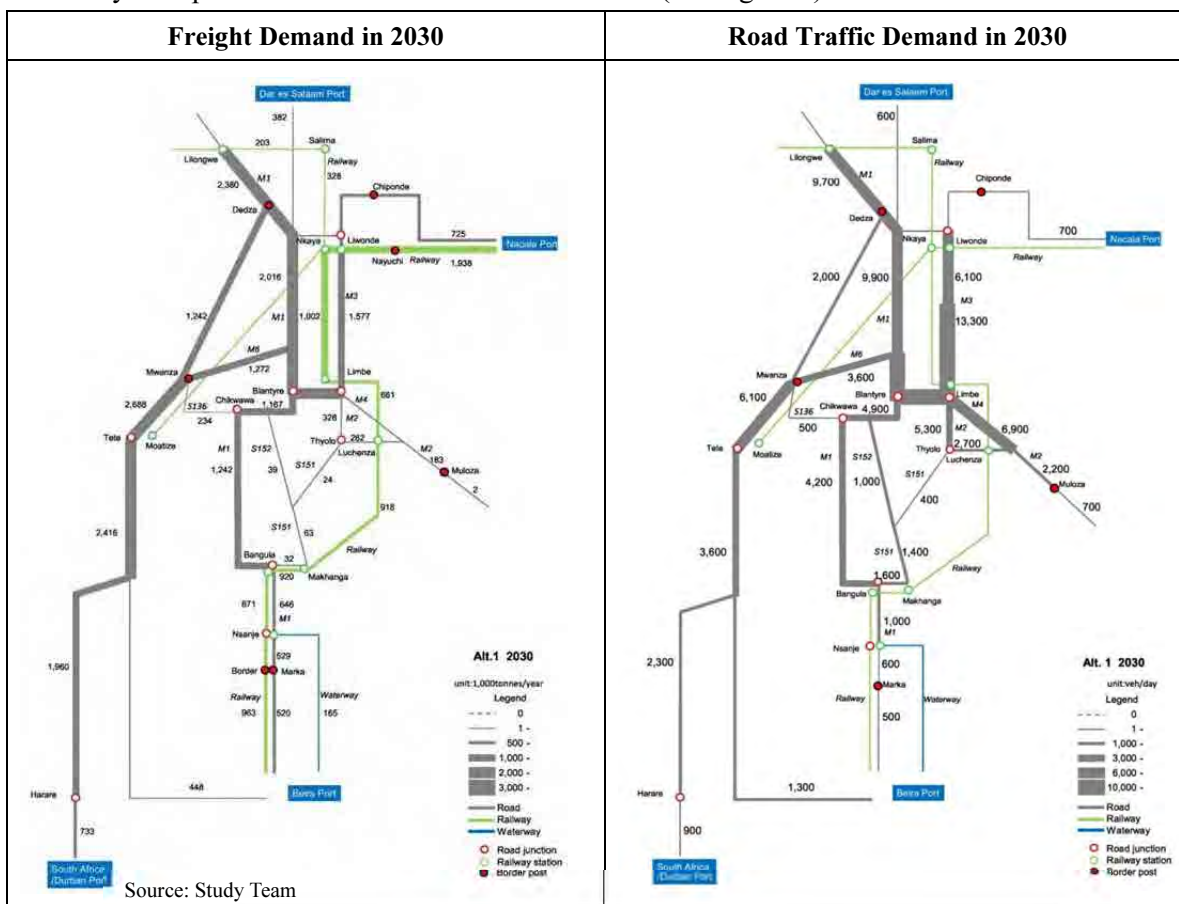


Figure 3 Freight and Road Traffic Demand in 2030 (Alt. 1)

5. Basic Policy for Development of the Sena Corridor

(1) Significance of Development of the Sena Corridor

For Malawi, there are several transport routes to neighbouring countries and some of the existing corridors are defined as international transport corridors as part of the North–South Transport Corridor defined by the SADC as gateways to neighbouring countries and ocean ports, as follows:

- Beira Corridor to Beira Port: Southwestern gateway
- Durban Corridor to RSA and Durban Port: Southwestern gateway
- Nacala Corridor to Nacala Port and Zambia: Eastern and Western gateway
- Dar es Salaam Corridor to Dar es Salaam Port: Northern gateway

If the Sena Corridor is developed, it will serve as both an international corridor as well as a domestic corridor in the Study Area, instead of only as a domestic corridor at present.

(2) Basic Concept of Developing the Sena Corridor

The development potentials in Malawi and the Study Area are as follows:

- The main industry in Malawi is agriculture and export-oriented products, which have long been cultivated. The productivity of these products can be increased by providing farmers with sufficient materials, such as fertilizer.
- Since Blantyre serves as the commercial and agro-processing centre in Malawi, the district centres in the Southern Region will serve as rural growth centres to support Blantyre.
- There is mining potential in Mulanje and Nsanje Districts, and tourism potential in Chikwawa, Nsanje and Mulanje Districts in the Study Area.

To maximize the development potential of the Study Area, three basic concepts for developing the Sena Corridor are prepared (see Table 1).

Table 1 Basic Concepts and Targets of the Sena Corridor

Area	Basic Concept	Target
South-eastern Africa	<ul style="list-style-type: none"> • Development of infrastructure network to support economic integration in South-eastern Africa 	<ul style="list-style-type: none"> • Achieve sustainable economic growth • Strengthen redundancy of transport network
Malawi	<ul style="list-style-type: none"> • Development of arterial transport network to support efficient export and import 	<ul style="list-style-type: none"> • Achieve sustainable economic growth • Improve international competitiveness of export products • Strengthen redundancy of transport network
Study Area	<ul style="list-style-type: none"> • Development of transport network to alleviate poverty 	<ul style="list-style-type: none"> • Achieve sustainable economic growth • Alleviate poverty • Improve living condition in the Study Area

Source: Study Team

The development goals of the Sena Corridor are sustainable economic growth and poverty alleviation in Malawi and the Study Area by improving the inadequate transport network and boosting regional development.

6. Master Plan for the Development of the Sena Corridor

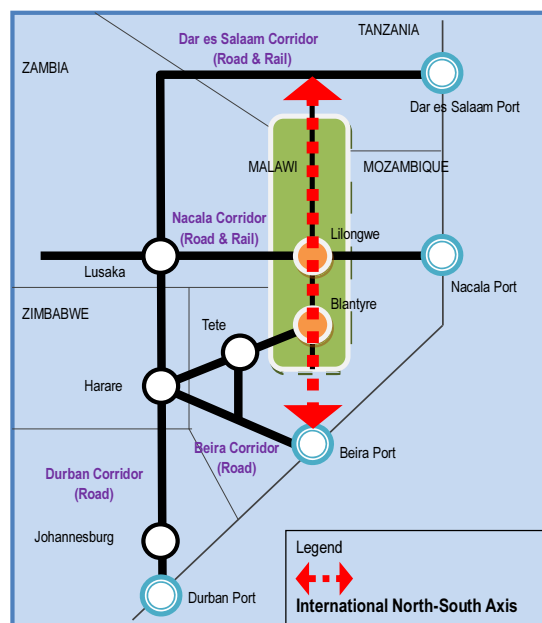
(1) Objective of the Master Plan

The objective of the Master Plan for the development of the Sena Corridor is to prepare improvement plans for the transport sub-sectors, i.e. road, railway and inland waterway sub-sectors, which form the Sena Transport Corridor. The Master Plan describes definite plans for the transport system and its services in the Southern Region of Malawi.

(2) Overview of the Development of the Sena Corridor

- The development of a north-south international corridor linking the east-west international corridors will create wider, regional, efficient logistics networks integrating the five countries of Malawi, Mozambique, Tanzania, Zambia and Zimbabwe.
- The Sena Corridor (from Blantyre to Beira Port) forms a part of the north-south international axis (see Figure 4).
- Based on the future demand, development of the Sena Corridor is of great significance for Malawi since it would supplement and diversify the traffic functions of the Nacala and Beira Corridors.

- For Malawi, the Sena Corridor is a part of the national north-south axis. The development of the Sena Corridor is expected to contribute to balanced development of the country since the southern region serves as the gateway to Beira Port with the shortest route, and will strengthen access to the Nacala Corridor.
- The Sena Corridor is an arterial transport network in the Study Area. Once the traffic functions are enhanced by developing the Corridor, it is expected to improve access to/from Blantyre as well as from the poverty areas to the arterial traffic network.



Source: Study Team

Figure 4 International North-South Axis

(3) Assumptions of External Factors for the Master Plan

- External Factors for the Road Sub-sector: Upgrading of the unpaved road section from *Vila Nova de Frontela* to *Caia* on N1 road in Mozambique (140 km).
- External Factors for the Railway Sub-sector: Rehabilitation of the existing railway section from *Vila Nova de Frontela* to *Dona Ana* in Mozambique (44 km).

There are three proposed assumptions for the Master Plan:

- **Assumption 1:** Both the road and railway will be developed up to 2030.
- **Assumption 2:** Only the railway will be developed up to 2030.
- **Assumption 3:** Only the road will be developed up to 2030.

The proposed evaluation items are “Transport Reliability” for Malawi and “Qualitative Benefit” for Mozambique. As a result of evaluating assumptions for the Master Plan, **Assumption 1** is evaluated as the most advantageous for both Malawi and Mozambique.

(4) Development Concept of Each Transport Sub-sector

The development concept for the Sena Corridor in the southern region of Malawi is to fully address the proposed six development challenges shown below, including regional development issues and potentials.

- Establishing regional growth axes by improving access to Blantyre and Beira Port
- Strengthening transport network redundancy by providing alternative transport routes
- Developing markets by improving access to markets at both rural and international levels
- Formulating an internationally competitive distribution network by assuring transport reliability, improving transport efficiency and integrating transport modes in a step-by-step approach
- Contributing to poverty alleviation by maintaining the transport network
- Improving access to education and medical services by securing safe, all-weather roads

(5) Preparation of Development Plans for the Transport Sub-sectors

Development plans for the short, medium and long term of the transport sub-sectors have been prepared, as shown in Table 2.

Table 2 Development Plans for the Transport Sub-sectors

Transport Sub-sector	Development Plan for Short Term (2015)	Development Plan for Medium Term (2020)	Development Plan for Long Term (2030)
1. Road sub-sector	<ul style="list-style-type: none"> * Upgrading of M1 Chikwawa–Nchalo (ongoing) * Upgrading of M1 Nsanje–Marka (planned) * Upgrading of S151 Thyolo–Makhanga (committed) * Improvement of S136 Mwanza–Chikwawa (planned) * Reconstruction of S151 Makhanga–Bangula 	<ul style="list-style-type: none"> * Construction of climbing lane on M1 Blantyre–Thabwa * Upgrading of S152 Thabwa–Seven 	<ul style="list-style-type: none"> * Upgrading of D379–New access road to Mozambique * Improvement of <i>Vila Nova de Frontela</i>–Caia road section (Mozambique)
2. Railway sub-sector	<ul style="list-style-type: none"> * Construction of new railway line by Vale 	<ul style="list-style-type: none"> * Rehabilitation of Limbe–Luchenza section * Rehabilitation of Luchenza–Makhanga section * Reconstruction of Makhanga–Bangula section * Installation of signal and telecommunication system * Procurement of rolling stock 	<ul style="list-style-type: none"> * Reconstruction of Bangula–Nsanje section * Reconstruction of Nsanje–Border (Marka) section * Installation of signal and telecommunication system * Procurement of rolling stock * Reconstruction of <i>Vila Nova de Frontela–Dona Ana</i> railway line (Mozambique) * Installation of signal and telecommunication system (Mozambique)
3. Inland waterway	<ul style="list-style-type: none"> * Start operation of Shire–Zambezi Inland Waterway 	<ul style="list-style-type: none"> * Rehabilitation of Shire–Zambezi Inland Waterway 	-

Source: Study Team

(6) Evaluation of Proposed Projects for the Master Plan

The Study Team has prepared three alternative transport networks based on the development plan for the transport sub-sectors in the Study Area and assumptions for external factors in Mozambique mentioned above in consideration of the essential factors as shown in Table 3.

Table 3 Alternative Transport Networks for Evaluation

Alternative	Transport Network	
	Road	Railway
Alt. 1	Connecting to Beira Port	Connecting to Beira Port
Alt. 2	Disconnecting S151 at Chiromo washaway	Connecting to Beira Port
Alt. 3	Connecting to Beira Port	Connecting to Nsanje Port

Source: Study Team

The overall evaluation shown in Table 4 identified **Alternative 1** (connection of both road and railway in Mozambique) as having the highest score.

Table 4 Overall Evaluation Results

Item		Alternative 1	Alternative 2	Alternative 3	Remarks
Economic Evaluation	EIRR	A+ (17.1 %)	A (13.3 %)	A (16.5 %)	
Environmental Impact	Local Economic Impact	A	B	A	refer to SEA
	Social Impact	B	B	B	refer to SEA
	Environmental Impact	B	B	B	refer to SEA
	CO ₂ Emission Reduction Effect	A	B	A	
Transport Viewpoints	Foreign Currency Saving	A+	A	B	
	Transport Reliability Improvement	A	A	B	
Overall Evaluation		A+	B	A	

Notes: A+ = Have a relatively high effect, A = Have a high effect, B = Have a relatively inferior effect, C = No effect

Source: Study Team

(7) Transport Master Plan Programmes

The proposed projects for the Master Plan are classified as short-term (2015), medium-term (2020) and long-term (2030) projects as shown in Figure 5. The implementation schedule for existing and proposed projects, considering the level of needs for each project, engineering judgment as well as investment environment for each transport sector (road and railway) by development partners, is prepared for each term.

(8) Proposed Projects for Pre-F/S

The following projects were selected for the Pre-F/S by the Steering Committee.

- Reconstruction of S151 Road between Makhanga and Bangula
- Rehabilitation and Reconstruction of Railway between Limbe and Border (Marka)



Source: Study Team

Figure 5 Projects Classified by Implementation Stage

7. Results of Hydrological Analyses

- Since the past maximum discharge volume has never exceeded 1,500 m³/sec and floods on the Ruo River continue for a long time, the planned maximum discharge volume as a peak discharge volume can be considered to equal the maximum discharge volume at Kamuzu Truss Bridge.
- The planned high water level (HWL) during flooding at the washaway section is estimated as 48.4 m.

- The Study Team has proposed to apply protection works for the abutments and piers of the proposed bridges and railway embankment.

8. Pre-Feasibility Study on Reconstruction of S151 Road between Makhanga and Bangula

(1) Preliminary Design of Road Section between Makhanga and Bangula

The required height of the raised road should be determined considering expected flood levels. The estimated height of raising the S151 road is 2.3 m on average for the total projected extension.

The Study Team conducted a comparison of three alternatives regarding where the raised road should be built outside of Makhanga. As a result of the comparison, the existing road alignment is considered as more advantageous in terms of i) measures for ground stabilization and ii) construction cost. The Study Team also conducted a comparison of three alternatives in the Makhanga area. As a result of the comparison, the alignment following the railway line is considered as most advantageous in terms of i) design element, ii) the Ruo River bank erosion, iii) road damage caused by flood and iv) construction cost.

(2) Preliminary Design of Chiromo Road Bridge

The best bridge construction position was selected among the three alternatives mentioned using the results of a comparative study on the bridge construction positions and access roads of the three alternatives.

The preferred bridge type was selected by a two-phase comparison of bridge types based on economic efficiency, construction efficiency, structural performance, and reduction of river cross-section. As a result, an Extradosed bridge is selected as the preferred type of bridge. However, when the detailed hydraulic analysis is carried out at the time of the feasibility study and if the HWL falls as a result, a PC 3-span continuous box-girder bridge may be selected instead.

(3) Preliminary Design of New Shire Bridge

The best bridge construction position was selected among the three alternatives mentioned using the results of a comparative study on the bridge construction positions and access roads of the three alternatives.

The preferred bridge type was selected by comparison of bridge types based on economic efficiency, construction efficiency, structural performance, and reduction of river cross-section. As a result, a PC 3-span continuous box-girder bridge is selected as the preferred type of bridge.

(4) Preliminary Cost Estimation

Table 5 summarizes the estimated project cost for the reconstruction of the S151 road between Makhanga and Bangula.

(5) Economic Analysis of Reconstruction of S151 Road between Makhanga and Bangula

Table 6 shows the result of economic analysis using the HDM-4 model.

Table 5 Estimated Project Cost

Cost Item		Estimated Project Cost (US\$ million)	
Improvement of Road between Makhanga and Bangula		14.52	
Chiromo Road Bridge	Superstructure works	15.64	22.08
	Substructure works	6.44	
New Shire Bridge	Superstructure works	12.80	19.48
	Substructure works	6.68	
Total Project Cost		56.08	

Source: Study Team

Table 6 Results of Evaluation of Basic Options

(SDR = 12.0%)

Engineering Option	Total Investment Cost (US\$ million)	Economic Internal Rate of Return (EIRR)	Benefit and Cost Ratio (B/C Ratio)	Economic Net Present Value (ENPV) (US\$ million)
1 Without Project	0.547	0.0%	0.0	0.000
2 With Project (Option-1) (Road improvement and Construction of Chiromo Road Bridge and New Shire Bridge)	42.358	26.0%	1.697	71.876
3 With Project (Option-2) (Road improvement and Construction of only Chiromo Road Bridge)	28.005	50.0%	6.421	179.831

Source: Study Team

Based on the above analysis, Option-1, the improvement of road section between Makhanga and Bangula with the construction of the Chiromo Road Bridge and the New Shire Bridge, is technically and economically viable, but in the worst case scenario the EIRR is near marginal at 14.2%. This would therefore need further confirmation by robust economic evaluation at the full feasibility study stage to be conducted later.

9. Pre-Feasibility Study on Rehabilitation/Improvement of the Railway between Limbe and Border (Marka)

(1) Basic Transportation Plan

- From the yearly cross sectional transportation volume of freight calculated based on the demand forecast, the daily average transportation volume is calculated and the number of trains required to transport freight multiplied by a fluctuation factor due to the seasons is decided.
- Passenger trains will operate on the section between Limbe and Bangula in the medium-term plan. In the long-term plan, the section will be extended to Border.

(2) Rehabilitation/Reconstruction Plan for Railway Infrastructure

- Three major places at the Chiromo Washaway section and near Sankhulani are found to need major earthworks.
- The bridges between Border and Limbe which should be rehabilitated or reconstructed were identified. The combination of “steel simple truss bridge + PC 5-span post-tensioned T-girder

bridge” is selected for the Chiromo Railway Bridge, and PC girder, RC girder and RC slab bridges for the remaining sections.

- To secure safe and stable transportation, all tracks are planned to be replaced, including sleepers and rails.

(3) Installation of Signalling and Telecommunication Systems and Procurement of Rolling Stock

- The Study Team proposed to install a signalling and telecommunication system covering the whole section between Limbe and Border.
- When the section between Border and Limbe is reopened, additional DLs, freight wagons and passenger coaches will be required.

(4) Preliminary Cost Estimate

The project costs are summarized in Table 7.

Table 7 Summary of Preliminary Cost Estimate

Unit: US\$ million

Item	Section Route Length	Border–Nsanje	Nsanje–Bangula	Bangula–Makhanga	Makhanga–Luchenza	Luchenza–Limbe	Total
		25.6 km	45.4 km	8.7 km	76.6 km	44.0 km	200.3 km
Earth Works		0.186	0.161	0.789	0.683	0.155	1.974
Bridge		10.232	4.480	17.550	3.911	4.407	40.579
Track		13.243	21.764	5.674	36.028	21.486	98.195
Station		0.138	0.275	0.413	0.688	0.688	2.200
Level Crossing		0.000	0.125	0.250	0.000	0.250	0.625
Signal & Telecommunication System		0.651	1.205	1.070	2.533	7.126	12.585
Sub-Total		24.449	28.009	25.746	43.841	34.112	156.158
Rolling Stock		0.000	0.000	0.000	0.000	46.500	46.500
Engineering Cost (10%)		2.445	2.801	2.575	4.384	3.411	15.616
Contingency (10%)		2.445	2.801	2.575	4.384	3.411	15.616
Total		29.339	33.611	30.895	52.610	87.434	233.890

Source: Study Team

(5) Economic and Financial Analyses

The results of the economic evaluation are summarized in Table 8.

Table 8 Results of Economic Evaluation

Total Investment Cost (US\$ million)	Economic Internal Rate of Return (EIRR)	Benefit and Cost Ratio (B/C Ratio)	Economic Net Present Value (ENPV) (US\$ million)
198.81	17.40 %	1.53	72.43

Source: Study Team

The results of the financial evaluation based on the above conditions are summarized in Table 9.

Table 9 Results of Financial Analysis

Financial Internal Rate of Return (FIRR)	Weighted Average Cost of Capital (WACC)	Financial Net Present Value (FNPV)
2.05 %	1.53 %	US\$ 22.70 million

Source: Study Team

As a result, rehabilitation/reconstruction of the railway between Limbe and Border is considered to be economically and financially viable.

10. Environmental and Social Considerations

(1) SEA

The Study uses the SEA methodology to evaluate qualitatively the environmental, social, and economic impacts of the regional transport development programme for the Sena Corridor.

The overall cumulative results for the Sena Corridor's Master Plan are summarised in Table 10. Regarding Alternatives 1 and 3, although both the social impact and environmental impact include some expected negative factors, a local economic impact can have a significant positive impact on the Study Area. For example, improving the disconnection at Chiromo will benefit the local population in terms of access to agricultural products, schools and health posts.

Table 10 Overall Results of SEA

Item	Zero-option	Alt.1	Alt.2	Alt.3
Local Economic Impact	D	A	B	A
Social Impact	D	B	B	B
Environmental Impact	C	B	B	B

Notes: A = Significant positive impact is expected, B = Some positive impact is expected, C = Some negative/negligible impact is expected, D = Significant negative impact is expected

Source: Study Team

(2) IEE

a) Possible Environmental and Social Impacts of the Projects

- Significant positive impacts for local residents by construction of the Chiromo Road Bridge.
- Significant positive impacts for local residents along the railway line by rehabilitation and reconstruction of the railway between Limbe and Border.
- Members of the boat association will lose their main source of income.
- Resettlement of about 20 huts and shops with grass structure in Makhanga.
- Land acquisition will be necessary for realignment of the road and railway line.
- Relocation of huts illegally occupying the railway.
- The expected difficulty of draining flood water on the land between the existing railway embankment and planned road embankment.
- Increase of dust, diesel emissions, noise, vibration, solid waste, risk of traffic accidents, and prevalence of HIV/AIDS by workers may be expected during construction.
- Risk of traffic accidents after improvement of the road.
- Risk of accidents between a train and a vehicle, bicycle or pedestrian at level crossings and on the Kamuzu Truss Bridge.

b) Mitigation Measures

Table 11 summarized mitigation measures to be taken for the above negative impacts.

(3) Necessity of EIA

The executing agencies of the project should prepare an EIA during the feasibility study phase, including public consultations. The results of the EIA should be incorporated in the Environmental Management and Monitoring Plan, which is mandatory in Malawi.

Table 11 Mitigation Measures

Impact	Mitigation Measure
Member of boat association will lose main source of income	- Introduce other job opportunities - Mitigation measures to create a source of income will be prepared in the F/S
Resettlement by realignment of road and railway reconstruction	- Compensation according to GoM regulation. - Provision of alternative land plots
Land acquisition by realignment of road and railway	- Acquire land according to GoM regulation - Provision of alternative land plots
Stop farming in railway ROW	- Compensation according to GoM regulation
Increase of dust, diesel emissions, noise, vibration, solid waste, risk of traffic accidents and prevalence of HIV/AIDS by workers during construction	- Environmental management plan by contractor
Risk of traffic accidents by vehicle traffic with pedestrians and bicycles	- Installation of traffic safety devices - Traffic safety education in primary schools
Risk of accidents by train with vehicles, bicycles and pedestrians	- Installation of safety devices at level crossing - Traffic safety education in primary schools.

Source: Study Team

11. Institutional Arrangements for Implementing the Master Plan Programme

(1) Institutional Arrangements for the Road Sub-sector

MoTPI and RA should focus on the operation and maintenance of road assets, by routine and periodic maintenance by the following programmes:

- Routine maintenance work should be carried out according to the O&M programmes.
- Periodic maintenance work should be carried out according to the O&M programmes for priority road sections identified by the HDM-4 model.
- Inspection and maintenance of drainage structures and bridges should be carried out annually to identify and repair/clean disorderly parts of structures.

(2) Institutional Arrangements for the Railway Sub-sector

The following institutional arrangements are necessary for executing the Master Plan for the railway:

- The Railway Division of MoTPI must be given greater authority to supervise CEAR.
- The tariff policy must be established.
- The problems and issues of the current concession with CEAR should be considered carefully for revision of the concession agreement.

12. Capacity Development Programme

(1) Capacity Development Programme in the Study

- The capacity development was planned to be carried out mainly through OJT training while Japanese experts were carrying out their studies in Malawi.
- JICA selected one counterpart personnel for one of the Training and Dialogue Programmes entitled “National and Regional Development Policy”.

(2) Evaluation of Capacity Development Programme in the Study

- Ability of counterparts to prepare the transport master plan and the Pre-F/S for both the road and railway projects has definitely been improved, particularly by process of studies carried out by JICA through OJT and preparation/presentation in technology transfer seminars.

13. Conclusions and Recommendations

(1) Conclusions

- The Basic Policy for development of the Sena Corridor is proposed in line with the national development policy for sustainable economic growth and poverty.
- Based on the Basic Policy, development of the Sena Corridor is examined in terms of the international north-south axis, the domestic north-south axis and arterial transport networks in the Study Area.
- Master Plans for the road and railway sectors are proposed divided into short-term (2015), medium-term (2020) and long-term (2030), followed by the Development Concept and Strategy.
- The proposed projects for the Master Plan in the Study are judged as technically and economically feasible. Hence, it is necessary to start preparing an investment programme for the Master Plan.
- The projects in the Master Plan will greatly contribute to sustainable economic growth, poverty alleviation and improvement of living conditions in the Study Area to sustainable economic growth, improving the international competitiveness of export products, and strengthening the redundancy of transport networks in Malawi, and to strengthening the international north-south axis in the region in Southeastern Africa.
- Reconstruction of the S151 road between Makhanga and Bangula is judged as technically and economically feasible.
- Rehabilitation and reconstruction of the railway between Limbe and Border (Marka) is technically, economically and financially feasible.
- The results of the IEE for both the road and railway projects identified minimal negative environmental and social impacts as a result of these projects.

(2) Recommendations for Project Implementation

- The GoM should continue dialogs with counterparts in the GoMZ.
- MoTPI can inform the outcome of the Master Plan as well as the Pre-F/S to development partners for possible assistance with project implementation.
- MoTPI should carry out the F/S and the EIA of priority projects identified as feasible under the Pre-F/S at an early stage.
- MoTPI should allocate sufficient budget to the compensation and land acquisition.

(3) Recommendations for Institutional Arrangements

- RA could consider changing the classification of S151 to “Main Road”.
- MoTPI needs to secure adequate budget for operation and maintenance of the road sub-sector to maximise use of the existing road assets.

- MoTPI needs to strengthen the organisation of the Railway Division, develop the capacity of personnel, and revise the Railway Act to supervise and check the performance of CEAR.
- MoTPI will need to review the present concession with CEAR starting from 2014.

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LIST OF ABBREVIATIONS

Abbreviation	Full Name
ADD	Agriculture Development Division
ADMARC	Agriculture Development and Marketing Corporation
ADT	Average Dairy Traffic
AfDB	African Development Bank
AHL	Auction Holdings Limited
AIDS	Acquired Immune Deficiency Syndrome
ANE	<i>Administracao Nacional de Estradas</i> (National Road Administration)
ARET	Agriculture Research and Extension Trust
ASWAp	Agriculture Sector Wide Approach
ATACSCARAT	Advanced Train Administration and Communications System, Computer and Radio Aided Train control
ATP	Automatic train protection
B/C Ratio	Benefit and Cost Ratio
BADEA	Arab Bank for Economic Development in Africa
BH	Boreholes
BOT	Build, Operattion and Transfer
BS	British Standards
BP	Border Post
C/P	Counterpart
CBR	California Bearing Ratio
CCFB	<i>Companhia Dos Caminhos De Ferro Da Beira</i> (Beira Railway Company)
CDN	<i>Corredor de Desenvolvimento do Norte</i> (North Development Corridor)
CEAR	Central East African Railways Co. Ltd.
CFM	<i>Portos e Caminhos de Ferro de Moçambique</i> (Mozambique Ports and Railways)
CO	Carbon Monoxide
CO ₂	Carbon Dioxide
COMBAT	Computer and Microwave Balise Aided Train control system
COMESA	Common Market for Eastern and Southern Africa
DADO	District Agriculture Development Officer
DBST	Double Surface Dressing
DT	Design Traffic
EA	Enumeration area
EAD	Environmental Affairs Department
EDF	European Development Fund
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIRR	Economic Internal Rate of Return
EMA	Environmental Management Act 1996
EMMP	Environmental Management and Monitoring Plan
EMU	Environmental Management Unit
ENPV	Economic Net Present Value
EPA	Extension Planning Area
EPAs	Economic Partnership Agreements
EPC	engineering, purchase and construction
ERTMS	European Rail Traffic Management System-Regional
ESAs	Equivalent Standard Axles
ETCS	European Train Control System
EU	European Union
FAO	Food and Agriculture Organization
FDI	Foreign direct investment
FIRR	Financial Internal Rate of Return

Abbreviation	Full Name
FNPV	Financial Net Present Value
FOCC	Financial Opportunity Cost of Capital
F/S	Feasibility Study
GDP	Gross Domestic Product
GIS	Geographic Information System
GoJ	Government of Japan
GoM	Government of Malawi
GoMZ	Government of Mozambique
GPS	Global Positioning System
GRDP	Gross Regional Domestic Product
GSM-R	Global System for Mobile communications - Railway
HC	Hydrocarbons
HDM	Highway Development Management
HIV	Human Immunodeficiency Virus
HWL	High Water Level
IDB	International Development Association
IEE	Initial Environmental Evaluation
IHS2	Second Malawi Integrated Household Survey
IMF	International Monetary Fund
IPS	Infrastructure Services Project
ITCZ	Inter-Tropical Convergence Zone
JICA	Japan International Cooperation Agency
JPY	Japanese Yen
JIS	Japanese Industrial Standard
KF	Kuwait Fund
LoS	Level of Service
LA	Local Authority
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MoAFS	Ministry of Agriculture and Food Security
MoDPC	Ministry of Development Planning & Cooperation
MoIWR	Ministry of Irrigation and Water Resources
MoNREE	Ministry of Natural Resources, Energy and Environment
MoTPI	Ministry of Transport and Public Infrastructure
MoU	Memorandum of Understanding
MtwDC	Mtwara Development Corridor
MGDS	Malawi Growth and Development Strategy
MPRS	Malawi Poverty Reduction Strategy
MRA	Malawi Revenue Authority
MWK	Malawi Kwacha
NACAL	National Census Agricultural and Livestock
NCE	National Council for the Environment
NDC	Nacala Development Corridor
NEAP	National Environmental Action Plan
NGO	Non-Governmental Organizations
NMS	Network Management System
NOx	Nitrogen Oxides
NRA	National Roads Authority
NTP	National Transport Policy
OCC	Operation Control Centre
O/D	Origin Destination
OECD	Organization for Economic Co-operation and Development,
OJT	On the Job Training

Abbreviation	Full Name
O&M	Operation and Maintenance
OPEC	Organization of the Petroleum Exporting Countries
OSBP	One-Stop Border Post
PABX	Private Automatic Branch Exchange
PAP	Project Affected Person
PC	Prestressed Concrete
PCC	Petroleum Control Commission
PCU	Passenger Car Unit
PIL	Petroleum Importers Limited
PM	Particulate Matter
PPP	Public Private Partnership
PSIP	Public Sector Investment Programme
PSO	Public Service Obligation
QV	Quantity-Velocity
RA	Roads Authority
RAP	Resettlement Action Plan
RC	Reinforced Concrete
RDM	Road Data Management
RFA	Roads Fund Administration
ROW	Right of Way
RSA	Republic of South Africa
RSDIP	Regional Spatial Development Initiatives Programme
RSP	Road Sector Programme
RTRI	Railway Technical Research Institute
SADC	Southern African Development Community
SATCC	Southern Africa Transport and Communications Commission
SCF	Standard Conversion Factor
SDCN	<i>Sociedade de Desenvolvimento do Corredor de Nacala</i> (Nacala Corridor Development Society)
SDI	Spatial Development Initiative
SDR	Social Discount Rate
SO ₂	Sulphur Dioxide
SEA	Strategic Environmental Assessment
STA	Sub Traditional Authority
TA	Traditional Authority
TC	Trading Centre
TCE	Technical Committee on the Environment
TCS/SL/RC	Train Control System for Secondary Lines using Radio Communications
TEU	Twenty-foot equivalent unit
TSIP	Transport Sector Investment Programme
TPA	Town Planning Area
TTC	Transport Time Cost
UIC	International Union of Railways
UK	United Kingdom
USA	United States of America
US\$	United States Dollar
Vale	<i>Brazilian Companhia Vale do Rio Doce</i>
VOC	Vehicle Operating Cost
VVVF	Variable Voltage Variable Frequency
vpd.	vehicles per day
WACC	Weighted Average Cost of Capital
WB	World Bank
WGM	Working Group Meeting
ZMM-GT	Zambia, Malawi, Mozambique-Growth Triangle

CHAPTER 1
INTRODUCTION

Chapter 1 Introduction

1.1 Background of the Study

Malawi is a landlocked country, surrounded by Mozambique, Zambia and Tanzania, with a population of about 13 million (Malawi Population and Housing Census Report, 2008). According to the World Bank (WB), in 2008 the country's per capita gross national income was US\$280, and the real Gross Domestic Product (GDP) growth rate was 9.7%.

Economic activity in Malawi grew rapidly 2004, but then slowed down from 2010 mainly due to the decline of tobacco exports. International trade routes from Malawi to ocean ports include: the Beira Corridor, which connects to Beira Port through Mozambique; the Durban Corridor, which connects to Durban Port through Mozambique and Zimbabwe; the Nacala Corridor, which connects to Nacala Port through Mozambique; and the Dar es Salaam Corridor, which connects to Dar es Salaam Port through Tanzania. Due to the long distances along these corridors, transport costs to ocean ports are very high, and this is one obstacle to the attainment of sustainable international competitiveness of domestic products. Under these circumstances, the Government of Malawi (GoM) has selected "Development of Transport Infrastructure" as one of the most important sectors in the Malawi Growth and Development Strategy (MGDS) prepared in 2006.

The Sena Corridor will be a part of the Beira Corridor connecting Malawi and Beira Port in Mozambique. This corridor was the main route from Malawi to the ocean when the roads and railways were well maintained. However, during the civil war in Mozambique (1977–1992), these infrastructures were destroyed making most sections impassable, and the reliability of the Sena Corridor declined. In addition, embankments of the railway and road (Route S-151) between Chiromo and Bangula were washed away by floods in 1997, and both the road and railway became impassable at that section.

In an effort to solve this problem, the GoM requested the Government of Japan (GoJ) to conduct a development study under the technical assistance scheme that would lead to the reconstruction of a bridge between Chiromo and Bangula. In response to this request, the Japan International Cooperation Agency (JICA) carried out a Detailed Planning Survey in February and March 2010. Based on the results of the study, it was found necessary to prepare a development plan for the "Sena Corridor" and the following three impacts are expected:

- Securing multiple international corridors for national security.
- Securing the shortest transport route to the ocean through international corridors that connect to Malawi.
- Promoting economic activity in the Southern Region, which is the centre of cash crop production and fertiliser consumption, by revitalising the traffic function of the Sena Corridor.

1.2 Objectives of the Study

(1) Objectives of the Study

- Prepare the Master Plan for the development of the Sena Corridor in order to secure multiple international corridors for national security, identify the shortest route to the ocean through international corridors that connect to Malawi, and promote economic activities in the Southern Region of Malawi.
- Carry out the pre-feasibility study (F/S) for the projects selected based on the results of the Master Plan. Selected projects for the Pre-F/S are as follows:
 - Reconstruction of S151 road between Makhanga and Bangula (9.5 km).
 - Rehabilitation and reconstruction of railway between Limbe and Border (Marka) (201 km).

(2) Number of beneficiaries

The number of beneficiaries is the population of Malawi, which is about 13 million people.

(3) Executing agency

The Ministry of Transport and Public Infrastructure (MoTPI) is the executing agency of the Study.

1.3 Study Area

The Study Area in Malawi covers the Blantyre, Chikwawa, Chiradzulu, Mulanje, Mwanza, Neno, Nsanje, Phalombe, Thyolo and Zomba Districts in the Southern Region, as shown in Figure 1-1. In addition, Tete, Sofara, Zambezia and Nampula Provinces in Mozambique are considered to be a part of the Study Area from the viewpoint of developing regional corridors to/from Malawi, as shown in Figure 1-2.

1.4 Scope of the Study

The Study consists of several work items for both the Master Plan and Pre-F/S stages as shown in Figure 1-3.



Source: The Study Team

Figure 1-1 Study Area in Malawi



Source: The Study Team

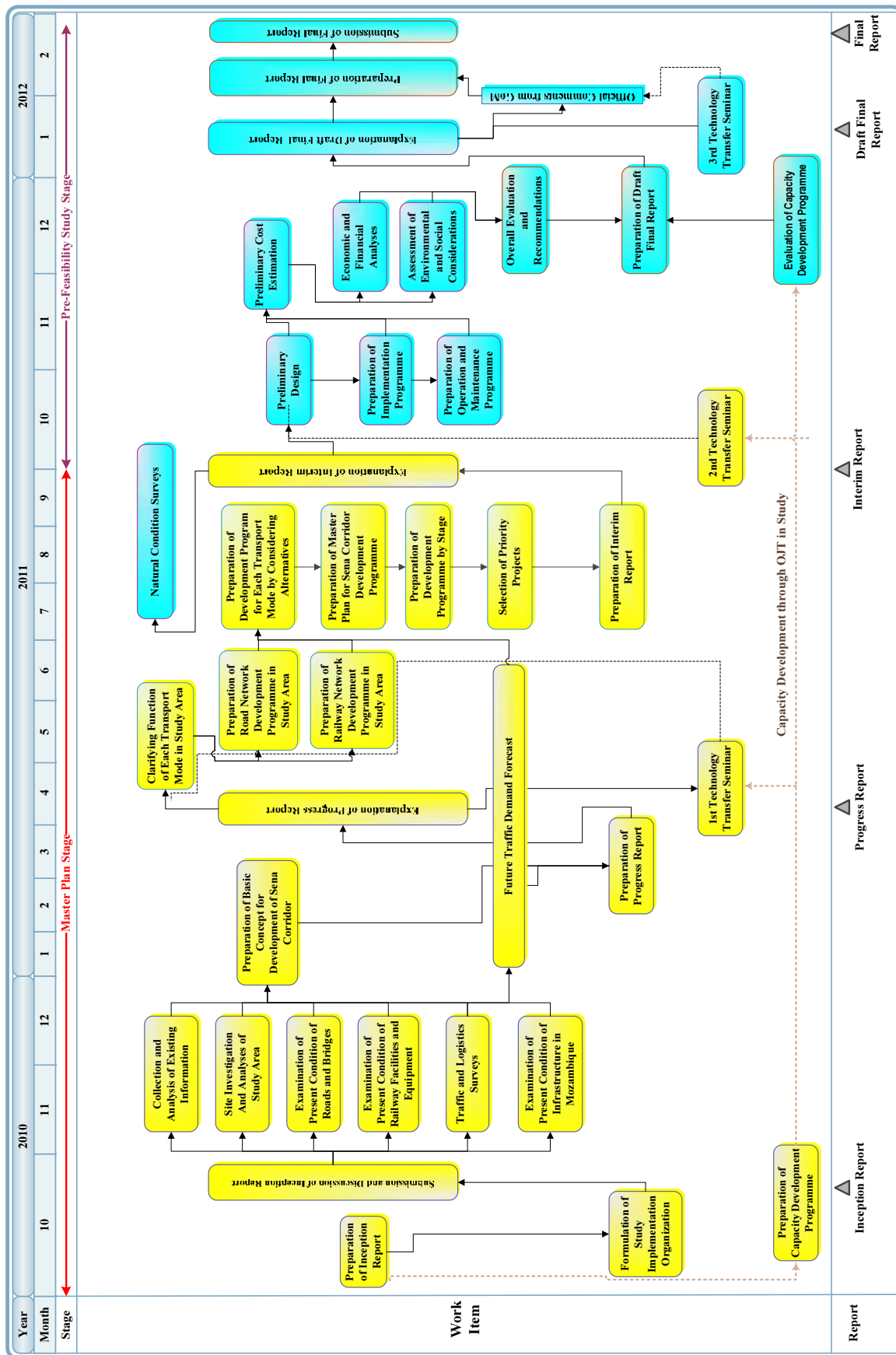
Figure 1-2 Study Area in Mozambique as a Part of a Regional Corridor

1.5 Definition of Projects and Bridges

(1) Definition of Projects

The following definitions are used for the projects in the Study.

- Reconstruction:** To restore the function of an infrastructure which completely lost its original function due to natural disaster or other causes. S151 between Makhanga and Bangula, and the railway between Makhanga and Nsanje completely lost their functions because of the major washaway at Chiromo in 1997, while the railway between Nsanje and Border (Marka) lost its function because of the civil war in Mozambique. Therefore, the Study Team considers that their functions should be restored by “reconstruction” of the infrastructures.



Source: Study Team

Figure 1-3 Work Flowchart of the Study

- **Rehabilitation:** To restore the function of an infrastructure which has mostly lost its original function due to improper maintenance or other reasons but which is still operable. The railway between Limbe and Makhanga lost its daily passenger train service between Limbe and Marka and freight trains after the major washaway at Chiromo. Even though CEAR is requested by the GoM in the concession agreement to operate passenger trains between Limbe and Makhanga at least twice a week, CEAR operates a train only once a week at present. In addition, freight trains are operated between Limbe and Luchenza on an on-demand basis to transport cargoes from warehouses at Luchenza. Therefore, the Study Team considers that its original function should be restored by “rehabilitation” of the railway infrastructure.

(2) Definition of Rivers and Bridges

Before 1997, only the Shire River existed, and the bridge (railway-cum-road bridge) over the Shire River was named Kamuzu Truss Bridge. But after the major washaway in 1997, a new continuous stream was formed from upstream of the bridge and joining the original Shire River at the southern part of Bangula. This stream has become another main stream in parallel with the Shire River with the discharge quantity, flow velocity and maximum depth of the river bed. On the other hand, the Study Team has planned to construct three bridges between Makhanga and Bangula. In order to avoid confusion among the names of rivers and planned bridges, the Study Team has defined the names of rivers and bridges as follows and as shown in Figure 1-4.



Source: Study Team

Figure 1-4 Definition of Rivers and Bridges between Makhanga and Bangula

- The original Shire River: Shire River
- Newly formed stream after 1997: New Shire River
- Existing railway-cum-road bridge: Kamuzu Truss Bridge
- Newly planned road bridge across the New Shire River: Chiromo Road Bridge
- Newly planned railway bridge over the New Shire River: Chiromo Railway Bridge
- Newly planned road bridge over the Shire River: New Shire Bridge

1.6 Study Schedule

The schedule of the Study is shown in Table 1-1.

Table 1-1 Study Schedule

Item	2010			2011												2012					
	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2				
Works in Japan	☐																☐				
Works in Malawi																					
Report		▲ IC/R					▲ PR/R										▲ IT/R			▲ DF/R	▲ F/R

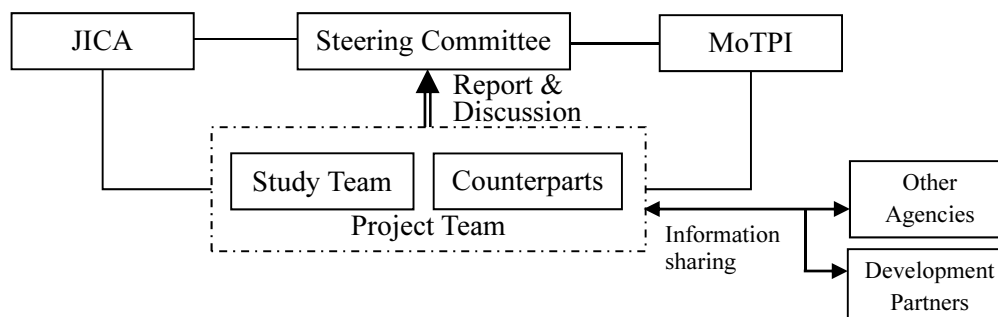
Note - IC/R: Inception Report, PR/R: Progress Report, IT/R: Interim Report, DF/R: Draft Final Report, F/R: Final Report

Source: Study Team

1.7 Study Organisation

1.7.1 Study Organisation

The Study will be carried out with close collaboration among JICA, MoTPI, the Study Team, counterpart personnel and other related agencies and development partners, as shown in Figure 1-5.



Source: Study Team

Figure 1-5 Study Organization

1.7.2 Study Team Member

The list of Study Team members is shown in Table 1-2.

Table 1-2 List of Study Team Members

Name	Responsibility
Mr. Hikaru NISHIMURA	Team Leader/Comprehensive Transport Planning/ Inland Waterway Planning
Mr. Teruo NAKAGAWA	Sub-Team Leader/Bridge Planning I
Mr. Masahiro IBAYASHI	Regional Development
Mr. Ryuichi OIKAWA	Logistics and Traffic Demand Forecast
Mr. Takeshi KAGAJO Mr. Kazuhiro FUJITA	Traffic Survey/Analysis
Ms. Izumi TAKAI	Logistics Survey/Analysis
Mr. Naoki TAKANASHI	Railway Planning
Mr. Nobuyuki CHIBA	Railway Facility Planning
Mr. Shigeru ANDO	Road Planning/Design
Mr. Ryo TANAHASHI	Bridge Planning II/Bridge Design
Mr. Jun UMENO	River Improvement Planning
Mr. Nobuo KASHIWAZAKI	Natural Condition Survey I (Hydrological Planning)
Mr. Satoshi AOKI	Natural Condition Survey II (Topographical Survey, Geotechnical Investigation)
Mr. Jiro NISHITANAKA	Construction Planning/Cost Estimation
Ms. Naomi AOKI	Economic and Financial Analyses
Ms. Akiko ABE	Environmental and Social Considerations
Mr. Tomomi FUJITA	Project Coordination/Traffic Survey

Source: Study Team

1.7.3 Counterpart Personnel

The list of counterpart personnel is shown in Table 1-3.

Table 1-3 List of Counterpart Personnel

Name	Organization
Mr. Geoffrey Magwede	MoTPI, Rail Transport Service Unit (Railway Planning)
Mr. Chimwemwe Kaunda	MoTPI, Planning Dept. (Transport Planning)
Mr. Kelvin Mphonda	MoTPI, Road Dept. (Road Planning)
Mr. Stephen Siwande	Roads Authority (Economic Evaluation)
Mr. Francis Dimu	Roads Authority (Bridge Planning)
Mr. Peter Makwinja	Roads Authority (Environmental and Social Considerations)

Source: Study Team

CHAPTER 2
OUTLINE OF
THE STUDY AREA

Chapter 2 Outline of the Study Area

2.1 Definition of the Sena Corridor

The Sena Corridor is defined as a traffic route connecting Blantyre to Beira Port and an additional southern gateway to Malawi from its historical backgrounds.

Figure 2-1 shows the location and characteristics of the present transport corridors and the Sena Corridor.

2.2 Regional Coordination Programmes

There are the following movements for regional coordination in Southern Africa which are directly related to the development of the Sena Corridor.

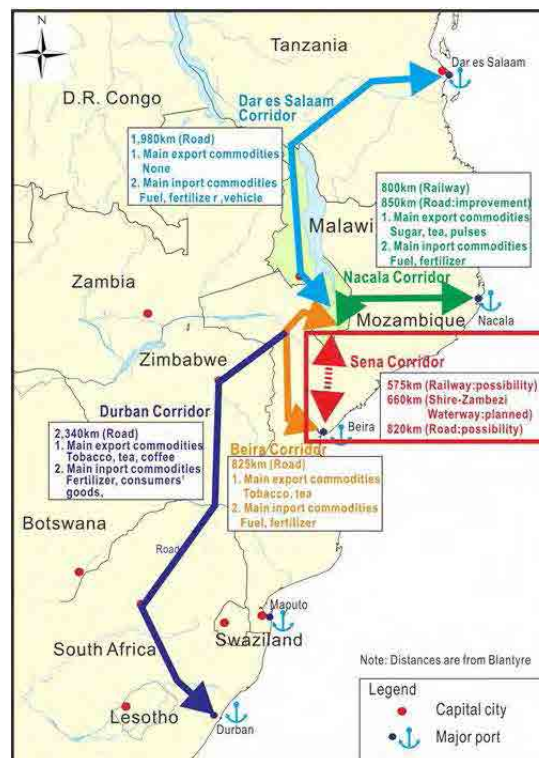
2.2.1 Southern African Development Community

In the Southern Africa region, 15 countries adopted the Southern African Development Community (SADC) Treaty in 1992.

The objectives of SADC as stated in the Treaty are to:

- Achieve development and economic growth, alleviate poverty, enhance the standard and quality of life of the people of Southern Africa and support the socially disadvantaged through regional integration.
- Evolve common political values, systems and institutions.
- Promote and defend peace and security.
- Promote self-sustaining development on the basis of collective self-reliance, and the interdependence of Member States.
- Achieve complementarity between national and regional strategies and programmes.
- Promote and maximise productive employment and utilisation of resources of the Region.
- Achieve sustainable utilisation of natural resources and effective protection of the environment.
- Strengthen and consolidate the long-standing historical, social and cultural affinities and links among the people of the Region.

Source: SADC website - <http://www.sadc.int/index/browse/page/64>, March 2011



Source: Study Team

Figure 2-1 Present Transport Corridors and the Sena Corridor

2.2.2 Common Market for Eastern and Southern Africa

The Common Market for Eastern and Southern Africa (COMESA) was established with 19 states (Mozambique and Tanzania are not member states) for promoting regional economic integration through trade and investment. The vision and mission of COMESA are as follows:

Vision

COMESA’s vision is “to be a fully integrated, internationally competitive regional economic community with high standards of living for all its people ready to merge into an African Economic Community”.

Mission

Its mission is “To endeavour to achieve sustainable economic and social progress in all Member States through increased co-operation and integration in all fields of development particularly in trade, customs and monetary affairs, transport, communication and information, technology, industry and energy, gender, agriculture, environment and natural resources”. The Secretariat was guided to develop its specific Mission Statement as follows:

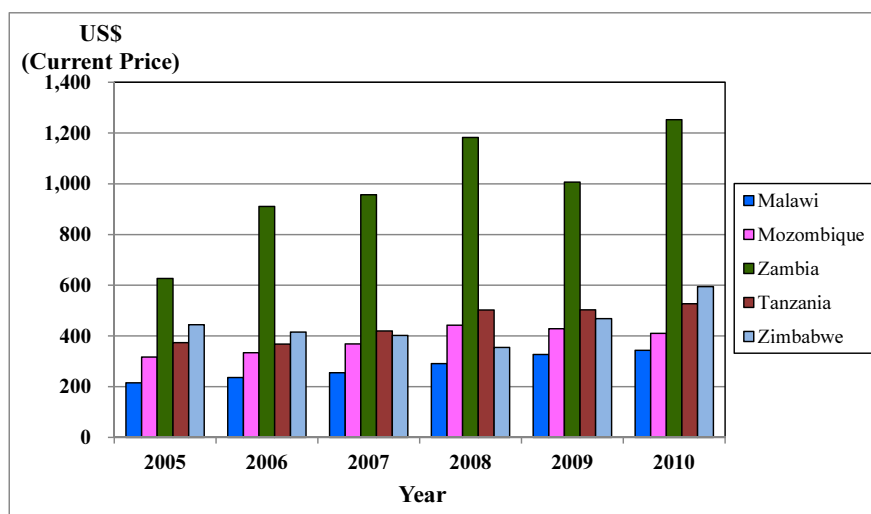
“To provide excellent technical services to COMESA in order to facilitate the region’s sustained development through economic integration”.

Source: COMESA website - <http://about.comesa.int/lang-en/overview/vision>, March 2011

2.3 Economic Condition in Malawi and the Study Area

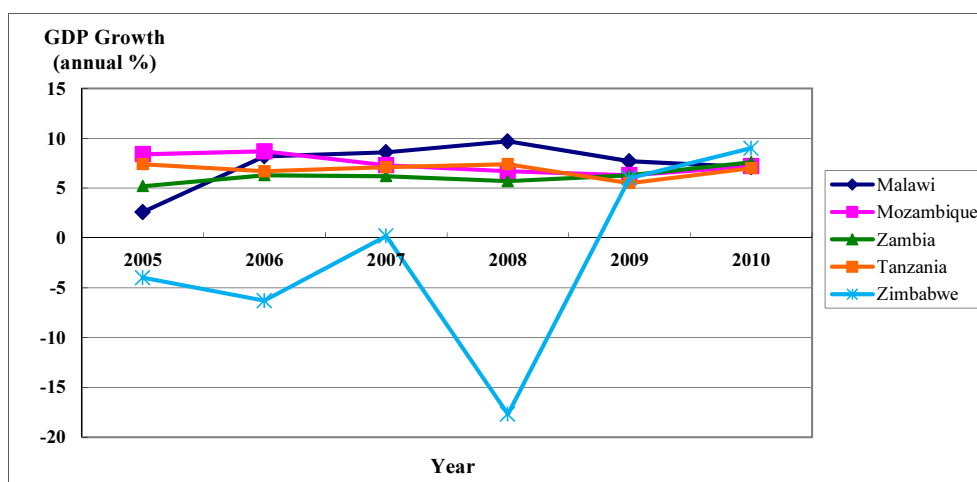
2.3.1 GDP

Figures 2-2 and 2-3 show the Gross Domestic Product (GDP) per capita and the fluctuation of GDP growth rate in Malawi and neighbouring countries, respectively. The GDP per capita has been lowest in Malawi (US\$ 343 in 2010), however, the GDP growth rate was higher in Malawi than in neighbouring countries between 2007 and 2009.



Source: Compiled by the Study Team using WB databank, <http://data.worldbank.org/country>, January 2012

Figure 2-2 GDP Per Capita in Malawi and Neighbouring Countries



Source: Compiled by the Study Team using WB databank, <http://data.worldbank.org/country>, January 2012

Figure 2-3 GDP Growth Rate in Malawi and Neighbouring Countries

Table 2-1 shows the medium- and long-term projection of real GDP made by the International Monetary Fund (IMF).

Table 2-1 Medium- and Long-Term Projection of Real GDP

Period	Average Annual Growth Rate (%)			
	Real GDP	Import	Exports	Transport & Storage Sector
2002-2008	6.2	0.3	2.2	-
2010-2015	6.6	4.8	7.1	5.9
2015-2020	5.4	4.9	8.7	5.7
2020-2025	5.4	5.2	8.2	5.7
2025-2030	5.4	5.2	6.3	5.7

Note: Average annual growth rate is calculated based on constant 2006 prices.

Source: IMF

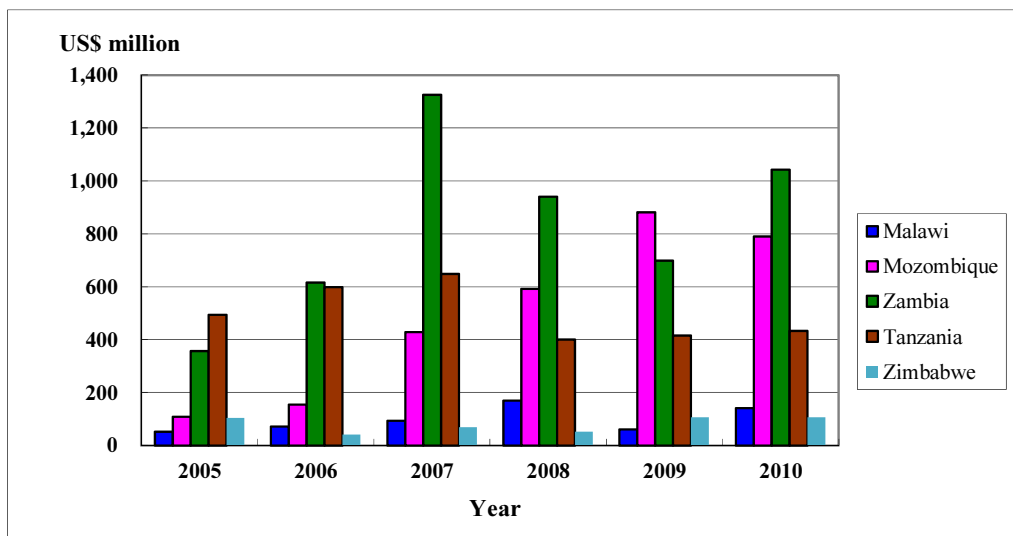
According to these projections, the real GDP will continuously increase up to 2015, after which the annual growth rate will be moderate at 5.4%.

2.3.2 Foreign Direct Investment and Merchandise Trade

Figures 2-4 and 2-5 show the net flow of foreign direct investment (FDI) and its share within GDP in Malawi and neighbouring countries. It is clear that FDI into Malawi is very low (US 140 million in 2010) compared with other three neighbouring countries (Mozambique: US\$ 789 million, Zambia: US\$ 1,041 million, Tanzania: US\$ 433 million). Even though the GDP growth rate has been higher in Malawi than in neighbouring countries between 2007 and 2009, FDI within GDP was much lower than Mozambique and Zambia in 2010. This situation is considered by business people as the following reasons:

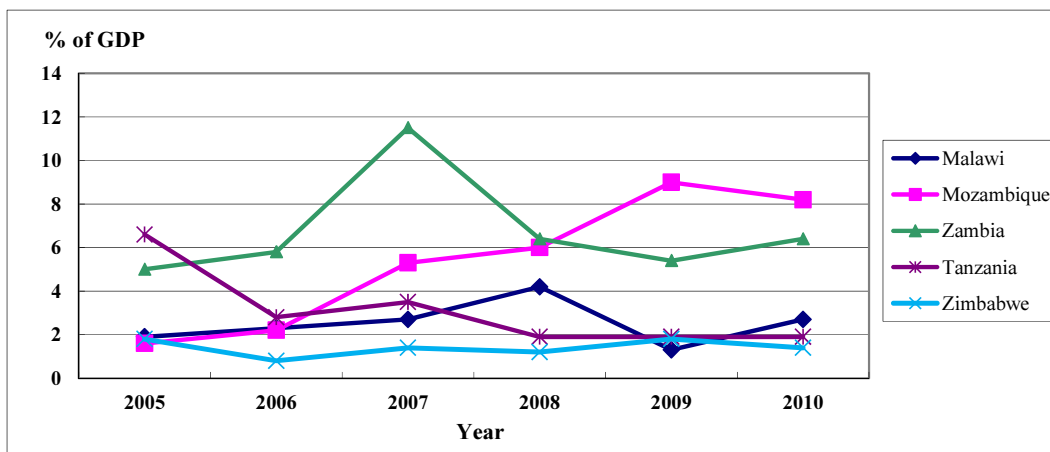
- Strict foreign exchange control
- Shortage of power and fuel supply
- Higher transport cost

In addition, the merchandise trade within GDP is about 10 points lower than in Zimbabwe, Mozambique and Zambia (see Figure 2-6).



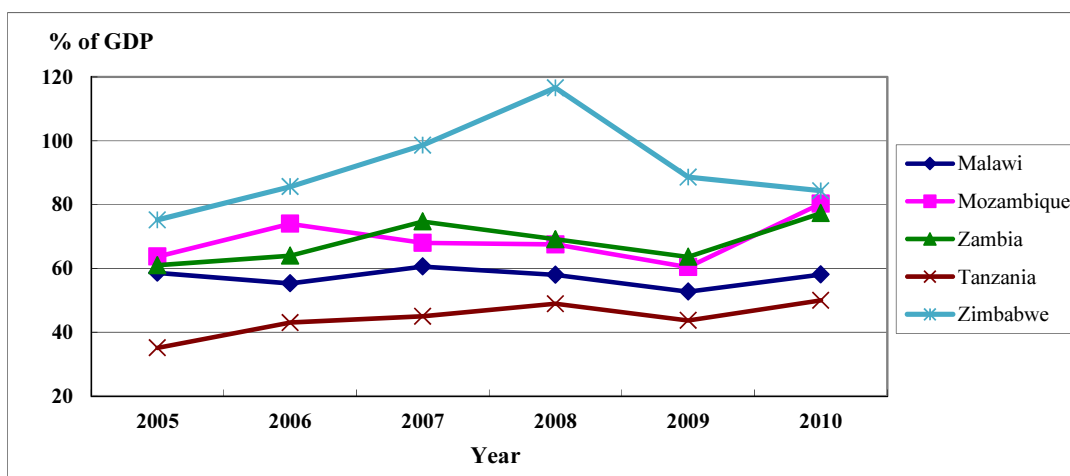
Source: Compiled by the Study Team using WB databank, <http://data.worldbank.org/country>, January 2012

Figure 2-4 Foreign Direct Investment (Net Flow)



Source: Compiled by the Study Team using WB databank, <http://data.worldbank.org/country>, January 2012

Figure 2-5 Foreign Direct Investment (% of GDP)



Source: Compiled by the Study Team using WB databank, <http://data.worldbank.org/country>, January 2012

Figure 2-6 Merchandise Trade (% of GDP)

2.3.3 Trade Balance

Table 2-2 shows the total imports and exports of Malawi and neighbouring countries. Even though exports increased in each country up to 2008, the negative trade balance has worsened except in Zambia.

Table 2-2 Total Imports and Exports by Country

(Unit: US\$ million)

Country	Item	2005	2006	2007	2008	2009	2010
Malawi	Import	1,163	1,206	1,380	1,700	2,096	n.a.
	Export	508	541	709	860	1,080	1,130
	Balance	-655	-665	-671	-840	-1,015	n.a.
Mozambique	Import	2,408	2,869	3,050	4,008	3,764	4,550
	Export	1,783	2,381	2,412	2,653	2,147	3,200
	Balance	-625	-488	-638	-1,355	-1,617	-1350
Zambia	Import	2,567	2,931	4,014	5,023	3,791	n.a.
	Export	1,780	3,828	4,641	5,186	4,389	7,207
	Balance	-786	896	628	163	599	n.a.
Zimbabwe	Import	2,350	2,300	2,550	2,950	2,900	3,700
	Export	1,850	2,000	2,400	2,200	2,269	2,500
	Balance	-500	-300	-150	-750	-631	-1,200

Note: Import – CIF, Export – FOB

Source: “2010 International Trade Statistics Yearbook”, UN Comtrade, <http://comtrade.un.org/pb/>

2.3.4 Agriculture

(1) Agricultural Products

Agriculture accounts for the largest proportion of GDP in Malawi. Agricultural production is divided into two types: smallholder production (customary land) and commercial estate production. The latter is mainly sugarcane, tea, cotton, tobacco and coffee.

Agricultural data is collected and compiled by the Agriculture Development Division (ADD), which is a regional/field office under the Ministry of Agriculture and Food Security (MoAFS). The following three ADDs cover the Southern Region:

- Machinga ADD: Mangochi, Machinga, Zomba Rural, Zomba City, Balaka
- Blantyre ADD: Chiradzulu, Blantyre Rural, Blantyre City, Neno, Mwanza, Thyolo, Mulanje, Phalombe
- Shire Valley ADD: Chikwawa, Nsanje

There are two types of agricultural data: one is the national crop estimates covering smallholder production and those estimated by field surveys by MoAFS, and the other is commercial estate production collected by several organisations. For example, Agriculture Research and Extension Trust (ARET) collects tobacco data.

Crop and livestock are the second largest proportion of GDP in Malawi after agriculture. Major industries in the Southern Region are sugar, tea, cotton and tobacco. Tobacco is the highest foreign-exchange earning product in Malawi, followed by tea.

a) Crops by Smallholder Production

Table 2-3 shows crop yields. The yields of most crops have increased, especially cassava, maize and sweet potato.

Table 2-3 Yield by Smallholder

(Unit: tonne)

Crop	2004	2005	2006	2007	2008	2009	2010
Maize	1,608,349	1,225,234	2,611,486	3,444,655	2,777,438	3,767,408	3,419,409
Rice	49,693	41,270	91,450	113,166	114,905	135,988	110,106
Groundnuts	153,414	141,078	203,071	273,757	260,573	293,948	297,487
Tobacco	106,187	93,598	121,600	117,412	160,238	208,155	172,973
Cotton	53,581	50,363	58,569	107,309	76,761	72,664	29,165
Wheat	1,668	1,730	2,000	63,290	2,491	2,746	2,341
Sorghum	40,905	18,175	54,309	4,605	61,999	60,025	53,932
Millet	17,349	15,970	27,037	32,251	31,869	26,866	24,495
Pulses	242,364	209,492	344,586	415,551	396,868	499,933	470,489
Cashew nuts	0	0	50	283	382	165	456
Macadamia	3	232	96	35	6,038	6,755	1,582
Sesame	227	106	291	504	909	679	544
Sunflower	3,660	2,672	5,450	5,910	5,745	8,087	9,175
Coffee	455	1,181	2,091	1,410	2,623	1,377,288	1,007,314
Paprika	837	1,218	2,127	1,917	2,215	2,388	395,556
Chilli	1,678	1,477	1,445	1,109	1,574	1,338	1,780
Cassava	2,532,079	2,197,640	2,832,141	3,285,127	3,539,660	3,874,705	4,000,986
Sweet potatoes	1,762,034	1,081,463	1,781,595	2,307,354	2,362,425	2,695,878	2,897,888
Irish potatoes	420,590	404,420	527,831	594,003	673,344	775,629	775,650
Total	6,995,073	5,487,319	8,667,225	10,769,648	10,478,057	13,810,645	13,671,328

Source: National Crop Estimates, MoAFS

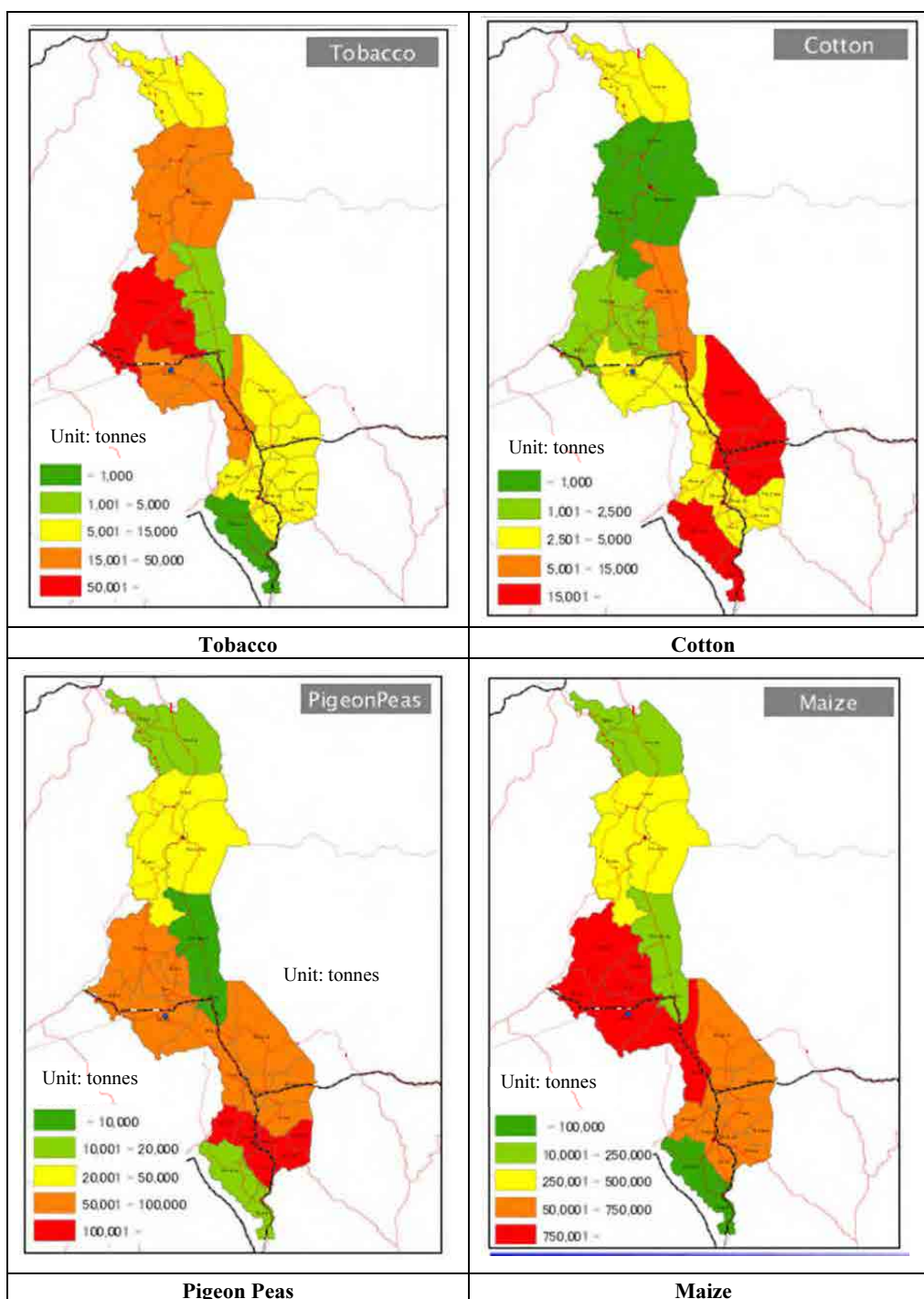
Table 2-4 shows the yields of crops by the three ADDs in the Southern Region and their proportions, while Figure 2-7 illustrates the production of major crops by ADD in 2009. In total, the Southern Region accounts for 27.0%, but the proportions vary by crop. The Southern Region accounts for almost 50% of the production of sweet potato, chilli, sesame, macadamia pulses, sorghum, and cotton.

Table 2-4 Yield by Smallholder, 2010

(Unit: tonne)

Crop	Karonga	Mzuzu	Kasungu	Salima	Lilongwe	Machinga	Blantyre	Shire Valley	Total
Maize	135,248	352,312	1,051,619	164,553	849,881	425,159	392,868	47,769	3,419,409
Ratio (%)	4.0	10.3	30.8	4.8	24.9	12.4	11.5	1.4	100.0
Rice	29,266	8,069	1,055	17,421	13,838	25,082	9,920	5,455	110,106
Ratio (%)	26.6	7.3	1.0	15.8	12.6	22.8	9.0	5.0	100.0
Groundnuts	7,462	25,543	118,226	13,879	87,459	23,492	20,842	584	297,487
Ratio (%)	2.5	8.6	39.7	4.7	29.4	7.9	7.0	0.2	100.0
Tobacco	7,144	32,996	66,744	4,448	45,124	9,320	7,005	192	172,973
Ratio (%)	4.1	19.1	38.6	2.6	26.1	5.4	4.0	0.1	100.0
Cotton	826	9	477	4,501	2,312	9,512	1,676	9,852	29,165
Ratio (%)	2.8	0.0	1.6	15.4	7.9	32.6	5.7	33.8	100.0
Wheat	680	282	61	14	194	5	1,105	0	2,341
Ratio (%)	29.0	12.0	2.6	0.6	8.3	0.2	47.2	0.0	100.0
Sorghum	54	0	99	359	1,241	14,089	27,159	10,931	53,932
Ratio (%)	0.1	0.0	0.2	0.7	2.3	26.1	50.4	20.3	100.0
Millet	2,299	6,947	1,049	19	7,343	854	747	5,237	24,495
Ratio (%)	9.4	28.4	4.3	0.1	30.0	3.5	3.1	21.4	100.0
Pulses	12,901	28,739	91,034	4,074	76,697	57,807	182,731	16,506	470,489
Ratio (%)	2.7	6.1	19.3	0.9	16.3	12.3	38.8	3.5	100.0
Cashew nuts	88	0	0	280	0	57	31	0	456
Ratio (%)	19.3	0.0	0.0	61.4	0.0	12.5	6.8	0.0	100.0
Macadamia	0	0	10	0	0	1,479	93	0	1,582
Ratio (%)	0.0	0.0	0.6	0.0	0.0	93.5	5.9	0.0	100.0
Sesame	141	0	0	0	0	43	4	356	544
Ratio (%)	26	0	0	0	0	8	1	65	100
Sunflower	539	313	544	0	0	27	7,752	0	9,175
Ratio (%)	5.9	3.4	5.9	0.0	0.0	0.3	84.5	0.0	100.0
Coffee	3,015	1,004,274	4	0	21	0	0	0	1,007,314
Ratio (%)	0.3	99.7	0.0	0.0	0.0	0.0	0.0	0.0	100.0
Paprika	20	393,946	323	28	1,211	20	5	3	395,556
Ratio (%)	0.0	99.6	0.1	0.0	0.3	0.0	0.0	0.0	100.0
Chilli	127	206	0	280	5	174	988	0	1,780
Ratio (%)	7.1	11.6	0.0	15.7	0.3	9.8	55.5	0.0	100.0
Cassava	370,915	1,020,588	503,937	754,867	300,023	348,247	681,303	21,106	4,000,986
Ratio (%)	9.3	25.5	12.6	18.9	7.5	8.7	17.0	0.5	100.0
Sweet potatoes	108,430	234,540	618,255	56,958	580,662	337,368	846,202	115,473	2,897,888
Ratio (%)	3.7	8.1	21.3	2.0	20.0	11.6	29.2	4.0	100.0
Irish potatoes	1,255	23,723	179,839	0	470,013	8,656	92,164	0	775,650
Ratio (%)	0.2	3.1	23.2	0.0	60.6	1.1	11.9	0.0	100.0
Total	680,410	3,132,487	2,633,276	1,021,681	2,436,024	1,261,391	2,272,595	233,464	13,671,328
Ratio (%)	5.0	22.9	19.3	7.5	17.8	9.2	16.6	1.7	100.0

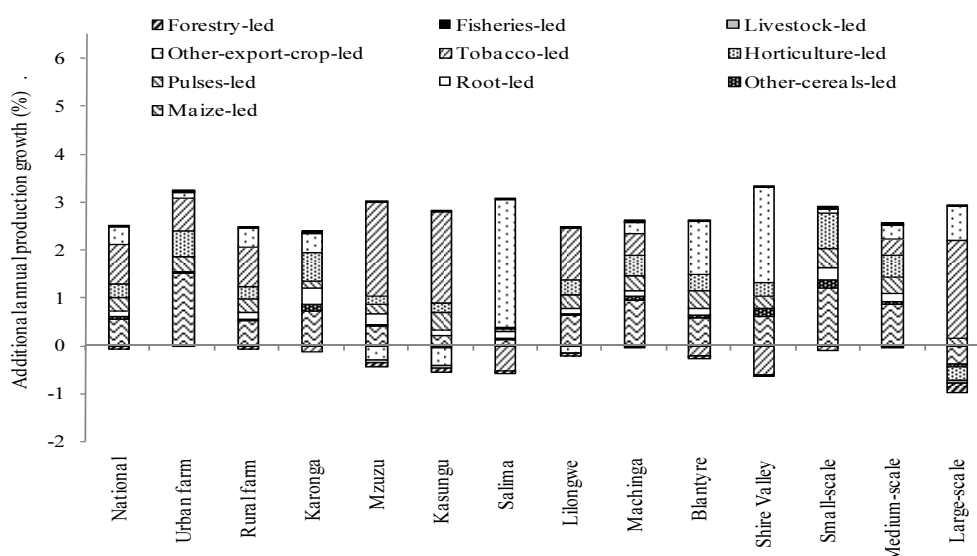
Source: National Crop Estimates, MoAFS



Source: Compiled by the Study Team based on the Crop Estimates 2009 of MoAFS

Figure 2-7 Production of Major Crops by ADD in 2009

MoAFS has estimated the sources of additional production growth by farm household group, as shown in Figure 2-8. This projection is an index for additional production growth.



Source: The Agriculture Sector Wide Approach (ASWAp) 2010-2014, MoAFS, September 2010.

Figure 2-8 Sources of Additional Production Growth by Farm Household Groups

b) Sugar

Sugar is produced by Illovo Sugar Ltd., which is the only sugar producing company in Malawi. There are two estates, one at Nchalo in Chikwawa District in the Southern Region and the other at Dwangwa in Nkhota-kota District in the Central Region. The former produces sugar for export and the domestic market in the Southern Region, and the latter produces sugar for the domestic market in the Northern and Central Regions.

Table 2-5 shows sugar production by sugar mill between 2000 and 2010.

Table 2-5 Sugar Production

(Unit: 1,000 tonnes)

Sugar Mill	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Nchalo	119.27	103.47	121.93	160.36	156.82	152.36	161.79	176.64	154.58	186.99	166.44
Dwangwa	90.43	83.62	85.87	100.15	103.06	104.35	107.74	111.82	111.21	116.78	113.76
Total	209.70	187.09	207.80	260.51	259.88	256.71	269.53	288.46	265.79	303.77	280.20

Source: Illovo Sugar Ltd.

Due to increasing demand in the European Union (EU), Illovo Sugar Ltd. has plans to expand its Nchalo Estate, targeting 280 thousand tonnes by 2015 and 400 thousand tonnes thereafter.

c) Tobacco

Table 2-6 shows the production of tobacco between 2000 and 2010 according to the Statistical Year Book of the National Statistical Office (NSO), while Table 2-7 shows the quantity of tobacco exported according to a study funded by the EU, “Malawi Transport Sector Multimodal Development and Potential Public Private Partnership Study, November 2010,” (hereafter referred to as “EU Multimodal Transport Study”). Tobacco exports are the highest contributor to GDP in Malawi. Main export destinations are EU, the United States of America (USA) and Egypt.

Table 2-6 Tobacco Production

(Unit: 1,000 tonnes)

Item	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Production	159.8	124.7	136.6	116.6	265.9	145.3	n.a.	n.a.	n.a.	n.a.	n.a.
Estates	152.9	123.7	136.6	116.6	174.7	64.1	155.2	110.7	n.a.	n.a.	n.a.
- Burley	142.2	115.3	125.4	102.8	151.5	43.7	124.2	86.6	n.a.	208.3	193.2
- Flue-cured	10.7	8.4	11.2	13.8	23.2	20.4	30.8	23.0	n.a.	20.5	24.3
- Fire-cured	n.a.	n.a.	1.6	4.5	1.9	0.1	0.5	1.1	n.a.	3.4	2.6

Source: Statistics Year Book 2010, NSO

Table 2-7 Quantity of Exported Tobacco

(Unit: 1,000 tonnes)

Year	2006	2007	2008	2009
Export Quantity	235.30	110.72	194.71	232.64

Source: EU Multimodal Transport Study, November 2010

d) Tea

Tea is mainly grown in Thyolo and Mulanje Districts in the Southern Region and Nkhata Bay District in the Northern Region. Most of the tea is exported to the United Kingdom (UK), the Republic of South Africa (RSA), Kenya, USA, Pakistan, Holland, Botswana and Canada. Table 2-8 shows the production of tea between 1998 and 2009, while Table 2-9 show the quantity of tea exported.

Table 2-8 Tea Production

(Unit: 1000 tonnes)

Item	2002	2003	2004	2005	2006	2007	2008	2009
Production	39.2	41.8	50.1	38.0	45.0	48.1	41.6	52.6

Source: Statistics Year Book 2010, NSO

Table 2-9 Quantity of Tea Exported

(Unit: 1000 tonnes)

Item	2002	2003	2004	2005	2006	2007	2008	2009	2010
Export Quantity	42.8	39.0	46.3	44.6	60.0	51.4	30.6	47.1	44.8

Source: Statistics Year Book 2010, NSO

e) Cotton

Cotton can be grown in the same places where sugarcane is planted. The main area for cotton is Chikwawa District in the low land along the Shire River and Salima District in the Central Region. Table 2-10 shows the quantity of cotton exported.

Table 2-10 Quantity of Cotton Exported

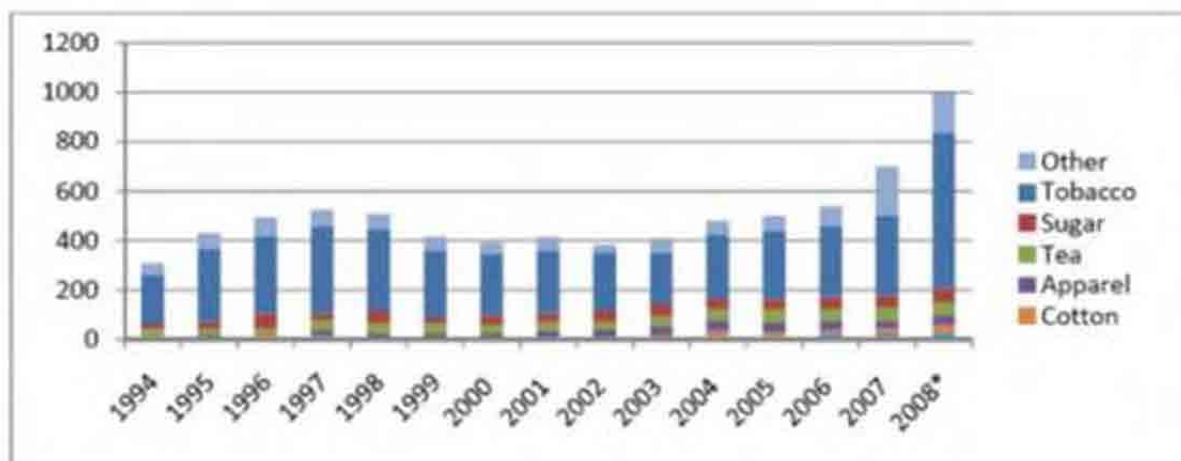
(Unit: 1000 tonnes)

Year	2006	2007	2008	2009
Export Quantity	23.40	18.80	13.40	27.56

Source: EU Multimodal Transport Study, November 2010

f) Composition of Agricultural Export Commodities

Figure 2-9 shows the composition of agricultural export commodities, which account for a majority of Malawi's exports. The share of tobacco exports was about 50% in 2007, followed by sugar and tea. Since tobacco exports are likely to decrease, exports of other commodities such as sugar, tea and cotton are expected to increase.



Source: EU Multimodal Transport Study

Figure 2-9 Composition of Agricultural Export Commodities by Value

(2) Livestock

Livestock is a means of subsistence for rural people and also a source of income. Chickens, goats, and cattle are the major types of livestock. Table 2-11 shows the livestock population, based on the socio-economic profile in each District, however the data of some districts are not updated.

Table 2-11 Population of Livestock

(Unit: head)

Area	Cattle	Goats	Sheep	Pigs	Chickens
Malawi	884,132	2,623,017	76,613	792,364	7,557,746
Northern Region	434,743	420,964	25,622	187,275	1,520,189
Central Region	262,745	1,118,254	25,189	452,937	3,282,044
Southern Region	186,644	1,083,799	25,801	152,151	2,755,513
Balaka	7,648	53,822	5,042	7,980	155,304
Mangochi	15,771	139,957	6,953	2,875	270,704
Machinga	8,921	82,241	3,296	1,912	208,464
Zomba rural	11,394	105,336	3,552	8,076	358,128
Zomba City	2,075	1,268	101	906	38,834
Chiradzulu	4,064	77,381	1,645	12,424	149,277
Blantyre rural	7,600	49,560	899	9,172	149,691
Blantyre city	354	53,989	..	773	277,979
Thyolo	3,290	80,479	3	37,927	338,347
Mulanje	2,174	115,052	1,397	3,842	162,658
Phalombe	10,300	60,882	351	17,710	103,603
Mwanza	11,464	48,800	393	19,164	163,995
Chikwawa	74,065	138,359	1,919	18,544	240,633
Nsanje	27,525	76,672	248	10,846	137,895

Source: NACAL 2007, National Statistical Office

Note: Shaded lines are districts in the Study Area

(3) Fishery

Table 2-12 shows fishery data for each district. In some districts, there are ponds for fish farming, while there are natural lakes in some districts. Lake Chilwa is located in Zomba with a

fish catch of 4,777 tonnes.

Table 2-12 Fisheries

(Unit: kg)

Type of Fishery	Zomba	Mwanza	Chiradzulu	Thyolo	Phalombe	Chikwawa	Mulanje	Neno	Blantyre	Nsanje
	2008/2009	2003	2005/2006	2008/2009	2005	2006	2006	2005	2005/2006	2007/2008
Fish Production	757,000	2360.05	N/A	2,683	1,200	11,900	N/A	333	860	N/A
Fish Catch	4,777,000	N/A	N/A	N/A	N/A	127,800	N/A	N/A	N/A	N/A

Source: Socio-Economic Profile in each district

2.3.5 Mining

Malawi has considerable potential mining resources. Mining was not considered an important sector before 1994, but mining exploration has been stepped up by mostly foreign organisations and companies. According to the “EU Multimodal Transport Study” and Department of Mining, mineral deposits and their locations are as shown in Table 2-13.

In the Southern Region, there is titanium at Tengani, which is located south of Bangula in the Nsanje District, and bauxite in Mulanje and Phalombe Districts.

Table 2-13 Mineral Deposits

Minerals	Mine Location
Uranium	Kayelekera (Karonga): 1,500 tonnes/year
Heavy mineral sands (titanium)	Salima, Makanjira (Mangochi), Tengani (Nsanje)
Ilemenite, rutile and zircon	Lake Chiwa (Zomba) Deposit of 15 million tonnes
Ilemenite, rutile, zircon and garnet	Chipokas HMS, Pipe to Chipoka and harbour and onwards by barges
Indium and palladium	Chimwadzulu
Ruby	Chimwadzulu ruby mine (Nyasa Ruby)
Coal	Mchenga: 5,000 tonnes/month
Niobium	Kasungu (KANIKA) 4,000 tonnes/year
Ferrochrome	Nthari, 30,000 tonnes/month
Nickel, copper, platinum (concessions)	Pemba Hill, Kapeni River (Southern Region) Linthipe, Katakwi in Central Region
Tantalite, zircon and corundum	Thambani Mountains and Mzimba
Monozite and strontianite	Kangankunde Hill
Bauxite	Mulanje
Granite	Chitipa, Mchinji, Mangochi and Mzimba



Source: EU Multimodal Transport Study
Department of Mining

2.3.6 Tourism

Table 2-14 summarizes the number of tourists visiting tourist sites in the Study Area, and Figure 2-10 shows the location of protected areas. There is one national park, two wildlife reserves, one nature sanctuary, all located in the Lower Shire area, and one mountain forest in Mulanje. The number of tourists who visit these tourist sites is between 1,000 and 6,000 per year.

Table 2-14 Number of Tourists Visiting Tourist Sites

(Unit: person)

Name of Protected Area	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Lengwe National Park	1,463	1,830	2,881	2,244	4,055	1,679	3,445	3,123	2,597	2,170
Majete Wildlife Reserve	n.a.	n.a.	n.a.	n.a.	n.a.	425	1,699	2,059	4,023	2,123
Mwabvi Wildlife Reserve	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	29	74	175
Michiru Nature Sanctuary	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	5,842
Mulanje Mountain Forest	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	1,000

Source: Control office of each tourist site



Source: Study Team

Figure 2-10 Location of Protected Areas

2.4 Natural Conditions in Malawi and the Study Area

2.4.1 Topographical Conditions and Soil

(1) Topographical Conditions

Malawi is located on the southern edge of the Great Rift Valley of the African Continent with South latitude between 9 and 17 degrees and East longitude between 32 and 35 degrees. Malawi is a landlocked country surrounded by Tanzania to the north, Mozambique to the south and Zambia to the west. The land area of Malawi is about 94,000 km², while lakes, including Lake Malawi which is the biggest lake in Malawi and marshes occupy about one-fifth of the territory with an area of about 24,000 km².

The physiographic units of Malawi are divided into four major categories (Figure 2-11). The Highlands consist of Mulanje and Zomba Districts at elevations of 1,600 and 3,000 m. The Plateaux are located at elevations of 1,000 and 1,600m and cover most land in Thyolo, Mulanje, and Phalombe Districts. The Rift Valley Escarpment is located in part of Chikwawa, Thyolo, Mwanza, Chiradzulu, and Zomba and the East African Rift Valley descends from the plateaux in a series of stepped faults. The Rift Valley Plains were mainly formed by the deposition of materials eroded from the Rift Valley Escarpment. The average elevation in the Rift Valley Plain is less than 600 m above sea level and the Lower Shire valley at Nsanje and Chikwawa Districts is in this category.

The Shire River is the longest river in Malawi with a total length of 340 km between Lake Malawi at an altitude of 473 m, and the confluence with the Zambezi River in Mozambique. The Shire River has five waterfalls on the western side of Blantyre District and flows into the low land at an altitude of about 100 m in Chikwawa and Nsanje Districts through Elephant Marsh.

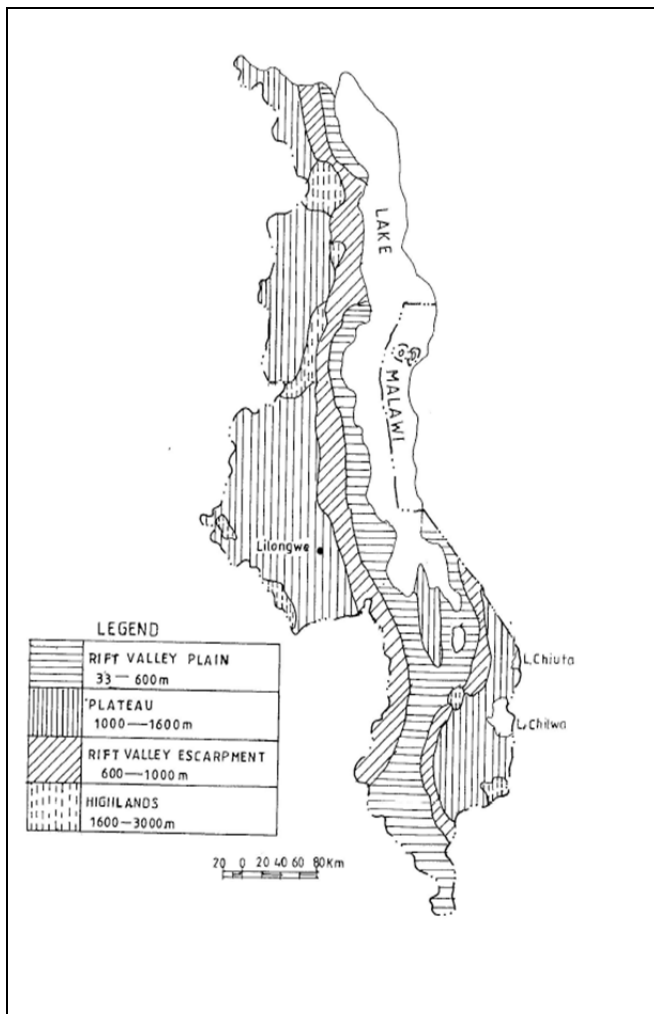
(2) Soil

The Department of Agricultural Research classifies the soils in Malawi into 28 classes (Figure 2-12). In general, soils in Malawi fall into three major types: 1) the Iatric Leptosols, known as Lithosols, which occur in all areas of broken relief; 2) the Chromic Luvisols, known as Latosols, which are red-yellow soils and include part of the Southern Region; 3) the Haplic Lixisols, which are alluvial soils of the lacustrine and river-line plains, the Vertisols of the Lower Shire Valley and Phalombe plain.

2.4.2 Meteorological Condition

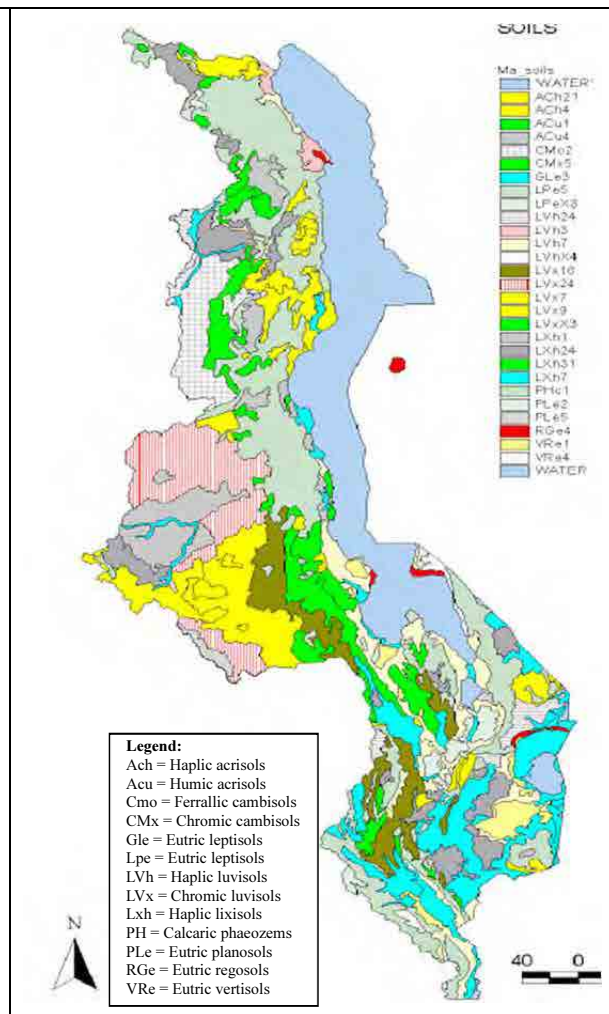
(1) Climate

The climate in the Southern Region of Malawi is tropical continental with two distinct seasons: the rainy season from November to April and the dry season from May to October. The dry season can be subdivided into the cool dry period from May to July and the hot dry period from August to October.



Source: The State of Environmental Report 2002

Figure 2-11 Major Physiographic Regions



Source: The State of Environmental Report 2002

Figure 2-12 Soil Types in Malawi

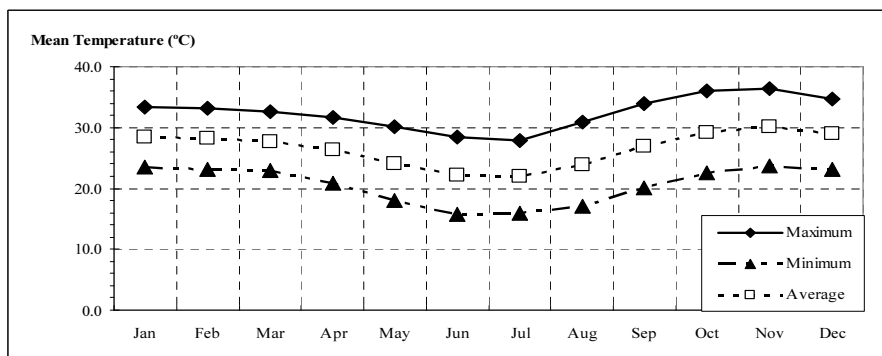
The average temperature in the highland ranges from 28 to 39°C in the hottest months while, on the Mulanje plateau, the temperature may fall slightly below zero in the coldest season. The dominating features of the Zomba Mountain and the Shire Highlands influence the high rainfall in Zomba, Thyolo and Mulanje Districts, thereby creating high run-off in these areas.

Most of the rain in Malawi is influenced by the Inter-Tropical Convergence Zone (ITCZ), where the north-easterly and south-easterly trade winds converge.

(2) Temperature

Figure 2-13 shows the monthly mean temperature¹ (maximum, average and minimum) at the Ngabu meteorological observatory in Chikwawa District between 1971 and 2009. The monthly average temperature is lowest in July (21.9°C) and the maximum temperature is highest in November (36.5°C).

¹ Monthly mean temperature is the mean value of monthly temperature between 1971 and 2009



Source: Malawi Meteorological Services

Figure 2-13 Maximum, Average and Minimum Temperature at Ngabu (1971-2009)

(3) Precipitation

a) Monthly Precipitation

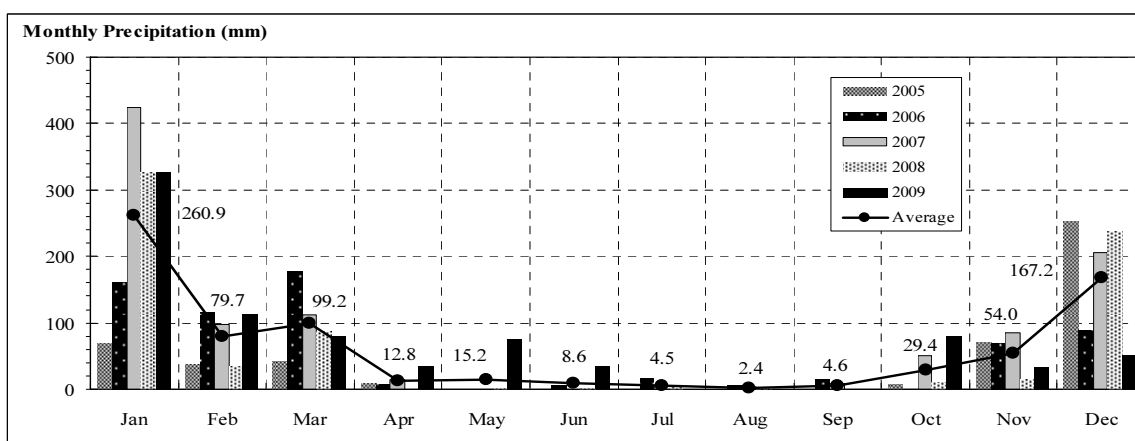
Table 2-15 and Figure 2-14 show the monthly precipitation at the Makhanga meteorological observatory in Nsanje District between 2005 and 2009. The average yearly precipitation varied between 486.3 mm in 2005 and 1,004.8 mm in 2007, and there are big differences in precipitation each year. The rainy season starts in October and ends in March, while rainfall is very limited between June and September.

Table 2-15 Monthly Precipitation at Makhanga between 2005 and 2009

(Unit: mm)

Year	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Total
2005	68.3	38.5	41.0	9.0	0.0	0.0	0.0	0.0	0.0	6.6	70.0	252.9	486.3
2006	160.1	115.0	177.0	6.5	0.0	6.0	15.8	5.0	14.0	0.0	68.0	88.9	656.3
2007	423.6	97.0	112.0	15.0	0.0	0.0	3.8	4.5	9.0	50.0	84.2	205.7	1004.8
2008	326.0	35.0	85.9	0.0	1.0	2.0	3.0	2.5	0.0	10.5	15.0	237.6	718.5
2009	326.3	113.1	80.0	33.5	75.0	35.0	0.0	0.0	0.0	80.0	33.0	51.0	826.9
Ave.	260.9	79.7	99.2	12.8	15.2	8.6	4.5	2.4	4.6	29.4	54.0	167.2	738.6

Source: Malawi Meteorological Services



Source: Malawi Meteorological Services

Figure 2-14 Monthly Precipitation at Makhanga between 2005 and 2009

b) Maximum Daily Precipitation

Table 2-16 shows the maximum daily precipitation at the Makhanga meteorological observatory between 2005 and 2009. Daily precipitation exceeded 70.0 mm on 4 days for the last 5 years and the highest daily precipitation was recorded in January 2009 at 110.0 mm.

Table 2-16 Maximum Daily Precipitation at Makhanga between 2005 and 2009

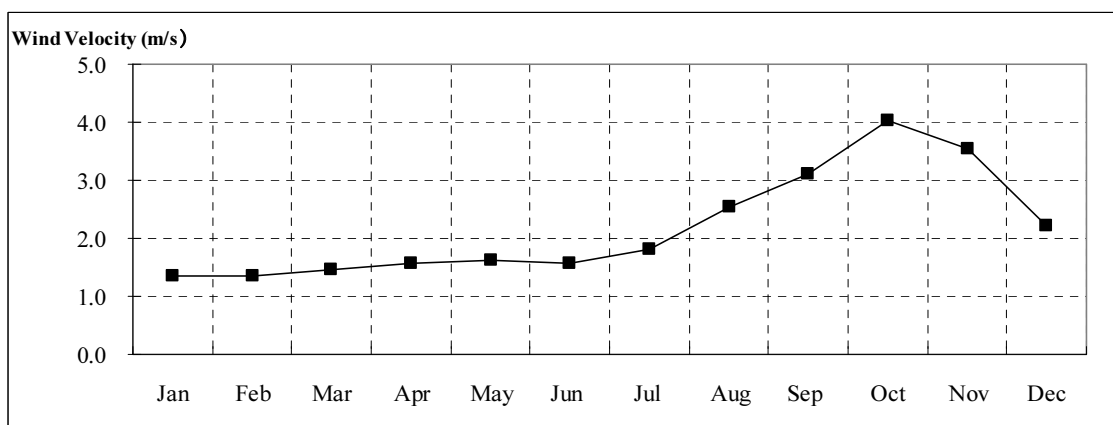
(Unit: mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2005	18.0	28.5	28.0	9.0	0.0	0.0	0.0	0.0	0.0	6.6	58.0	89.0
2006	40.0	36.0	68.0	6.5	0.0	5.0	9.0	5.0	14.0	0.0	47.0	23.5
2007	51.0	26.0	58.0	15.0	0.0	0.0	3.8	3.0	9.0	50.0	44.0	48.0
2008	64.0	11.0	21.0	0.0	1.0	2.0	3.0	2.5	0.0	10.5	9.0	47.0
2009	110.0	38.0	21.0	14.0	75.0	35.0	0.0	0.0	0.0	80.0	16.0	30.0

Source: Malawi Meteorological Services

(4) Wind Velocity

Figure 2-15 shows the mean monthly wind velocity at the Ngabu meteorological observatory between 2005 and 2009. The wind velocity tends to become stronger between August (middle of the dry season) and December, and then weakens in the rainy season.



Source: Malawi Meteorological Services

Figure 2-15 Mean Monthly Wind Velocity at Ngabu between 2005 and 2009

2.4.3 Hydrological Conditions

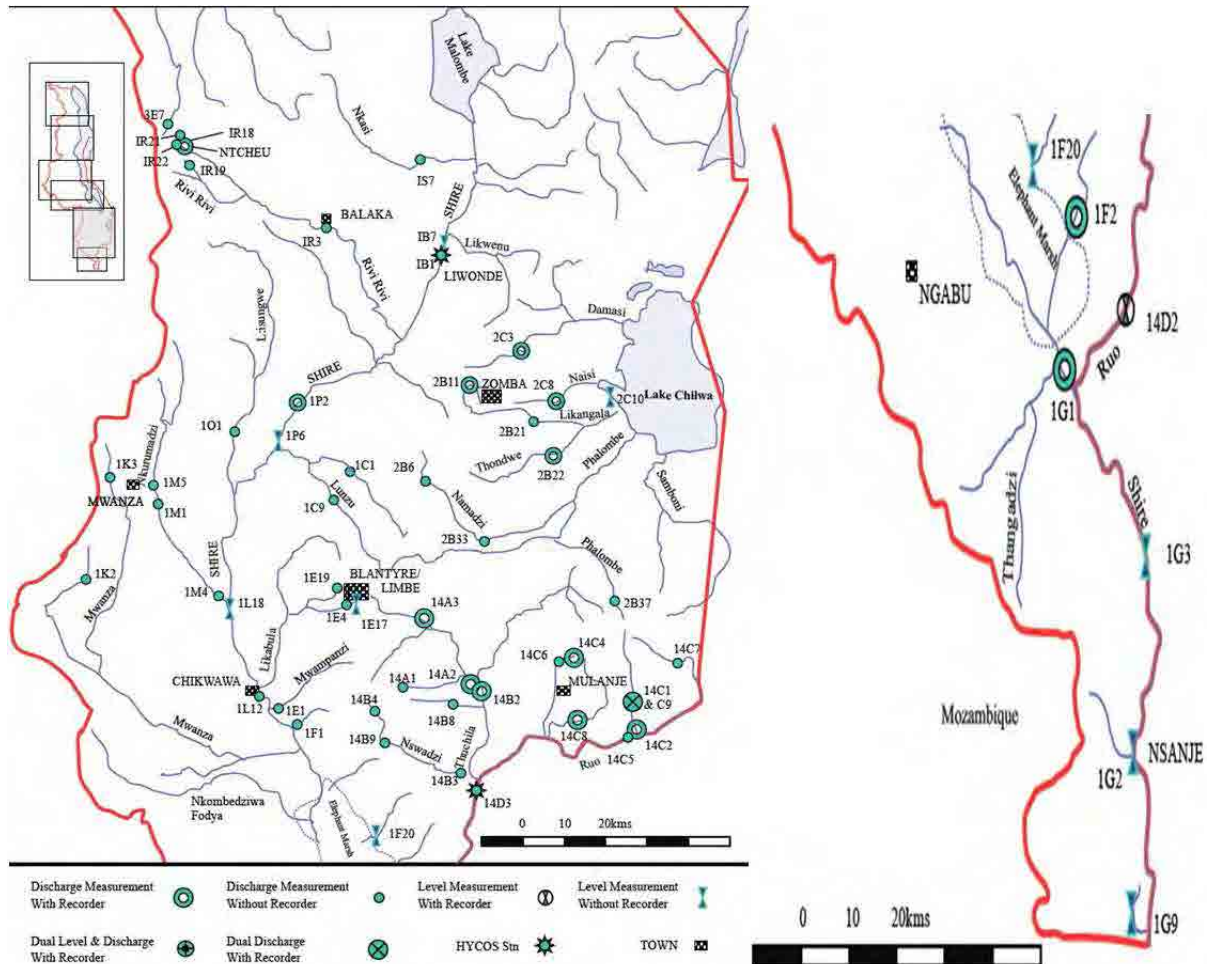
(1) Hydrology in the Study Area

The Southern Region of Malawi is rich in water resources and divided into two major water catchment areas, Lake Chilwa and the Shire Basin. The river and lake systems in the Southern Region are shown in Figure 2-16 according to data from the Department of Water, Ministry of Natural Resources, Energy, and Environment (MoNREE). Major rivers in this region include the Shire, Mwanza, and Ruo. The Shire Basin has a total drainage area of 18, 945 km² and most of the rivers in this basin are perennial, but could become annual in periods of low rainfall. Table 2-17 shows details of drainage size, mean annual rainfall, runoff, and percentage runoff. A high percentage of the runoff is recorded in the Ruo River, which results in occasional floods in this area.

Table 2-17 Rivers and Streams in Southern Malawi

River Basin	Area (km ²)	Rainfall (mm)	Runoff		Percent Runoff
			(mm)	(m ³ /s)	
Shire	18,945	902	137	82	15.2
Lake Chilwa	4,981	1,053	213	34	20.2
Ruo	3,494	1,373	538	60	39.2

Source: Malawi State of Environment and Outlook 2010



Source: Data from the Department of Water, MoNREE

Figure 2-16 Hydrology Systems in Southern Malawi

2.4.4 Hydrological Condition at the Shire River and Chiromo Washaway Section

(1) Outline

In March 1997, water overflowed into Elephant Marsh located upstream of Kamuzu Truss Bridge on the southern bank of the Shire River. This breach was caused by the backflow of the Shire River from the confluence of the Shire and Ruo Rivers, thereby causing the embankment of the railway and the S151 road at Chiromo to be washed away. A new river has since formed, called the New Shire River in this report, which flows parallel to the original Shire River. The effects of the washaway of the embankment remain today.

Thirteen years after the washaway, the hydrological effects of the newly formed river have

caused erosion and sedimentation in Elephant Marsh, and the topography around the washaway section in the Chiromo Area has been deformed.

In order to grasp the hydrological conditions before and after the washaway on the Shire River, the Ruo River, and the washaway section, the Study Team carried out a hydrological analysis.


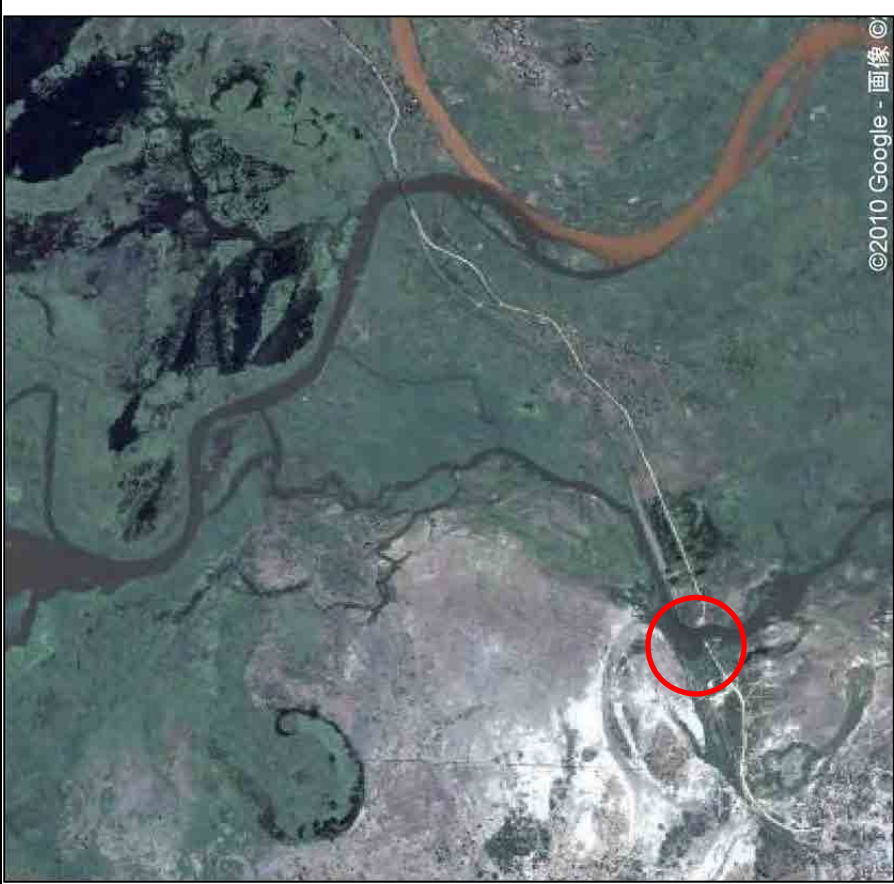
(2) Mechanism of Washaway of Embankment at Chiromo

Figure 2-17 compares aerial photos before and after the washaway in 1997. According to analyses by the Ministry of Irrigation and Water Resources (MoIWR), the mechanism by which the embankment at Chiromo was washed away is considered to be as follows:

- When the Ruo River was flooded in March 1997, the whole area on the southern side of the railway embankment was inundated up to the washaway section.
- At the same time, the main flow of the Shire River flowed into the northern marsh and the water level in the marsh continuously increased.
- When the water level on the southern side of the embankment reduced, the entire water pressure was forced into the embankment from the northern side. The gradient of the humidity line in the embankment became steep and a water leakage path formed in the embankment.
- Finally, a weak section of the embankment, which was not designed to withstand water force, was washed away by the force of water accumulated on the northern side of the marsh.

(3) Hydrological Condition at the Shire River and Chiromo Washaway Section

The Study Team gathered hydrological data from the hydrological observation stations as well as by observation at sites. Details of the hydrological condition at the Shire River and Chiromo Washaway Section are described in Chapter 9.

	<p>October 1995</p>	<p>The main stream of the Shire River formed a clear river line and there was no gap on the embankment on the right side.</p>
	<p>2010</p>	<p>There are some gaps on the right embankment of the main stream of the Shire River and water flows south between these gaps.</p>

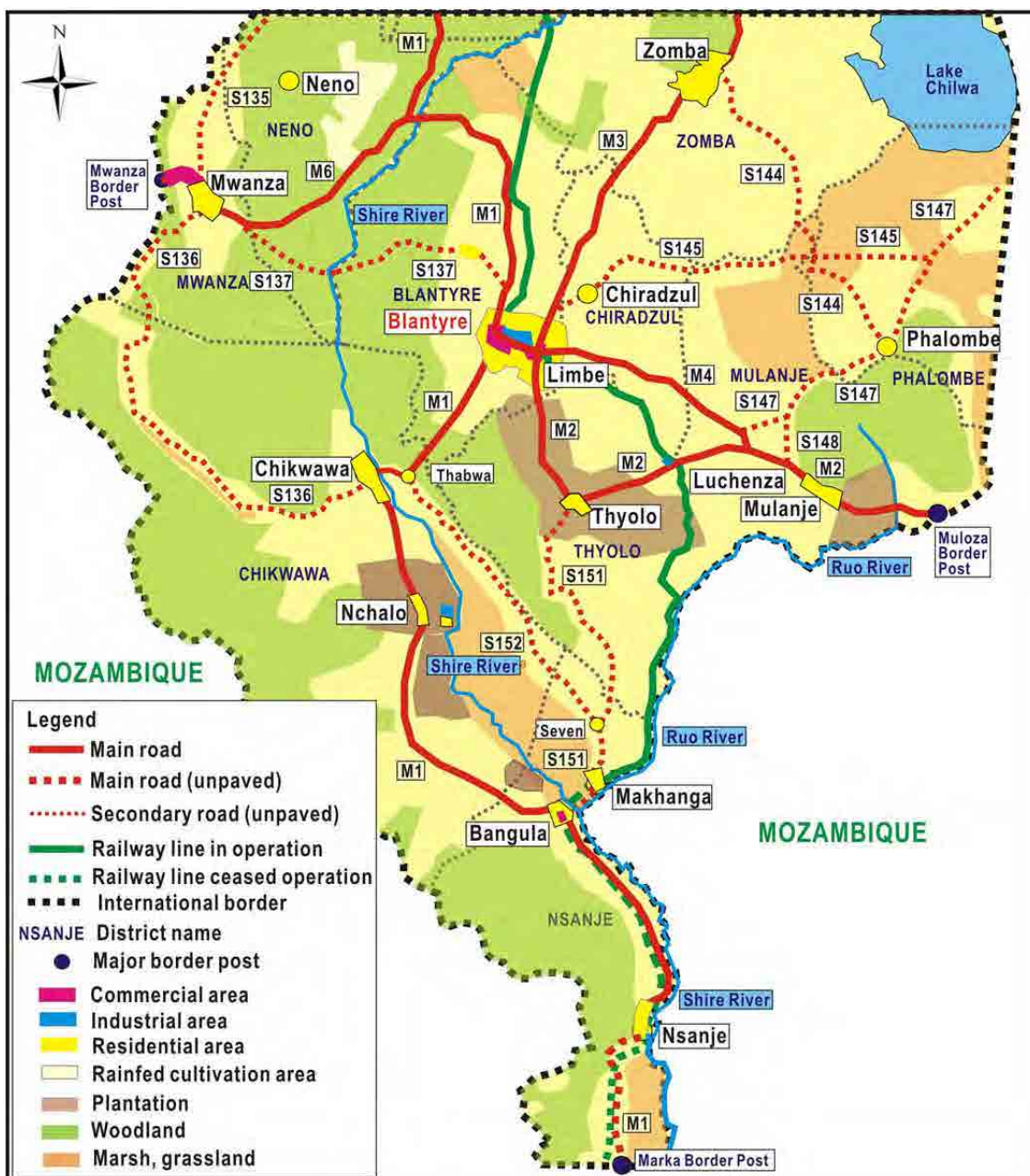
Source: Survey Department of Malawi (1995 aerial photo), Google Earth (2010 aerial photo)

Figure 2-17 Comparison of Aerial Photos before and after the Washaway in 1997

2.5 Social Conditions in Malawi and the Study Area

2.5.1 Land Use in the Study Area

Land use in the Study Area is mainly agricultural, consisting of the Shire Highland with widespread cultivation of tea, nuts, pigeon peas and food crops, the Lower Shire area (western side) with cultivation of sugar and cotton, and cattle breeding (dry area) and the Lower Shire area (eastern side) with cultivation of food crops, banana and cattle breeding. The land use in the Study Area is shown in Figure 2-18, the land use pattern in each district is shown in Table 2-18, and the land use in each district in the Study Area is shown in Appendix-1.



Source: Study Team

Figure 2-18 Land Use in the Study Area

Table 2-18 Land Use Pattern in Each District in the Study Area

(Unit: ha)

District	Woodland	Plantation	Small Holder Farming	Marsh, Grassland & Others	Total
Blantyre	122,114 (61%)	2,017 (1%)	64,455 (32%)	13,110 (6%)	201,696 (100%)
Chikwawa	266,815 (56%)	19,071 (4%)	112,193 (24%)	74,853 (16%)	472,932 (100%)
Chiradzulu	n.a.	n.a.	n.a.	n.a.	76,700 (100%)
Mulanje	52,907 (26%)	14,847 (7%)	137,546 (67%)	-	205,300 (100%)
Mwanza	12,432 (15%)	90 (0%)	27,215 (33%)	42,863 (52%)	82,600 (100%)
Neno	25,200 (17%)	0 (0%)	38,000 (26%)	83,690 (57%)	146,900 (100%)
Nsanje	40,395 (21%)	0 (0%)	98,436 (51%)	54,301 (28%)	193,112 (100%)
Phalombe	11,806 (7%)	1,826 (1%)	124,500 (76%)	25,168 (16%)	163,000 (100%)
Thyolo	n.a. (44%)	n.a. (8%)	n.a. (31%)	n.a. (17%)	171,500 (100%)
Zomba	14,781 (6%)	22,575 (9%)	161,513 (63%)	59,131 (23%)	258,000 (100%)

Source: Socio economic profile of each district.

(1) Blantyre District

Blantyre District and City are located in the centre of Shire Highland. Urban activities in the commercial, industrial and residential areas are located in the centre of Blantyre City. Small holder farming lots are located mainly on the eastern side of Blantyre District with cultivation of mainly food crops, such as maize. Woodlands are located on the western side of Blantyre District facing the escarpment of the Great Rift Valley.

(2) Chikwawa District

Chikwawa District is located in the northern part of the Lower Shire Valley area and occupy the largest area in the Study Area. In the northern and western parts of the district, woodland occupies about 56% of the land area. Sugar cane cultivated by Illovo Sugar occupies 4% of the land area, which is the main industry together with cotton cultivation and cattle breeding on the western side of the Shire River. The eastern side of the Shire River consists of Elephant Marsh and a narrow cultivation area along S152, and food crops are the main agricultural products.

(3) Chiradzulu District

Chiradzulu District is located on the eastern side of Blantyre District and is mostly small holder farming land with the cultivation of food crops such as sweet potato, cassava and maize.

(4) Mulanje District

Mulanje District is located on the eastern edge on the Study Area boundary with Mozambique at the Muloza Border Post. The highest peak of Malawi, Mulanje Mountain, is

located at the centre of the district, and there is arable land on the southern and western sides of the mountain. Tea estates are located in the southeastern part of the district and occupy 7% of the land area. Pigeon peas are another cash crop cultivated for export, while food crops are also cultivated over much of the district.

(5) Mwanza District

Mwanza District is located on the western edge of the Study Area, on the boundary with Mozambique at the Mwanza Border Post. Only 33% of its land is arable other than woodland and grassland, and food crops and fruits are cultivated.

(6) Neno District

Neno District, which was a part of Mwanza District until 2001, is located on the northern side of Mwanza District. Only 26% of its land is arable, and mainly food crops and fruits are cultivated.

(7) Nsanje District

Nsanje District is located on the southern edge of the Study Area, on the boundary with Mozambique at the Marka Border Post. Due to difficult natural conditions (hot and dry), irrigation facilities are necessary to cultivate crops and production volumes are much lower than in other districts in the Study Area, even though arable land occupies 51%. Cotton is produced as cash crop for export.

(8) Phalombe District

Phalombe District is located on the northern side of Mulanje Mountain. Arable land occupies 77% of the total area and tobacco is cultivated as a cash crop for export, while food crops are also cultivated.

(9) Thyolo District

Thyolo District is located between Shire Highland and the Lower Shire, and consists of flat terrain in the northern part and mountainous terrain in the southern part. There are several tea and macadamia nuts estates along M2 in the central part of the district, which occupy 8% of the land area. Banana is produced in the southern mountainous area, and is famous in Malawi as a cash crop and is transported to Blantyre and Lilongwe markets.

(10) Zomba District

Zomba District is located on the northern edge of the Study Area. 63% of the land is arable, with small holder cultivation of food crops, mainly cassava, maize and sweet potato.

2.5.2 Demography

(1) Population in Malawi

Population and housing censuses have been conducted regularly in Malawi since colonial times. However, the most comprehensive censuses have been conducted since 1966 and every ten years thereafter. In the last 30 years, censuses were conducted in 1988, 1998 and 2008.

Malawi comprises three regions, namely the Northern, Central and Southern Regions, 28

districts and four cities namely Mzuzu, Lilongwe, and Zomba and Blantyre Cities located in the Northern, Central and Southern Regions, respectively. In terms of population in each region, the Northern Region has less than one third of the populations of the Central and Southern Regions, while the Central and Southern Regions have almost the same population.

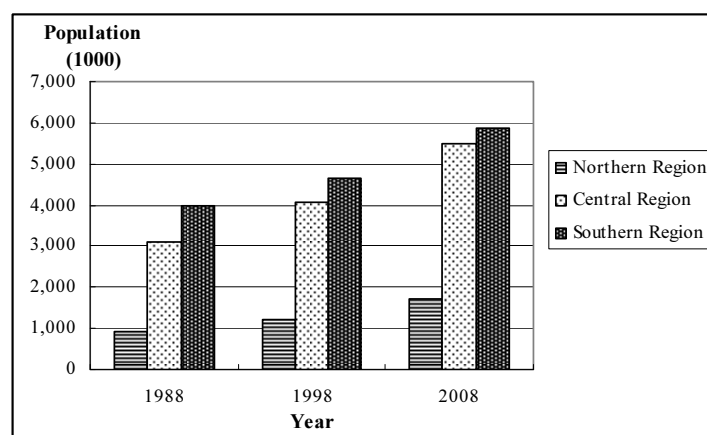
In the Southern Region, the population in Blantyre (1,001,984 in 2008) is particularly high while that in Mwanza (92,947 in 2008) is low. The population by region and district and annual increase rate between 1998 and 2008 (average of 2.4% of Southern Region) are shown in Table 2-19 and the trend of population increase in each region is shown in Figure 2-19. Even though the annual growth rate of the Southern Region is lower than the national level as well as other regions, the rates in Mwanza and Neno Districts are as high as 3.9% and 3.7%, respectively.

Table 2-19 Population by Region and by District for the Southern Region

Region/District	1988	1998	2008	Growth Rate 1998/2008
Northern Region	911,787	1,233,560	1,708,930	3.3%
Central Region	3,110,986	4,066,340	5,510,195	3.1%
Southern Region	3,965,734	4,633,968	5,858,035	2.4%
Mangochi	496,578	610,239	797,061	2.7%
Machinga	301,849	369,614	490,579	2.9%
Balaka	213,416	253,098	317,324	2.3%
Zomba	441,615	546,661	667,953	2.0%
Chiradzulu	210,912	236,050	288,546	2.0%
Blantyre	589,525	809,397	1,001,984	2.2%
Mwanza	121,513	63,220	92,947	3.9%
Neno	N/A	74,795	107,317	3.7%
Thyolo	431,157	458,976	587,053	2.5%
Mulanje	419,928	428,322	521,391	2.0%
Phalombe	218,134	231,990	313,129	3.0%
Chikwawa	316,733	356,682	434,648	2.0%
Nsanje	204,374	194,924	238,103	2.0%
Total	7,988,507	9,933,868	13,077,160	2.8%

Source: Population and Housing Census 2008, Population and Housing Census 1998, NSO

Note: Shaded lines are districts in the Study Area



Source: Population and Housing Census 2008, Population and Housing Census 1998, NSO

Figure 2-19 Trend of Population Increase in Each Region

(2) Population in the Study Area

The Southern Region comprises 13 districts and two cities. Zomba City was the former capital of Malawi before the capital was transferred to Lilongwe City in 1975. Blantyre City is the commercial centre of Malawi. Each district is divided into several Traditional Authorities (TA) as local authorities. There are 107 TAs and Sub Traditional Authorities (STA) in the Southern Region: the population of each TA in 1998 and 2008 is shown in Table 2-20.

Table 2-20 Population by Traditional Authority in the Study Area (1/2)

(Unit: person)

District	Traditional Authority	1998	2008
Zomba	Kuntumanji	61,076	71,926
	Mwanbo	96,106	117,220
	Mkumbira	5,074	4,803
	Chikowi	45,650	56,726
	STA Mbiza	108,967	137,593
	Mlumbe	116,283	132,340
	Malemia	47,590	59,031
	Zomba Municipality	65,915	88,314
	Sub-total	546,661	667,953
Chiradzulu	Mpama	46,914	58,005
	Likoswe	46,527	56,840
	Kadewere	62,198	77,540
	Nkalo	34,381	41,640
	Chitera	15,789	18,394
	Nchema	27,542	33,779
	Chiradzulu Boma	2,699	2,348
	Sub-total	236,050	288,546
Blantyre	Kapeni	73,055	72,236
	Lundu	20,184	25,676
	Chigaru	33,243	39,836
	Kunthembwe	26,703	33,770
	Makata	13,656	15,991
	Kuntaja	64,025	71,434
	Machinjili	21,430	22,297
	Somba	55,048	59,488
	Blantyre City	502,053	661,256
	Sub-total	809,397	1,001,984
Mwanza	Kanduku	23,735	35,971
	Nthache	31,296	42,750
	Mwanza Boma	8,189	14,226
	Sub-total	63,220	92,947
Neno	Dambe	19,262	24,858
	Mlauli	17,153	24,775
	Symon	25,130	38,179
	Ngozi	13,133	17,820
	Majete Game Reserve	117	36
	Neno Boma	0	1,649
	Sub-total	74,795	107,317
Total of Mwanza and Neno	138,015	200,264	
Phalombe	Mkhumba	152,909	206,554
	Nazombe	76,503	69,475
	STA Chiwalo	0	32,165
	Phalombe Boma	2,578	4,935
	Sub-total	231,990	313,129

Table 2-20 Population by Traditional Authority in the Study Area (2/2)

(Unit: person)

District	Traditional Authority	1998	2008
Thyolo	Nsabwe	28,417	34,746
	STA Thukuta	11,771	15,055
	STA Mbawela	31,072	40,534
	Changata	27,960	36,887
	STA Mphuka	36,021	50,763
	STA Kwethemule	37,016	47,490
	Kapichi	39,642	50,143
	Nchiamwela	52,187	56,225
	Chimaliro	83,281	112,127
	Bvumbwe	72,643	92,444
	Thomas	24,811	32,050
	Thyolo Boma	5,313	7,693
	Luchenza Township	8,842	10,896
	Sub-total	458,976	587,053
Mulanje	Mabuka	133,118	155,099
	Laston Njema	50,181	66,287
	Chikumbu	60,466	71,736
	Nthiramanja	34,688	41,731
	Nkanda	76,056	93,892
	Laston Juma	61,207	78,149
	Mulanje Mountain	58	0
	Mulanje Boma	12,548	14,497
		Sub-total	428,322
Chikwawa	Ngabu	121,312	149,490
	Lundu	42,511	46,372
	Chapananga	64,993	86,495
	Maseya	19,216	26,639
	Katunga	16,429	24,680
	Kasisi	25,362	31,003
	Makhuwira	59,022	62,929
	Lengwe National Park	304	53
	Mejete Game Reserve	59	0
	Chikwawa Boma	7,474	6,987
		Sub-total	356,682
Nsanje	Ndamera	23,550	26,596
	Chimombo	8,844	10,239
	Nyachikadza	4,366	3,640
	Mlolo	47,663	57,937
	Tengani	25,076	34,690
	STA Mbenje	34,254	43,394
	Malemia	16,009	18,033
	Ngabu	9,094	11,146
	STA Makoko	5,037	6,687
	Mwabvi Game Reserve	4,044	5,562
	Nsanje Boma	16,987	20,179
		Sub-total	194,924

Source: Population and Housing Census 2008, Population and Housing Census 1998, NSO

(3) Urbanization

Urbanisation is highest in the Southern Region, largely due to Blantyre and Zomba Cities. In terms of urbanisation in each district, the ratios in districts other than Mwanza and the two cities are lower than the national average. The urbanisation ratio in Thyolo, Mulanje, Phalombe, Chikwawa, Nsanje, Balaka, and Neno Districts are very low, in single figures.

Urbanisation in the Southern Region is regarded as generally very low. Table 2-21 summarises urbanisation in the Southern Region.

Table 2-21 Urbanisation in the Southern Region

(Unit: person)

vRegion/District	Total	Urban	Rural	Urbanisation (%)	Difference from Urbanisation of Whole of Malawi (%)
Whole of Malawi	13,077,160	2,003,309	11,073,851	15.3	0.0
Northern Region	1,708,930	240,515	1,468,415	14.1	▲ 1.2
Central Region	5,510,195	832,113	4,678,082	15.1	▲ 0.2
Southern Region	5,858,035	930,681	4,927,354	15.9	0.6
Mangochi	797,061	50,821	746,240	6.4	▲ 8.9
Machinga	490,579	24,147	466,432	4.9	▲ 10.4
Balaka	317,324	22,733	294,591	7.2	▲ 8.1
Zomba	579,639	0	579,639	0.0	▲ 15.3
Zomba City	88,314	88,314	0	100.0	84.7
Chiradzulu	288,546	2,348	286,198	0.8	▲ 14.5
Blantyre	340,728	0	340,728	0.0	▲ 15.3
Blantyre city	661,256	661,256	0	100.0	84.7
Mwanza	92,947	14,226	78,721	15.3	0.0
Thyolo	587,053	18,589	568,464	3.2	▲ 12.1
Mulanje	521,391	14,497	506,894	2.8	▲ 12.5
Phalombe	313,129	4,935	308,194	1.6	▲ 13.7
Chikwawa	434,648	6,987	427,661	1.6	▲ 13.7
Nsanje	238,103	20,179	217,924	8.5	▲ 6.8
Neno	107,317	1,649	105,668	1.5	▲ 13.8

Source: Population and Housing Census 2008, NSO

Note: Shaded lines are districts in the Study Area

(4) Population Density

In terms of population density, it is highest in the Southern Region. The density in Blantyre and Zomba Cities is higher than in Lilongwe City. The population density in the six districts of Mangochi, Machinga, Mwanza, Chikwawa, Nsanje, and Neno out of the 15 districts/cities in the Southern Region is lower than the national average, while it is higher in the other districts. The population density is shown in Table 2-22.

Figure 2-20 shows the population density and its distribution in Malawi. For the country as a whole, most of the population lives in the Central and Southern Regions, especially Lilongwe and Blantyre and their surroundings.

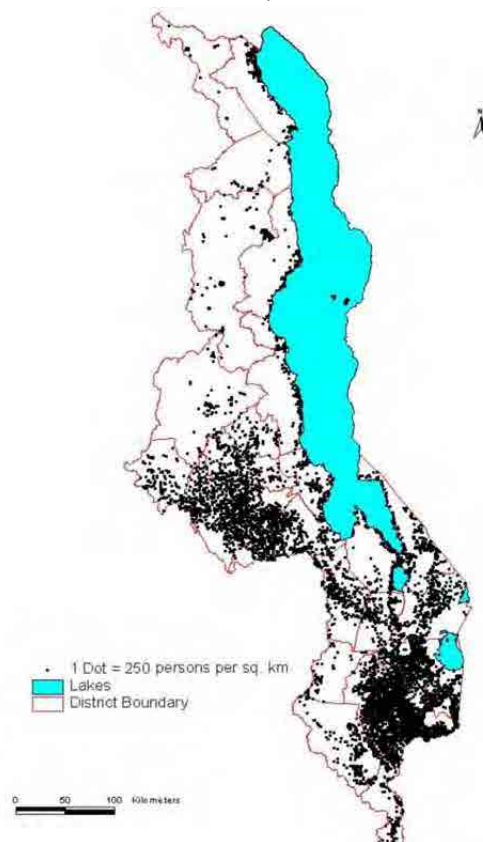
The population in the Study Area is mainly distributed in highland districts, while the population distribution in the Lower Shire, i.e., Chikwawa and Nsanje Districts, is limited.

Table 2-22 Population Density

Region/District	Area (km ²)	Population Density in 2008 (Person/km ²)
Whole of Malawi	94,276	138.6
Northern Region	26,931	63.1
Central Region	35,592	154.3
Lilongwe Rural	5,703	215.4
Lilongwe City	456	1,467.2
Southern Region	31,753	185.1
Mangochi	6,273	128.1
Machinga	3,771	129.7
Balaka	2,193	144.4
Zomba Rural	2,541	229.5
Zomba City	39	2,240.2
Chiradzulu	767	379.3
Blantyre Rural	1,792	188.6
Blantyre City	220	3,006.6
Mwanza	826	114.4
Thyolo	1,715	342.5
Mulanje	2,056	255.6
Phalombe	1,394	224.7
Chikwawa	4,755	92.3
Nsanje	1,942	122.6
Neno	1,469	74.1

Source: Population and Housing Census 2008, NSO

Note: Shaded lines are districts in the Study Area



Source: State Environment Report, 2002

Figure 2-20 Population Density and its Distribution of Malawi (1998 Census)

2.5.3 Poverty Ratio

(1) Poverty Ratio

The Second Malawi Integrated Household Survey (IHS2) is a nationally representative sample survey designed to provide information on poverty and expenditure, etc. The survey was conducted from March 2004 to March 2005, and covered 11,280 households. Following this IHS2, NSO conducted IHS3 from 2009 to 2010, but the results were not disclosed until the end of December 2011. Hence, the Study Team used the results of IHS2 for the analysis of poverty ratio in the Study Area.

The IHS2 defined the poverty line in Malawi based on the cost-of-basic-needs method and the poverty line and the ultra poverty line are defined as follows:

- Poor: Malawi Kwacha (MWK) 16,165 per annum
- Ultra poor: MWK 10,029 per annum

Table 2-23 shows the poverty ratio in the IHS2. The poverty ratio is highest in the Southern Region with 64.4% below the poverty line. The ultra poverty ratio in the Southern Region is also the highest at 31.5%, compared with 22.4% for the whole of Malawi. Especially in Nsanje and Zomba Rural, the ultra poverty ratio is more than 40%. Figure 2-21 shows the poverty ratio in the Study Area.

Table 2-23 Poverty Ratio

Region/District	Poverty Ratio (% of Pop.)	Ultra Poverty Ratio (% of Pop.)
Whole of Malawi	52.4	22.4
Urban	25.4	7.5
Rural	55.9	24.3
Lilongwe City	24.6	8.8
Northern Region	56.3	25.9
Central Region	46.7	16.2
Southern Region	64.4	31.5
Mangochi	60.7	29.3
Machinga	73.7	38.3
Balaka	66.8	33.5
Zomba rural	70.0	41.0
Zomba City	28.7	11.6
Chiradzulu	63.5	27.5
Blantyre rural	46.5	16.0
Blantyre City	23.6	4.8
Mwanza	55.6	19.7
Thyolo	64.9	33.0
Mulanje	68.6	30.6
Phalombe	61.9	26.9
Chikwawa	65.8	31.9
Nsanje	76.0	44.3

Source: IHS2, NSO

Note: Shaded lines are districts in the Study Area

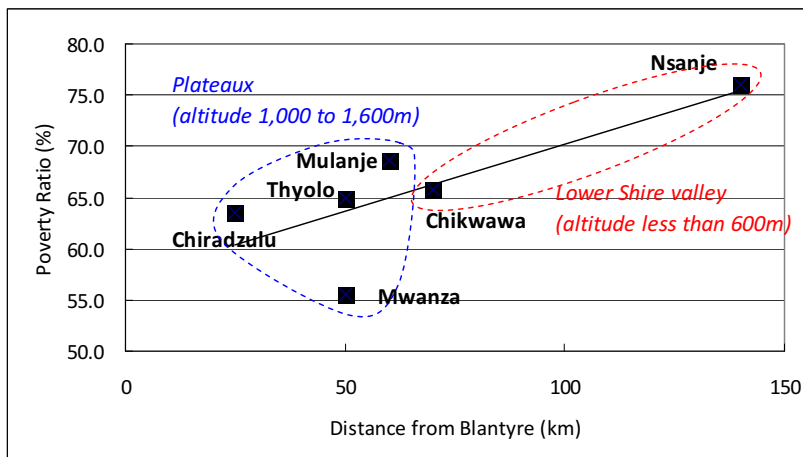


Source: Prepared by the Study Team based on IHS2

Figure 2-21 Poverty Ratio in the Study Area

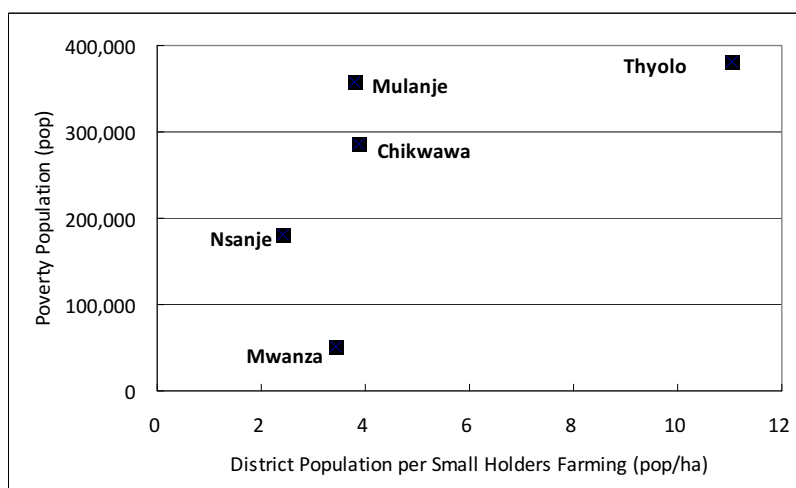
The poverty ratio is highest in Nsanje District (76.0%), followed by the three districts of Mulanje (68.6%), Chikwawa (65.8%) and Thyolo (64.9%). Nsanje District is the furthest away from Blantyre at approximately 140 km, and lies in the Lower Shire Valley (altitude of less than 600 m). The high poverty ratio in each district of the southern region is partly related to the distance from Blantyre and its altitude, and tends to be lower in the districts which are closer to Blantyre and at higher elevation such as the Plateau (altitude 1,000 to 1,600 m). Figure 2-22 shows the correlation of the poverty ratio and distance form Blantyre.

The correlation between the poverty population and the district population of smallholder farming (see Figure 2-23) shows that Thyolo District is an excessive population density of smallholder farmers (approximately 11 persons per hectares), which is three times higher than in other districts. In other word, the area farmed per person in Thyolo District is far smaller than in other districts.



Source: Study Team

Figure 2-22 Poverty Ratio and Distance from Blantyre



Source: Study Team

Figure 2-23 Poverty Population and District Population per Small Holders Farming

(2) Expenditure

Per-capita expenditure is lowest in the Southern Region and is lower than the national average, as shown in Table 2-24. Per-capita expenditure in rural areas in Malawi is less than half that in urban areas. Most of the Southern Region is rural areas, and per-capita expenditures in the southern districts, except for Zomba City, Blantyre Rural, Blantyre City, Mwanza and Phalombe, are lower than the national average for rural areas. In general, per-capita expenditure in the Southern Region is low.

2.5.4 Problems Caused by Regional Disconnection in the Chiromo Area

(1) Regional Disconnection in the Chiromo Area

Regional connectivity is one of the main requirements for harmonised regional development. However, connectivity is often disturbed by a natural barrier such as a large/medium-scale river or a mountain range. In such cases, socio-economic activities develop independently and are performed on either side of the physical barrier, causing economic disparity if there is a large

gap in economic development between the two sides.

Table 2-24 Per-Capita Expenditure

Region/District	Household		Per Capita		Difference from Per-Capita Mean of Whole of Malawi (MWK)	Difference from Per-Capita Mean of Rural (MWK)
	Mean (MWK)	Median (MWK)	Mean (MWK)	Median (MWK)		
Whole of Malawi	99,532	72,280	26,059	18,510	0.0	3,604.6
Urban	191,304	112,586	52,594	31,463	26,535.8	30,140.4
Rural	87,066	68,504	22,454	17,467	▲ 3,604.6	0.0
Northern Region	92,064	72,647	22,340	17,011	▲ 3,718.3	▲ 113.7
Central Region	119,684	86,048	29,739	20,921	3,680.7	7,285.3
Lilongwe City	233,118	123,251	63,010	35,099	36,951.7	40,556.3
Southern Region	83,814	62,518	23,696	16,872	▲ 2,362.5	1,242.1
Mangochi	77,486	65,527	20,709	16,229	▲ 5,349.9	▲ 1,745.3
Machinga	64,680	52,591	16,812	13,290	▲ 9,246.2	▲ 5,641.6
Balaka	69,128	58,626	20,019	15,972	▲ 6,039.5	▲ 2,434.9
Zomba Rural	66,856	50,501	19,431	14,219	▲ 6,627.2	▲ 3,022.6
Zomba City	154,521	105,942	38,869	27,665	12,810.3	16,414.9
Chiradzulu	75,908	63,679	20,252	16,068	▲ 5,806.2	▲ 2,201.6
Blantyre Rural	94,309	70,803	27,254	20,699	1,195.4	4,800.0
Blantyre City	160,606	105,019	47,090	31,007	21,031.1	24,635.7
Mwanza	81,428	68,257	22,901	18,377	▲ 3,157.3	447.3
Thylo	69,196	50,716	21,326	14,966	▲ 4,733.1	▲ 1,128.5
Mulanje	70,264	55,830	20,640	15,170	▲ 5,418.2	▲ 1,813.6
Phalombe	70,530	61,223	23,078	17,192	▲ 2,980.2	624.4
Chikwawa	72,729	59,697	18,900	15,350	▲ 7,158.3	▲ 3,553.7
Nsanje	74,954	64,173	17,042	14,126	▲ 9,017.0	▲ 5,412.4

Source: IHS2, NSO

Note: Shaded lines are districts in the Study Area

The area between Bangula and Makhanga is administratively under the TA Mlolo of Nsanje District. By 1997, this area was physically connected with the other part of Nsanje District by the rail/road bridge at Chiromo, which had been reconstructed in 1975 after the collapse of the previous railway bridge. At that time, people in the TA Mlolo and an area further east were able to freely move between both sides of the Shire River and brought agricultural products to Bangula, which is one of the core commercial centres in Nsanje, second to Nsanje Boma. There was also a daily train between Limbe and Nsanje which transported passengers and goods between Nsanje and Thylo Districts to the main commercial city of Blantyre.

In 1997, part of the railway embankment near Bangula was washed away by a heavy flood, entirely cutting off both the rail and road links. Since then, adequate measures have not been taken to connect both sides of the washaway section and people have been forced to cross the washaway section by boat at their own expense. The disconnection has thus created regional disparity, because administratively and socio-economically, one region was suddenly physically disconnected and lost its transport links and mobility.

(2) Negative Effects for People Living on Both Sides of the Chiromo Washaway

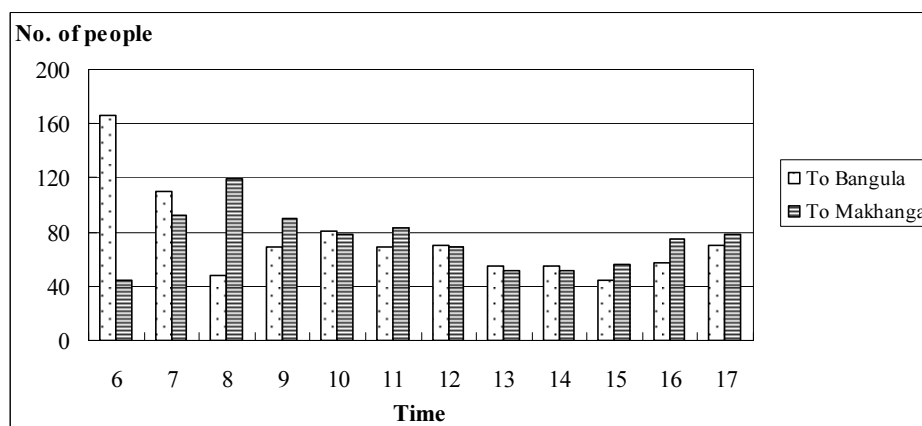
a) Results of the Mobility Survey

In order to identify problems caused by the disconnection at Chiromo, the Study Team conducted a mobility survey by interviewing people crossing at the washaway section in Chiromo, residents of the Chiromo area and at the Makhanga market. Details of the result of a mobility survey are attached in Appendix-3.

1) Number of People Crossing the Washaway Section

Figure 2-24 shows the hourly fluctuation of the number of people crossing the washaway section of the Chiromo by direction. Since the counting was carried out on a Saturday when the market was open in Bangula, 276 people crossed toward Bangula between 6:00 a.m. and 8:00 a.m. just after the boats started operation at 6:00 a.m. 301 people then crossed toward Chiromo between 7:00 a.m. and 9:00 a.m. After these peak hours, the number of people crossing was almost constant at between 50 to 80 for both directions.

In total, 1,044 people were recorded to cross the washaway section by boat for both directions.

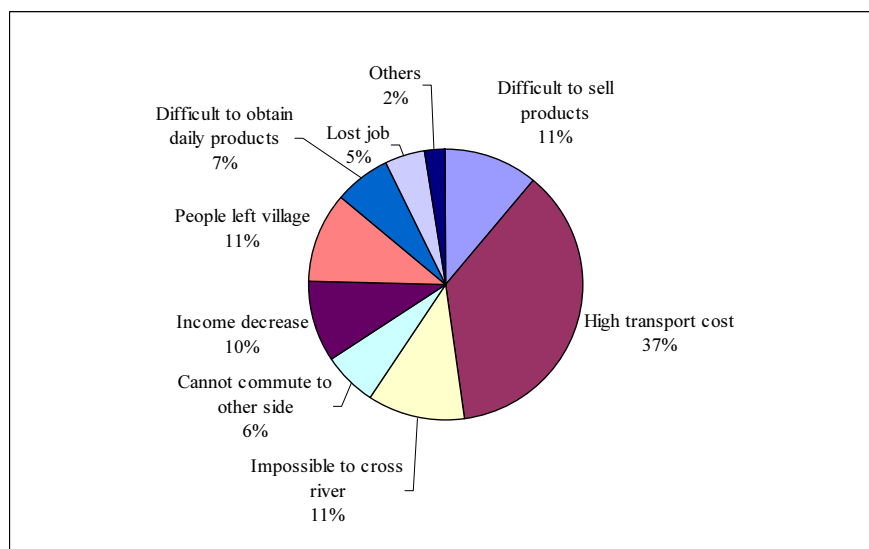


Source: Mobility survey conducted by the Study Team on 27th November, 2010.

Figure 2-24 Hourly Fluctuation of People Crossing the Washaway Section

2) Major Problems after the Washaway in 1997

Figure 2-25 summarises the major problems that local residents have faced after the washaway in 1997. Some 37% of people claimed “High transport cost” (cost of boat), followed by “Difficult to sell products”, “Impossible to cross river during rainy season” and “People left village” (each at 11%).



Source: Mobility survey conducted by the Study Team on 26th and 27th November, 2010.

Figure 2-25 Major Problems after the Washaway in 1997

b) Boat Turnover Accidents

Since small boats are used to cross the washaway section, turnover accidents have occurred with fatalities as shown in Table 2-25. The most serious accident was occurred on 4th June, 2011 with 7 fatalities.

Table 2-25 Number of Fatalities by Boat Turnover Accidents at Washaway Section

Year	Fatality at Washaway Section
1997	2
1998	0
1999	1
2000	1
2001	0
2002	0
2003	1
2004	0
2005	0
2006	0
2007	0
2008	0
2009	0
2010	1
2011	4 (7)*

Source: Bangula Police Station

Note: Even though 7 people died, the accident report of the police station states that only 4 people died at the site.

(3) Negative Effects for People Living along the Railway Line between Luchenza and Makhanga

Two daily passenger trains and one daily freight train used to operate between Limbe and Nsanje before 1997, but after the washaway at Chiromo, the trains ceased daily operation.

When the Central East African Railways Co. Ltd. (CEAR) started operation of the railway,

GoM requested it to run at least two passenger trains a week between Limbe and Makhanga according to the concession agreement. However, CEAR has operated only one passenger train a week (goes to Makhanga on Saturday and returns to Limbe on Sunday) mainly due to lack of rolling stock and fuel as well as unprofitable operation of passenger trains. Even this weekly train often does not run due to delayed arrival of the train from Balaka or lack of fuel.

On the other hand, public transport services from Limbe through M2 operate only until Thekerani on S151 and Makoka on S160, and there is no public transport service on other local roads.

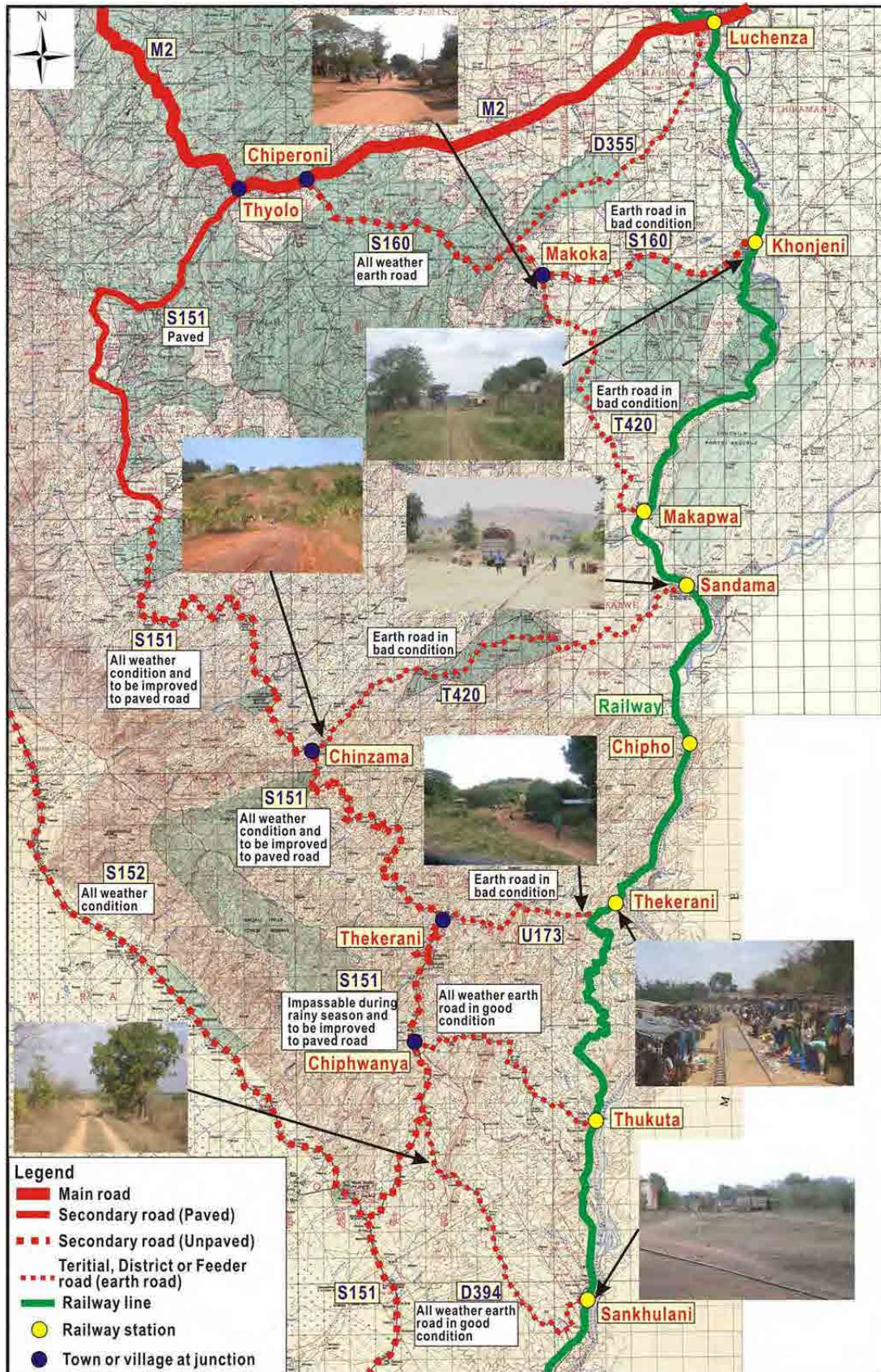
As a result, people living in villages around the three stations of Khonjeni, Sandama, Thekerani, Thukuta and Sankhulani have almost no means of transport, except for the weekly train instead of daily train, since there is no all-weather road with public transport service.

Based on brief interviews with residents in those villages by the Study Team, the weekly life of people before and after the 1997 washaway is compared in Table 2-26. The locations of these railway stations and the conditions of access roads are shown in Figure 2-26.

Table 2-26 Comparison of Weekly Life of People along the Railway Line between Luchenza and Makhanga

Item	Khonjeni Station	Sandama Station	Thekerani Station
Major products	Sugarcane, Cassava, Banana	Sugarcane, Cassava, Pigeon peas, Banana	Banana
Place to receive income	1996: Limbe, Luchenza	1996: Limbe, Luchenza	1996 Limbe, Luchenza
	2011: Luchenza	2011: Limbe, Makhanga	2011 Makhanga
Frequency of taking train	1996: Daily	1996: 2-3 times/week	1996 2-3 times/week
	2011: Weekly	2011: 2 times/month	2011 2 times/month
Return trip mode	1996: Train	1996: Train	1996 Train
	2011: Mini-bus + Walking, Walking	2011: Next-day train (Makhanga), train at next week (Limbe), Mini bus+Walking, Walking	2011 Next-day train (Makhanga), train next week (Limbe), Mini-bus + Walking, Walking
Nearest bus stop	Makoka (10km) Luchenza (10km)	Makoka (10km) Makwasa (20km)	Thekerani (S151:5km)
Train fare	Limbe: MWK200 Luchenza: MWK100	Limbe: MWK300 Luchenza: MWK200	Limbe: MWK300 Luchenza: MWK200 Makhanga: MWK200
Mini-bus fare to nearest bus stop	n.a.	n.a.	Thekerani: MWK2,200 (from Limbe)
Comparison of daily life between 1996 and 2011	Worse		
Problems of train operation	Very limited operation, unreliable service, slow, unsafe, congested (cannot take train)		

Source: Brief interview survey by the Study Team in June 2011.



Source: Study Team

Figure 2-26 Locations of Railway Stations and Conditions of Access Roads

2.6 Existing Development Programmes in the Study Area

2.6.1 Malawi Growth and Development Strategy

Sustainable economic growth is one of the main targets under the MGDS. Sustainable economic growth is central to Malawi's ability to reduce poverty, achieve the MGDS and gain food self-sufficiency. Without this growth, it will be impossible to create wealth and employment for all the people of Malawi, transform from a consumption-based economy to a production-based economy, and gradually emerge as an industrial nation.

Sustainable economic growth is comprised of six sub-themes: potential growth sectors, enabling environment for private-sector led growth, food security, export-led growth, economic empowerment, land and housing. Table 2-27 shows a summary of sustainable economic growth defined in the MGDS.

2.6.2 Potential Growth Sectors in the Study Area

The MGDS focused on addressing these specific constraints and engaged in dialogue with the private sector to implement strategies to achieve the desired medium-term outcomes.

(1) Tourism

GoM will work closely with the private sector to strategically diversify tourism products, identify niche opportunities, and make Malawi's tourist destinations a good-value proposition against competitors in the region. To facilitate private-sector investment in tourism, GoM will prioritise the construction and rehabilitation of roads and landing strips to key destinations, build the capacity of communities for tourism through tailor-made courses in training institutions, and coordinate efforts for a unified position on tourism promotion to reach potential customers in international and regional markets.

(2) Mining

GoM will work with mining companies to accelerate the acquisition and dissemination of geological and mineral data to strengthen public-private partnerships in infrastructure provision. It will continue to provide extension services to small-scale miners to learn value-added skills. It will also improve the regulation and monitoring of mining to reduce threats to the environment, enforce safety standards, and reduce smuggling.

(3) Integrated Cotton Industry

GoM will encourage the integration of production, processing and marketing of cotton products. Main strategies include:

- Producing raw cotton and ginning;
- Garment manufacturing for export markets;
- Reducing out-of-factory costs such as transportation; and
- Identifying and negotiating trade opportunities at the regional, international and global level.

Table 2-27 Summary of Sustainable Economic Growth

Sub-Theme	Long-Term Goal	Medium-Term Outcome
1. Potential growth sectors	<ul style="list-style-type: none"> * Sustained economic growth of at least 6% from 2007 * Increase in exports * Diversification of economic base and sources of foreign exchange * Reduced environmental degradation 	<ul style="list-style-type: none"> * High growth through tourism, mining, cotton/textiles, manufacturing; and agro-processing * Increased agricultural output mainly from tea, tobacco, sugar, cotton, maize and other crops * Increased value added to agriculture and productivity of farmers and reorientation of smallholder sub-sector toward greater commercialisation and international competitiveness * Increased productivity and protection of natural resources (fisheries, forestry, mining and environment)
2. An enabling environment for private sector led growth	<ul style="list-style-type: none"> * Increase in private sector foreign and domestic investment 	<ul style="list-style-type: none"> * Increase in business enterprises that contribute positively to economic growth and increase in domestic market supply * Increased foreign direct investment * Improved private-sector competitiveness
3. Food security	<ul style="list-style-type: none"> * No food shortages even in times of disaster such as drought and floods * Increased exports of food staples 	<ul style="list-style-type: none"> * Food is available in sufficient quantities and qualities and supplied through domestic production or imports * All Malawians have at all times physical and economic access to sufficient nutritious food required to lead a healthy and active life
4. Export-led growth	<ul style="list-style-type: none"> * Malawi becomes a net exporter 	<ul style="list-style-type: none"> * Increased number of businesses accessing the international markets with products
5. Economic empowerment	<ul style="list-style-type: none"> * Reduction in income disparity * Increase in employment, and income 	<ul style="list-style-type: none"> * Increased employment and income of the poor from on- and off-farm activities * Increased productivity of rural communities/businesses and their contribution to economic growth * Women, youth and the disabled fully participate in economic activities
6. Land and housing	<ul style="list-style-type: none"> * Tenure security and equitable access to land * Improved housing delivery systems, processes, procedures, and services with particular focus on vulnerable and low-income groups 	<ul style="list-style-type: none"> * Efficient use of land and land-based resources and equitable access to land by all productive Malawians and other investors * Provision of adequate and conducive framework for improved access

Source: MGDS

(4) Manufacturing

GoM will work with the private sector to establish conditions for manufacturing to take off. The private sector will look for ways to strengthen the links with raw material sources, especially in the agricultural sector and consider additional processing in the rural areas. Main strategies include:

- Improving the quality of products and productivity of both labour and capital;
- Enhancing skills through better integration of science and technology into vocational training;

- Enhancing the capabilities of the Malawi Bureau of Standards and other related bodies to perform their functions;
- Developing additional incentives for investment including redefining the roles and responsibilities of support institutions, and working to target infrastructure leading to improvement of the benefit of the manufacturing sector; and
- Reducing the cost of doing business by reviewing licences and taxes.

(5) Agro-processing

The expected medium-term outcome is to substantially increase the contribution of agro-processing to GDP. The food and agro-processing sub-sectors account for more than 30% of manufacturing output with added value ranging from 30 to 35%. The MGDS identified agro-processing as a potential high-growth sector. In this sector, processing is largely concentrated on tobacco, tea, sugar and cotton. However, the agro-processing of fruits and vegetables, rice, cassava, macadamia, cashew nuts, Irish potatoes and spices has potential for growth, but each of these is relatively small at present.

To achieve this, constraints facing the sector need to be addressed, including poor and inadequate infrastructure such as roads and electricity. In addition, the unfavourable macroeconomic environment, low level of vocational skills, weak marketing and distribution systems for raw crops, low productivity of smallholders, and high import duties on equipment are additional constraints.

Main strategies include:

- Improving the infrastructure for agro-processing.
- Reviewing the policy and regulatory frameworks that affect agro-processing.
- Building the capacity of small-scale enterprises.
- Improving the productivity of smallholder farmers.

(6) Core crops of agro-processing

The agriculture sector has in the past been dominated by tobacco, tea and sugar as the major foreign exchange earners. In the medium term, these crops are expected to continue to dominate amidst the challenges they are currently facing. The importance of these crops for Malawi cannot be overemphasised, and so efforts will continue to focus on these crops in order to maximise their economic contributions to the agriculture sector in particular and the economy in general. The overall goal is to achieve sustainable agricultural production and increased farmers' income.

a) Tea

The tea industry will focus on increasing tea estate and smallholder profitability and reinvestment, as well as adding value. The current strategies are for the private sector to take a leading role, while GoM focuses on the broader constraints, such as the availability of reliable and cheap sources of power (electricity) and the creation of a favourable macroeconomic environment. The sub-sector and GoM will work together to develop focused investment

incentives and other measures to strengthen the industry.

b) Tobacco

The medium-term expected outcome is to add value to tobacco and maintain a position of market leader in burley. Tobacco is the main export crop accounting for over 70% of total export earnings. However, over the past several years, there has been a decline in the average yields and profitability of Malawi's tobacco. The tobacco sub-sector faces a number of constraints which include widespread use of low-quality seed, increased incidence of disease and pests due to inadequate crop rotation, and significant post-harvest losses due to inadequate curing barn infrastructure. The decline in profitability is also due to inefficiencies in the current marketing system. The industry also faces regional competition.

c) Sugar

The medium-term expected outcome is to increase the current production of sugar by 23%. For Malawi to compete successfully as an international player in the sugar market, it must ensure that its sugar industry is profitable and is able to reinvest in growing and processing. However, the sub-sector faces a number of constraints which include access to the major EU markets and poor transport linkages to ports.

Main strategies include:

- Negotiating Economic Partnership Agreements (EPAs) with the EU to ensure fair trading of sugar,
- Promoting out-grower schemes for smallholders, and
- Improving inter-modal transport for effective linkages to ports.

(7) Agricultural Productivity

Malawi's agriculture sector is characterised by low productivity. Low and stagnant yields have been influenced by a number of factors including: over-dependence on rain-fed farming, low level of irrigation development, low uptake of improved farm inputs, poor selection of varieties, and continued use of outdated agricultural practices. It is also influenced by declining soil fertility, and poor land rights and administration. Smallholder livestock is characterised by low productivity due to the high incidence of diseases, poor nutrition and breeding practices, seasonal lack of feed and the stocking of species that are genetically of low productive potential.

The low profitability of smallholder agriculture has also been influenced by weak links to markets, high transport costs, few farmer organisations, poor quality control and lack of information on markets and prices. In addition, due to high risks in agricultural production and poor access to credit, investment and re-investment have been poor. This is particularly the case with cotton.

Main strategies include:

- Strengthening linkages of farmers to markets by connecting rural communities, targeting rural roads and developing farmer organisations and market information.
- Encouraging the expansion and intensification of staple food production by smallholders.

-
- Providing effective extension services with more decentralised service delivery for agribusiness skills.
 - Increasing the use of pest-resistant varieties and promotion of pest management.
 - Promoting soil and water conservation and farming techniques.
 - Promoting irrigation farming.
 - Ensuring that existing land rights are recognised, clarified and secured by appropriate legislation.

2.6.3 Major Development Projects

Table 2-28 shows major projects listed in the Public Sector Investment Programme (PSIP) for the target year of 2015.

The Ministry of Development Planning & Cooperation (MoDPC) received proposals from relevant government agencies, and identified programmes and projects that are consistent with GoM's strategic objectives and priorities as aligned with the MGDS and links them to available financing mechanisms. Those selected projects are listed in the PSIP. According to the PSIP database, major projects in the ten districts covered by the Study are identified as follows.

- Some are road projects, such as improvement of main roads, which will contribute to improve transportation in the region.
- Others are agricultural projects, such as cotton development programmes and promotion of fruit production, which will increase crop yields.
- Apart from the public projects above, some private projects will affect the future transportation/logistics network in the Southern Region.

Table 2-28 Major Projects Listed in the PSIP

Project Title	Period	Status
Nsanje District		
Shire Zambezi Waterway	2005/07–2012/06	Ongoing
Oil Pipeline and Strategic Storage Facility	2006/07–2014/06	Ongoing
Cotton Development Programme	2008/07–2013/06	Ongoing
Upgrading Aerodromes	2008/07–2014/06	Ongoing
Chikwawa–Nchalo–Bangula Road (Rehabilitation)	2008/11–2012/11	Ongoing
Nsanje World Inland Port and Urban Development Plan	2009/07–2010/06	End
Mapping for Disaster Management for High Flood Risk Areas of Malawi	2010/07–2013/07	Ongoing
Study on the Development of the Sena Corridor	2010/07–2011/06	End
Establishment of New Border Posts	2011/07–2014/06	New
Rehabilitation of Railway System	2011/06–2016/07	Ongoing
Thyolo District		
Malowa–Goliati–Chiperoni	2008/07–2011/06	End
Promotion of Fruit Production	2011/07–2016/07	New
Rehabilitation of Railway System	2011/06–2016/07	Ongoing
Chikwawa District		
Malawi/Mozambique Boundary Re-Affirmation Exercise	2007/09–2012/08	Ongoing
Mwanza–Chapananga–Chikwawa (F/S and Design)	2007/07–2011/06	End
Cotton Development Programme	2008/07–2013/06	Ongoing
Chikwawa–Nchalo–Bangula Road (Rehabilitation)	2008/11–2012/11	Ongoing
Mulanje District		
Malawi/Mozambique Boundary Re-Affirmation Exercise	2007/09–2012/08	Ongoing
Zomba–Jali–Kamwendo–Phalombe–Chitakale	2008/07–2013/06	Ongoing
Chilinga–Muloza (F/S and Design)	2009/07–2011/06	End
Promotion of Fruit Production	2011/07–2016/07	New
Mwanza District		
Malawi/Mozambique Boundary Re-Affirmation Exercise	2005/07–2015/06	Ongoing
Ntcheu–Tsangano–Mwanza (F/S)	2009/7–2012/06	Ongoing
Promotion of Fruit Production	2011/7–2016/07	New
Rural-Farmer Linkage to Export Transport Brokers	2011/7–2014/07	New
Neno District		
Promotion of Wheat Production in Malawi	2007/7–2015/06	Ongoing
Mapping for Disaster Management for High Flood Risk Areas of Malawi	2010/7–2013/07	Ongoing
Agriculture Infrastructure Support Project	2010/7–2015/12	Ongoing
Promotion of Fruit Production	2011/7–2016/07	New
Rural-Farmer Linkage to Export Transport Brokers	2011/7–2014/07	New
Blantyre		
Promotion of Cotton Production	2005/7–2012/06	Ongoing
Establishment of Malawi Agricultural Warehousing and Trading Company	2008/7–2012/06	Ongoing
Zomba–Blantyre (Rehabilitation)	2009/7–2012/06	Ongoing
Rural-Farmer Linkage to Export Transport Brokers	2011/7–2014/07	New
Rehabilitation of Railway System	2011/6–2016/07	Ongoing
Upgrading of Nkula B Hydro Power Station	2012/7–2018/06	Upcoming
Chiradzulu District		
Chiradzulu–Chiringa	2008/8–2011/08	Ongoing
Rehabilitation of Railway System	2011/6–2016/07	Ongoing
Zomba District		
Malawi/Mozambique Boundary Re-Affirmation Exercise	2007/9–2012/08	Ongoing
Zomba–Jali–Kamwendo–Phalombe–Chitakale	2008/7–2013/06	Ongoing
Mapping for Disaster Management for High Flood Risk Areas of Malawi	2010/7–2013/07	Ongoing
Promotion of Fruit Production	2011/7–2016/07	New
Development of Agricultural Biotechnology in Malawi	2011/7–2016/06	New
Rural-Farmer Linkage to Export Transport Brokers	2011/7–2014/07	New
Rehabilitation of Railway System	2011/6–2016/07	Ongoing
Phalombe District		
Malawi/Mozambique Boundary Re-Affirmation Exercise	2007/9–2012/08	Ongoing
Chiradzulu–Chiringa	2008/8–2011/08	Ongoing
Zomba–Jali–Kamwendo–Phalombe–Chitakale	2008/7–2013/06	Ongoing
Chilinga–Muloza (F/S and Design)	2009/7–2012/06	Ongoing
Mapping for Disaster Management for High Flood Risk Areas of Malawi	2010/7–2013/07	Ongoing

Source: PSIP Database, MoDPC