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Transport and communications projects

SOUTHERN AFRICA TRANSPORT
AND COMMUNICATIONS COMMISSION

Hoff & Overgaard Planning Consultants Copenhagen



SECOND SOUTHERN AFRICAN DEVELOPMENT COORDINATION CONFERENCE
Segunda Conferência para a Coordenação do Desenvolvimento na África Austral
Conferência do Maputo 27-28 de Novembro de 1980

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PREFACE

On the 1st April 1980 at the historic summit meeting in Lusaka, leaders and representatives of the nine independent countries of Southern Africa, i.e. Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe, made a joint declaration of their strategy for a closer integration of their economies. This marked a new commitment to co-ordinate their economies so as to accelerate their development and reduce their dependence on the Republic of South Africa.

The programme of action which was approved at the summit placed major emphasis on the establishment of a Southern Africa Transport and Communications Commission to be based in Maputo.

To assist the Commission in its preparations for the Second Southern Africa Development Coordination Conference the Swedish International Development Authority agreed to provide a team of 6 transport and communications experts, and a contract was subsequently signed with Hoff & Overgaard, Planning Consultants.

The work was initiated on 22nd September and completed at the end of October. During this period the whole team or part of the team visited all nine member states to discuss relevant projects with local authorities and to collect available information. The following report contains the material collected during these visits and the analysis which flows from this data.

In view of the time available to the Consultants it has not been feasible to circulate a draft of the Report to the nine SADCC States for comment. It is, therefore, possible that certain omissions may have been made or that errors might have crept into the text. Any corrections will be collected before the November Conference and made available to delegates.

In conclusion we want to thank the Governments of the member states and the many officials we have met with for their excellent co-operation and never ending efforts to comply with our requests.

Maputo, 29th October 1980

Hoff & Overgaard A/S

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PART I

SECTOR REVIEW AND PROJECT SUMMARY

1. INTRODUCTION

The main objective of this report is to present the projects, for which the member states are seeking international financing, in a brief and systematic way, which will allow the reader to quickly identify projects of potential interest. This implies that the descriptions are far from being exhaustive. Additional information is available in the countries concerned, and also to some extent with the Commission.

The report consists of three parts:

- Part I: Sector Review and Project Summary
- Part II: Project Descriptions
- Part III: Appendices

Part I establishes an overview of the transport and communications sector, which will serve to evaluate the proposed projects in a broader regional perspective. The present and possible future demands for transport are elaborated first and followed by brief reviews of each transport sub-sector and telecommunications. It is attempted to identify the major problem areas and to indicate ways and means for improvement and future development.

At the end of each chapter all proposed projects within the sub-sector and their estimated costs are listed and assigned priority classifications as follows:

- Priority class 1: Rehabilitation/Upgrading
- Priority class 2: New telecommunication projects
- Priority class 3: New transport projects
- Priority class 4: Studies

These priority classes have been established by the Commission. They express the commitment of the member states to make optimal use of existing facilities before implementing new projects wherever possible.

It should be pointed out, however, that the application of these priority classes raises some problems, as rigid definitions have not been established. Instead the Consultants have adopted a pragmatic approach. This implies for instance that some projects which should be preceded by a study are placed under priority class 1, 2 or 3 with a remark to that effect. Also, the list of priorities should not be interpreted to mean that all proposed projects in priority class 1, 2 and 3 must be carried out before any of the studies included in priority class 4.

No other attempt to rank the projects according to priorities is made in this report. Rather it is left for the potential financiers to decide which sub-sector, country and project should receive support.

The projects included in the report are generally of a regional character, i. e. they concern at least two countries or/and they serve the objective of reducing the countries' dependence on the Republic of South Africa. However, as most projects serve both domestic and regional traffic some projects which are primarily of national interest have also been included.

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The status of the proposed projects with regard to financing varies from projects which have never before been presented to potential financiers, over projects for which the financing is being negotiated, to projects with most of the required financing already committed. Independent of their status all projects have been included in this report for the sake of completeness. However, the required financing as presented here, has been reduced by firmly committed funds to the extent known by the Consultants.

The projects have been assigned three digit numbers, the first digit indicating the sub-sector as follows:

- 0 - Multi-modal
- 1 - Roads
- 2 - Railways
- 3 - Ports and Water Transport
- 4 - Airports and Air Transport
- 5 - Telecommunications

The second digit indicates the country:

- 0 - Regional
- 1 - Angola
- 2 - Botswana
- 3 - Lesotho
- 4 - Malawi
- 5 - Mozambique
- 6 - Swaziland
- 7 - Tanzania
- 8 - Zambia
- 9 - Zimbabwe

The third digit is a serial number within each sub-sector and country.

Part II of the report contains brief descriptions of the proposed projects. Although it has been attempted to standardize the descriptions variations occur due to differences in type of project, in amount and quality of available information etc.

The descriptions are generally based on information provided by the member states either in the form of specific project descriptions or more general information including study reports. Supplementary data have been extracted from the reports on "United Nations Transport and Communications Decade for Africa, 1978-1988".

Only to a very limited extent it has been possible for the Consultants to undertake own analyses and assessments of the projects due to the short time available for the assignment. The "Comments by the Consultants" should be read with that in mind, and they do not, in general, represent an endorsement of the technical and economic feasibility of a project.

Part III comprises two appendices:

Appendix 1: "Foreign trade", which represents the Consultants' attempt to establish the present and future demand for goods transport between the member states and between the region and the rest of the world.

Appendix 2: "Bibliography", which lists the reports and other material used in the preparation of this report.

2. SUMMARY

2.1 Regional development

The independence of Zimbabwe has created a new basis for co-ordinated economic development within the region. The addition of Zimbabwe's rich resources to the resources of the other countries, and the prospects of peace and political stability will open up possibilities for a strong economic growth and an increased standard of living.

The total resources of the region are unique. Vast areas of unused cultivable agricultural land are available with ample water for irrigation purposes.

Huge resources of high quality coal in Zimbabwe, Botswana, Mozambique and Swaziland, which cannot be utilized otherwise by these countries, wait for exploitation and exportation to an energy-hungry world. Other mineral deposits are identified all over the region with iron, chrome and copper as the most important ones.

The present economic level, from which the new development would start, is very low. By far the most of the population get their poor living from agriculture, carried out with the same primitive tools as were used by their ancestors for many centuries. Generations of colonial rule has kept education at an extremely low level, and the intellectual resources of most countries are undeveloped.

The basic problem for economic development is education and vocational training, which is necessary in order to provide sufficient skilled labour and managerial and administrative capacity.

The process of education takes time, and will be a serious bottleneck for development.

Obviously, this region with all its physical resources will, sooner or later, reach a level of wealth comparable to any other region in the world. The timing, however, depends on education and training.

Two major development strategies are possible. One, which will increase the standard of living gradually over a long period of time, relies on the human resources within the region and a strong effort to improve education and training. The other one, which could create a much faster development, allows for a considerable number of expatriates to assist both in education and training and in actual performance of management and administration - an assistance which should be phased out as the results of the educational activities emerge.

2.2 Development of transport and communications

The transport sector is a key to the economic development of the region. Specially the railways and ports of Mozambique are outlets, which must function smoothly if a fast development is to take place.

In the short run it seems that rehabilitation or upgrading of existing railway and port facilities will create sufficient capacity to take care of the transport demand, even if it is increased by additional mining activity. Skilled labour and managerial and administrative talent are, however, scarce resources which will continue to hamper the smooth running of the transport system unless extraordinary efforts are made to increase them. In this key sector it seems to be risky

not to rely on both intensive vocational training of local staff and a temporary assistance from expatriates.

In the long run exploitation of the enormous mineral reserves will require special transport facilities. Around the turn of the century the coal production could be well beyond 40 million tons per year. In addition several other minerals could be exported from the region. Transportation via the existing rail network originally designed for a modest traffic will probably not be economical for such huge quantities and would create serious capacity problems for all other traffic. Consequently it may be feasible to establish new special mineral railways and terminals for these large bulk transports.

Exploitation and transport of the mineral reserves seems to be the most important development project for the region, and should be subject to careful study and planning to ensure the highest benefits for the countries involved.

Passenger transport in the region is generally of low standard due to poor roads and low air traffic frequencies. The increased emphasis on economic development and co-operation will necessitate and justify the improvement of passenger transport services.

A properly functioning telecommunications system is a prerequisite for further development of the region not only because of the general demand for communication, but also due to the need for reliable telecommunication in the running of transport services. The deficiency of the present system is in many instances hampering development and resulting in inefficient utilization of resources throughout the region.

2.3 Summary of proposed projects

In order to improve transport and communications in the region 97 projects at an estimated total cost of US dollars 1,912 million are being proposed for international financing. The projects are summarized in table 2.1, which shows the number of projects according to priority class, sub-sector and country. Table 2.2 shows the costs of the projects in a similar way.

TABLE 2.1: SUMMARY OF PROPOSED PROJECTS BY NUMBER

Priority class	Sector	REC	ANG	BOT	LES	MAL	MOZ	SWA	TAN	ZAM	ZIM	Total
	<u>Rehabilitation/Upgrading</u>											
1	- Roads			1	3	2	5	1	1	2	3	17
	- Railways	1	2		1	5	2	2				11
	- Ports & Water Transport					3						3
	- Airports & Aviation					2	2			3	2	9
	- Telecommunications			1		1				1	2	3
	Subtotal											43
2	<u>New Telecommunic. Projects</u>	1	1	1	2	9	1	2	6	5		21
3	<u>New Transport Projects</u>											21
	- Roads	1		1		1		1	1			4
	- Railways			2	1				5			8
	- Ports & Water Transport											1
	- Airports & Aviation			1								1
	Subtotal											13
4	<u>Studies</u>											
	- Multi-modal	1										1
	- Roads		2	1		1			1	1		5
	- Railways	3	1			1			1			6
	- Ports & Water Transport	1	2						1	1		5
	- Airports & Aviation	2										2
	- Telecommunications	1										1
	Subtotal											19
	Total	8	8	6	8	6	28	6	12	16	13	97
							13 9 1		12 1	16 1	13 1	

Note: Joint projects have been noted for both countries involved. The real numbers of projects are given in the column "Total".

TABLE 2.2: SUMMARY OF PROJECT COSTS (IN MILLION US DOLLARS)

Priority class	Sector	REG	ANG	BOT	LES	MAL	MOZ	SWA	TAN	ZAM	ZIM	Total
1	<u>Rehabilitation/Upgrading</u>											
	- Roads			13	117	55	81	17	130	21	43	477
	- Railways	60	104			21	276	1)	50			511
	- Ports & Water Transport						369					369
	- Airports & Aviation						8	16		40	111	175
	- Telecommunications			-			1			-	-	1
	Subtotal											<u>1533</u> 2
2	<u>New Telecommunic. Projects</u>	12	1	-	4	67	3	2	8	21		<u>118</u> 6 2
3	<u>New Transport Projects</u>											
	- Roads	50			14	30		12	50			156
	- Railways				6	26		43				75
	- Ports & Water Transport											
	- Airports & Aviation				14							14
	Subtotal											<u>245</u> 11-8
4	<u>Studies</u>											
	- Multi-modal			3								3
	- Roads		2	-								2
	- Railways	5	1			1			1			8
	- Ports & Water Transport		2									2
	- Airports & Aviation											-
	- Telecommunications			1								1
	Subtotal											<u>16</u> 0 8
	Total	9	127	118	151	106	833	36	237	120	175	1912
		4.6	6.1	2.9	5.1	11.6	14.4	12.1	6.5	4.2		

Note - indicates less than half of one unit.

1) Costs of projects included under Mozambique

3. TRANSPORT DEMAND

3.1 Population

The total 1980 population in the region can be estimated at 59 million distributed as follows:

Table 3.1: Population 1980

	million inhabitants
Angola	7,1
Botswana	0,8
Lesotho	1,3
Malawi	6,0
Mozambique	11,7
Swaziland	0,6
Tanzania	18,6
Zambia	5,7
Zimbabwe	7,4
Total	59,2

r = .492
 .012 + 4.015 P.P
 Cnts : 72.125 + 20.659 P.P

The distribution by provinces is shown in Fig. 3.1. For Angola and Zimbabwe the province figures are estimated, as considerable population movements have taken place since the last census and part of the rural population is still moving. Urban population in towns more than 20.000 inhabitants is shown in Fig. 3.2.

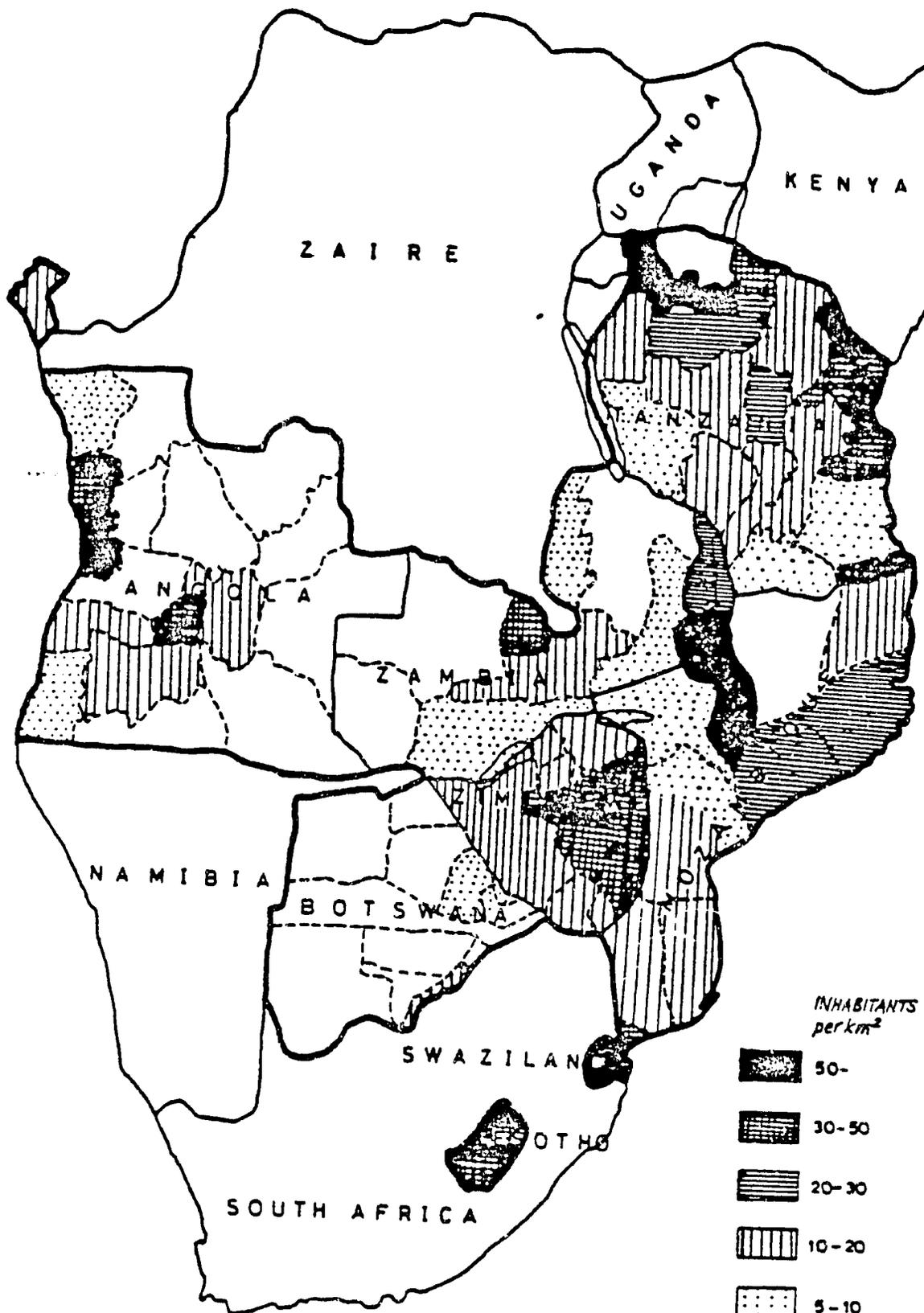
3.2 Foreign Trade

The basis for our estimates of present and future transport demand is given in appendix 1, where forecasts are made for the main foreign trade commodities for 7 of the 9 countries. Angola and Tanzania has only been considered with regard to certain aspects of their foreign trade due to the limitations on available data. Also, this trade is of very limited relevance to the projects. Each country chapter consists of three sections. One is giving the basis for our estimates of export by commodity group 1980-2000 with 5 year intervals. One is giving corresponding information for import, and one is explaining the background for our estimates of origins and destinations of foreign trade 1980, 1990 and 2000. All estimates are in tons as estimates of value are less relevant to the transport projects.

The reliability of the data on present foreign trade seems to be good in some countries, less convincing in others. The Mozambique figures are probably the least reliable.

Considerable changes in traded amounts, origins and destinations have taken place in 1980. Transit traffic from the landlocked countries is

POPULATION DENSITY BY PROVINCE



0 500 1000 1500 2000 km

Approximate scale 1: 20.000.000

FIGURE 3.1

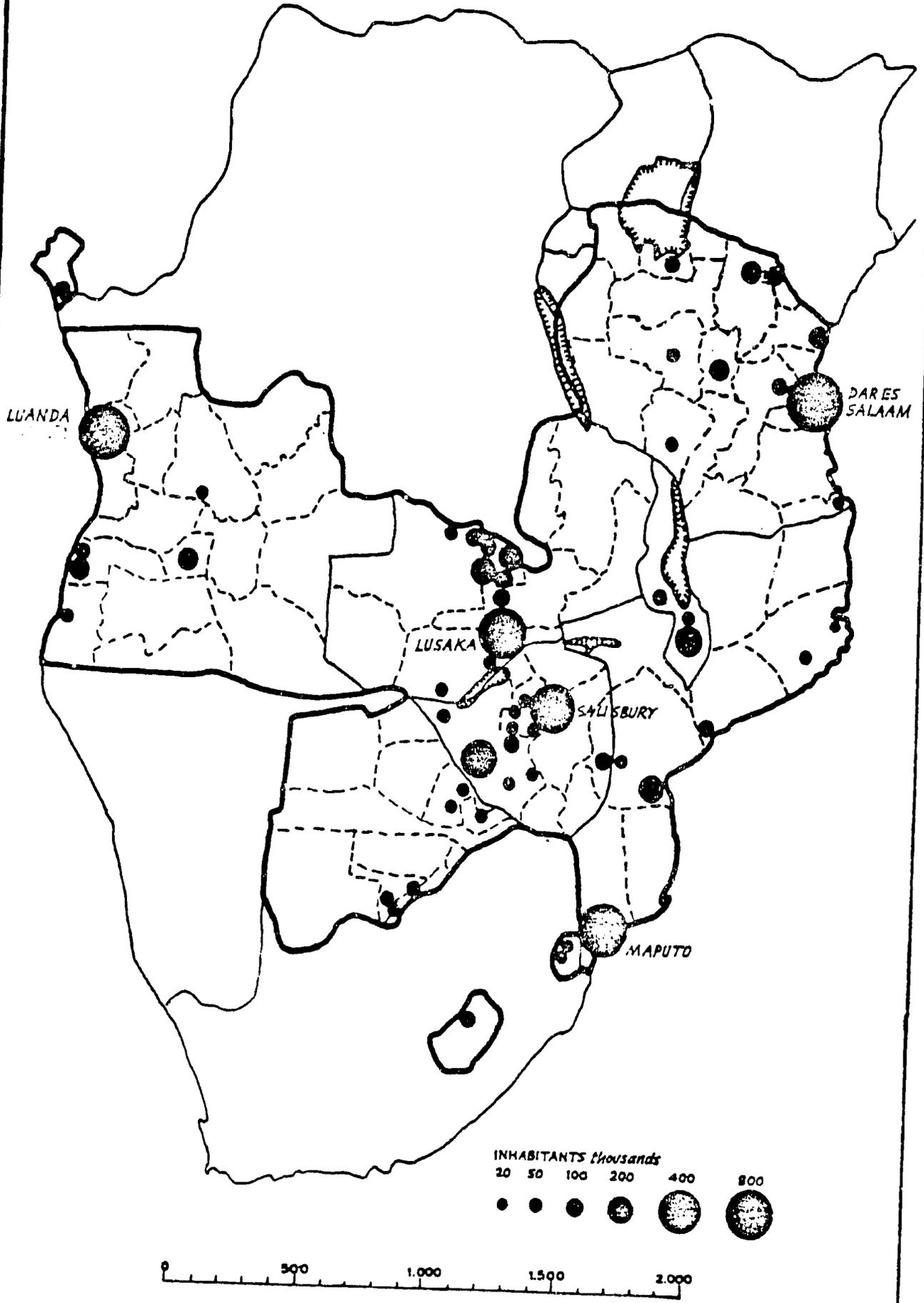


FIGURE 3.2

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already influenced very much by the opening of the Zimbabwean borders, and future traffic will change still more as new trade channels are established. Exports from Zimbabwe will also substitute imports which the neighbour countries previously had to buy in R.S.A. or from more distant places. The serious droughts which devastated much of the maize harvest in the region in 1979 created an import demand which hopefully is temporary.

For Zimbabwe, Zambia and Malawi - the three most important of the landlocked countries - we have obtained trade statistics or good estimates of foreign trade by commodities for the first 6-7 months of 1980. Zambian and Malawian Railways also provided data on origins and destinations for this period. This has given us a certain guidance for the expected development in the new situation.

The forecasts are based on interview with key personnel in the relevant ministries and institutions in each country. Another important source of information is the various transport studies carried out during the last few years in parts of the region. Some forecasts from these studies are adopted. Others are revised due to recent developments or because we found them too pessimistic or (more seldom) too optimistic. We have made free use of information given in all reports and publications mentioned in appendix 2 without quoting the source in all cases. Usually our forecasts are higher than previous forecasts, made by other consultants. This is due to five reasons:

- we find that the base period 1979-1980 is a period of economic depression, characterized by war and guerilla activity within most of the region, with closed borders, poor transport facilities and unusually bad harvest results;
- we expect that inclusion of Zimbabwe in the region will create new economic developments;
- we assume that international financing will make it possible to rehabilitate and upgrade the present transport system within the next few years, which will induce new production;
- we find, that the economic consequences of a certain overcapacity in the transport system are usually less than the consequences of a capacity which is too small.
- there is a high margin of error attached to long term forecasts, and the transport system may also in the future be strained by political events, bad harvests and difficulties in administrating railways and ports in an efficient way, which will require spare capacity.

Considering this, we prefer the consequences of a too high forecast to the consequences of a forecast which is too low.

It must be born in mind, that the whole study of transport demand was carried out by the team's transport economist in 5 weeks out of which 2-3 weeks were spent visiting the various countries for data collection. Details on individual commodities, origins or destinations may be wrong, as very little time was left for checking. We believe, however, that our forecasts of total flows between countries and exit ports are of the right order of magnitude.

The main results of our transport demand studies are given in table 3.2 and 3.3. Our estimates of present and future trade between the countries of the region and between each country and the rest of the world - divided between R.S.A. and "Other countries" - can be seen in table 3.2.

The distribution of the trade with "Other countries" on export ports is found in table 3.3.

Fig. 3.3 and 3.4 show the flow of dry cargo - except coal - exported to or imported from other countries in 1980 and 1990 - distributed on main ports.

Fig. 3.5 and 3.6 show the trade (import+export) between the countries of the region and between each country and R.S.A. in 1980 and 1990.

The following assumptions were made in order to decide on the future transport pattern:

All present railways and ports will be rehabilitated or upgraded to a reasonable standard before 1985.

The railways and ports are assumed to be managed in a way which guarantees smooth running. This also applies to the Benguela Railway.

The coal export will reach:

- 10 mill tons from Zimbabwe before 1990
- 10 mill tons from Mozambique before 2000
- 2 mill tons from Swaziland before 1990

In order to transport the amounts of coal from Moatize a coal railway is assumed to be built to Nacala before 2000.

These assumptions lead to considerable changes in the trade pattern of the region. In 1980 a considerable part of Zimbabwean foreign trade went to or through R.S.A. No information is available on the exact distribution, but our estimate is given in table 3.2 and 3.3. In 1990 Zimbabwe will supply an important part of the import requirements of the other countries in the region and all the transit traffic to "other countries" will pass Beira or Maputo. The export from the other countries of the region will not change so much as it mostly consists of bulk products for the world market and the commodity composition is very uniform for the various countries (coal, other minerals, sugar, tea, tobacco). The transit through R.S.A. will disappear except for the meat from Botswana. The copper of Zambia is assumed to be equally distributed between Lobito and Dar-Es-Salaam according to the final destination of the export.

3.3 Transport of coal and other material

The known deposits of coal and other minerals of the region are huge. The unknown may be even larger, as vast areas - specially in Angola and Botswana - are virgin land for geological surveys.

Those deposits can only be utilized when cheap and efficient transport - and terminal facilities are available. Existing railways and ports can - if rehabilitated - carry a certain part of the possible mineral export.

1.000 tons

TABLE 3.2
Cargo flow between countries

FROM	TO	TO							TOTAL	
		BOTSWANA	MALAWI	MOÇAMBIQUE	SWAZILAND	ZAMBIA	ZIMBABWE	R.S.A.		OTHER COUNTRIES
BOTSWANA	1980		0	0	-	5	5	10	122	142
	1990		5	5	-	10	10	15	185	230
	2000		10	10	-	15	20	25	310	390
MALAWI	1980	0		5	-	5	0	10	300	320
	1990	5		30	-	30	40	15	650	770
	2000	5		50	-	50	65	20	1090	1280
MOÇAMBIQUE	1980	0	65			5	0	50	1130	1285
	1990	10	150		35	30	15	50	5570	5875
	2000	15	250		70	50	50	50	5570	5875
SWAZILAND	1980	-	-	5		-	-	95	730	830
	1990	-	-	200		-	-	100	2500	2800
	2000	-	-	250		-	-	100	2500	2800
ZAMBIA	1980	5	10	0		-	-	100	2650	3000
	1990	20	20	10		-	0	-	760	820
	2000	30	30	15		-	10	-	1365	1445
ZIMBABWE	1980	150	30	0	0	100		15	1930	2050
	1990	265	80	350	50	400		110	1980	2370
	2000	430	110	700	100	600		50	12015	13210
R.S.A.	1980	120	45	250	650	25	110		50	12510
	1990	65	25	50	800	30	50		50	1700
	2000	100	30	50	1000	50	50		5200	6200
OTHER COUNTRIES	1980	260	500	1670	15	700	1350	500		6200
	1990	470	650	2585	100	700	2300	1500		
	2000	720	830	3425	230	1070	3080	2000		
TOTAL	1980	535	650	1930	700	840	1465			
	1990	835	930	3230	1000	1200	2425			
	2000	1300	1250	4500	1400	1835	3280			

- 1) including to Zaire
1980: 45
1990: 20
2000: 30
- 2) only R.S.A. traffic passing Maputo port
- 3) including 3600 tons Coal
- 4) including 10000 tons Coal
- 5) including 2000 tons Coal
- 6) including 10000 tons Coal

TABLE 3.3

1,000 tons

Cargo flow to "other countries" with
origin or destination ports

	DAR-ES-SALAM			NACALA			BEIRA			MAPUTO			R.S.A PORTS			LOBITO			
	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	
BOTSWANA	1980	-	-	-	-	-	24	60	84	23	-	23	75	200	275	-	-	-	
	1990	-	-	-	-	-	45	200	245	45	160	205	95	110	205	-	-	-	
	2000	-	-	-	-	-	125	300	425	125	250	375	60	170	230	-	-	-	
MALAWI	1980	-	-	-	80	200	280	220	300	520	-	-	-	-	-	-	-	-	
	1990	-	-	-	650	650	1300	-	-	-	-	-	-	-	-	-	-	-	
	2000	-	-	-	1090	830	1920	-	-	-	-	-	-	-	-	-	-	-	
MOZAMBIQUE	1980	-	-	-	135	80	215	550	310	860	445	1280	1725	-	-	-	-	-	
	1990	-	-	-	330	230	560	4475	875	5350	765	1480	2245	-	-	-	-	-	
	2000	-	-	-	8410	430	8840	3170	1040	4210	1030	1955	2985	-	-	-	-	-	
SWAZILAND	1980	-	-	-	-	-	-	-	-	-	730	15	745	-	-	-	-	-	
	1990	-	-	-	-	-	-	-	-	-	2500	100	2600	-	-	-	-	-	
	2000	-	-	-	-	-	-	-	-	-	2650	230	2880	-	-	-	-	-	
ZAMBIA	1980	600	350	950	-	-	-	10	50	60	-	-	-	150	300	510	-	-	
	1990	675	350	1025	-	-	-	-	-	-	-	-	-	-	-	-	600	350	950
	2000	915	535	1435	-	-	-	-	-	-	-	-	-	-	-	-	1015	535	1550
ZIMBABWE	1980	-	-	-	-	-	-	180	200	380	300	150	450	1500	1000	2500	-	-	
	1990	-	-	-	-	-	-	1015	1900	2915	11000	400	11400	-	-	-	-	-	
	2000	-	-	-	-	-	-	1310	2480	3790	11200	600	11800	-	-	-	-	-	
R.S.A.	1980	-	-	-	-	-	-	-	-	-	1700	600	2300	-	-	-	-	-	
	1990	-	-	-	-	-	-	-	-	-	5200	1500	6700	-	-	-	-	-	
	2000	-	-	-	-	-	-	-	-	-	6200	2000	8200	-	-	-	-	-	
TOTAL	1980	600	250	950	215	280	495	984	920	1904	3198	2045	5243	1725	1500	3225	-	-	
	1990	675	350	1025	980	680	1860	5535	2975	8510	19510	3640	23150	95	110	205	600	350	950
	2000	915	535	1435	9500	1260	10760	4605	3820	8425	21205	5035	35240	60	170	230	1015	535	1550

DRY CARGO
FLOW TO AND FROM PORTS, 1980
(Including oil to R.S. A)

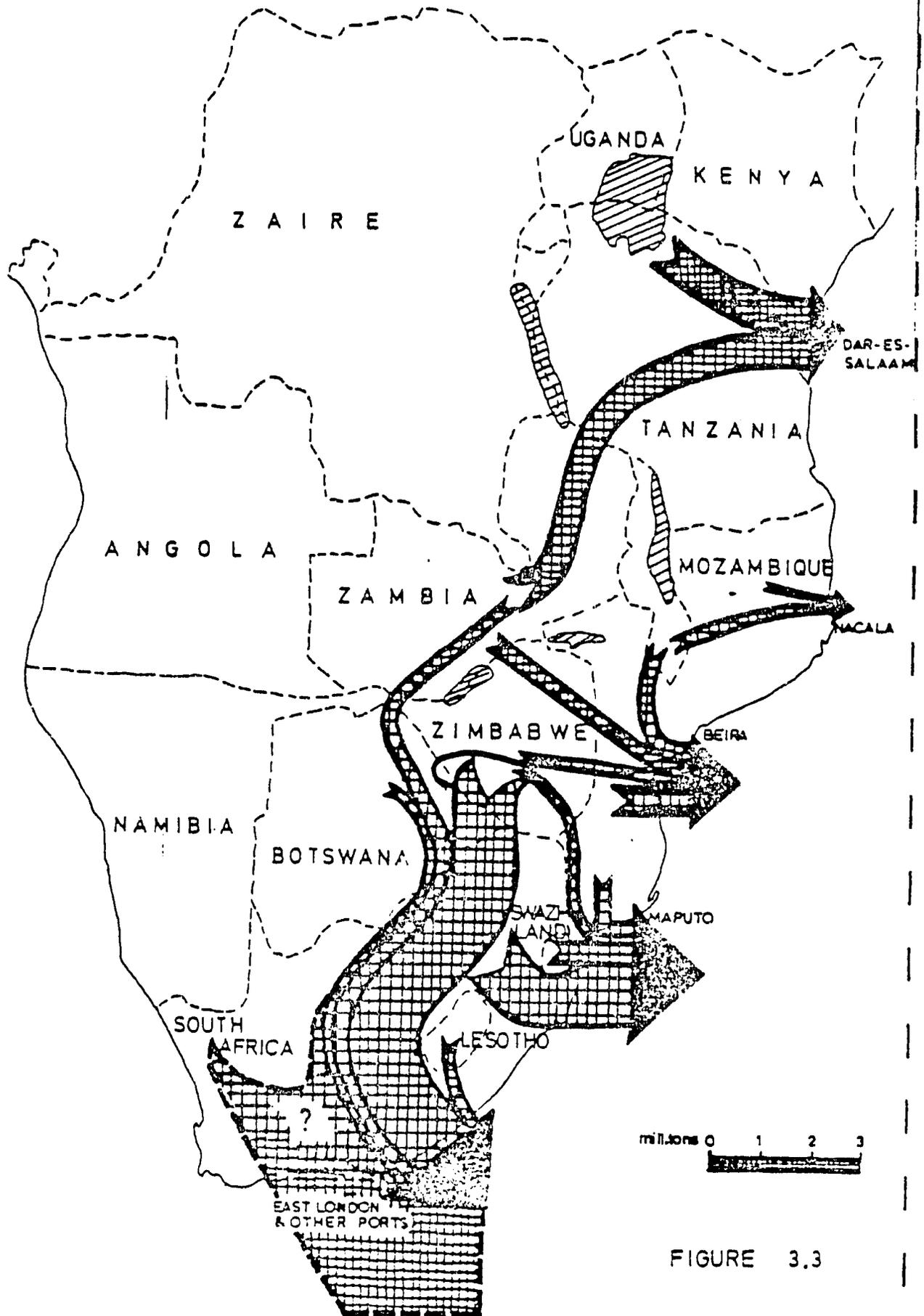


FIGURE 3.3

DRY CARGO FLOW (WITHOUT COAL) TO AND FROM PORTS, 1990
(Including oil to R.S.A.)

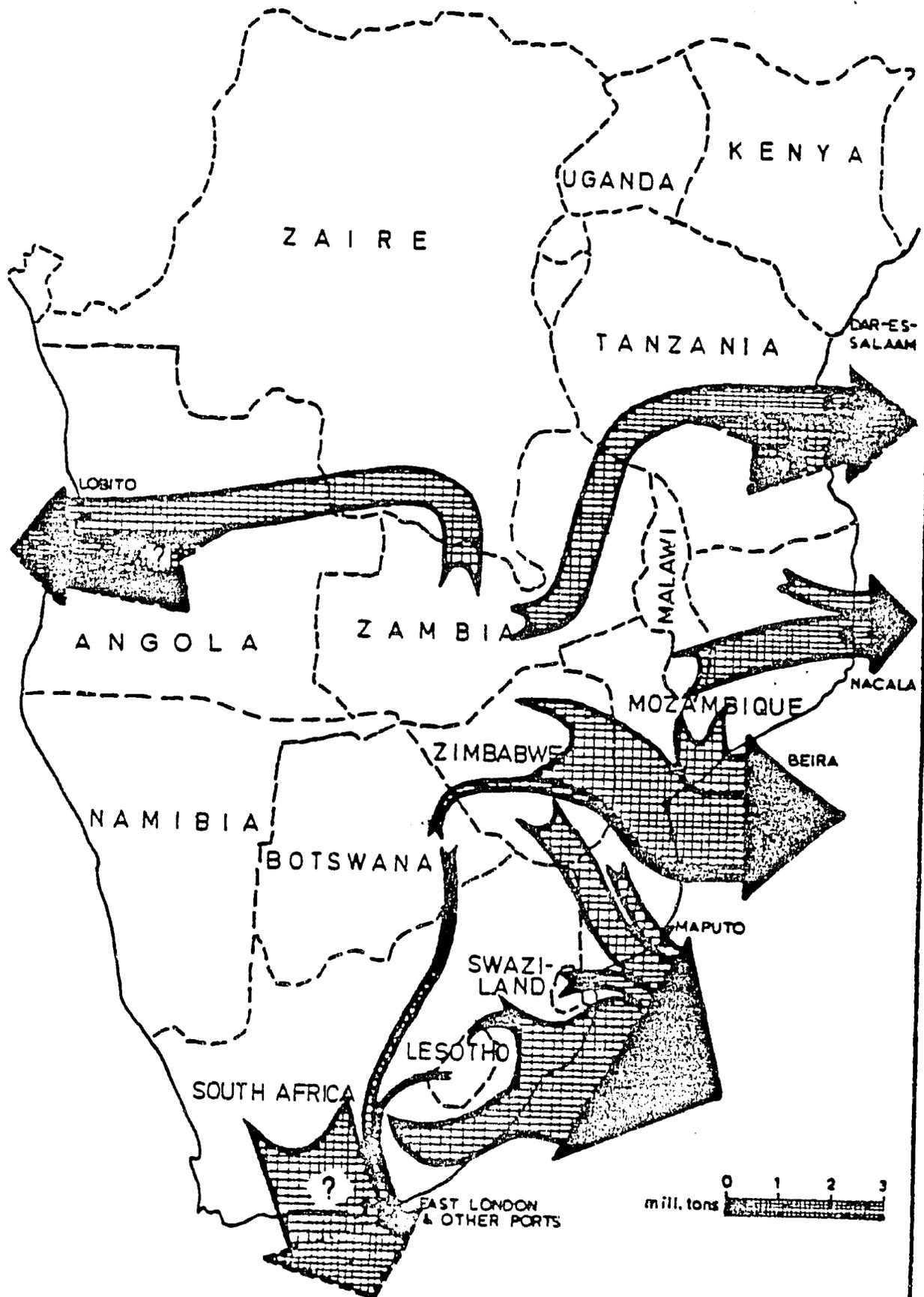


FIGURE 3.4

I-16 FLOW OF TRADE BETWEEN COUNTRIES OF THE REGION AND WITH R.S.A. — 1980

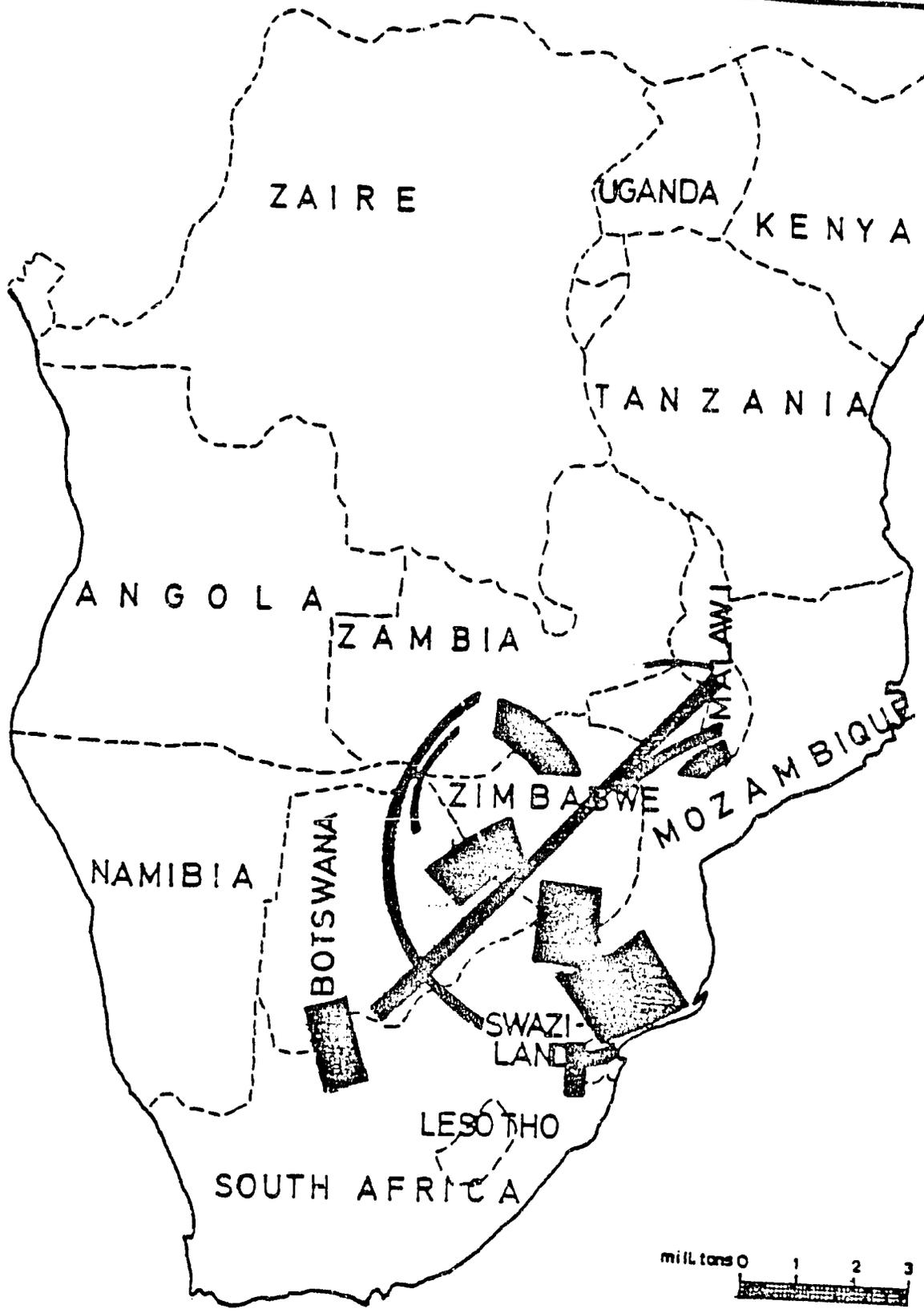


FIGURE 3.5

FLOW OF TRADE BETWEEN COUNTRIES OF
THE REGION AND WITH R.S.A. - 1990

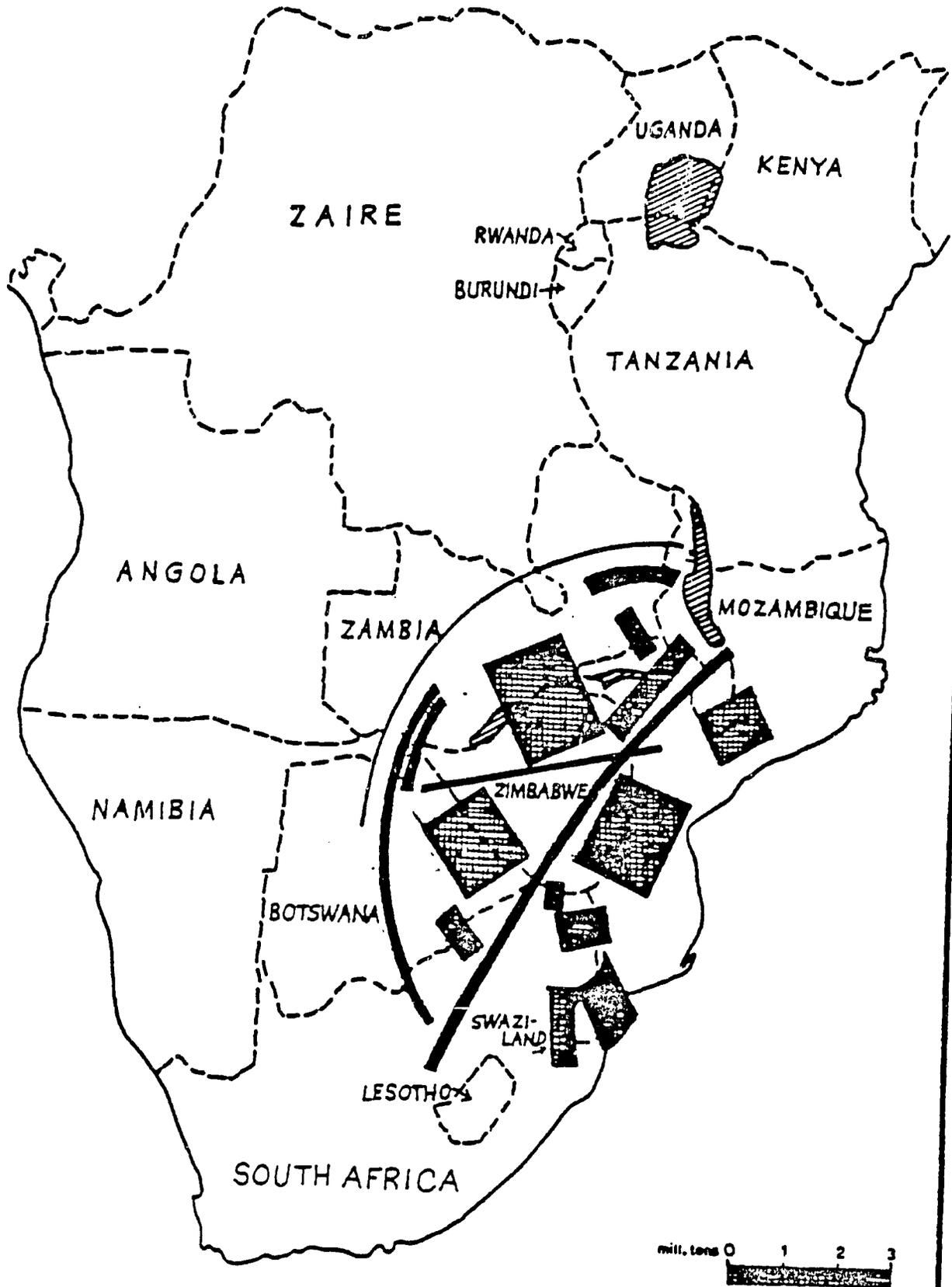


FIGURE 3.6

ESTIMATES OF COAL RESERVES (million tons)

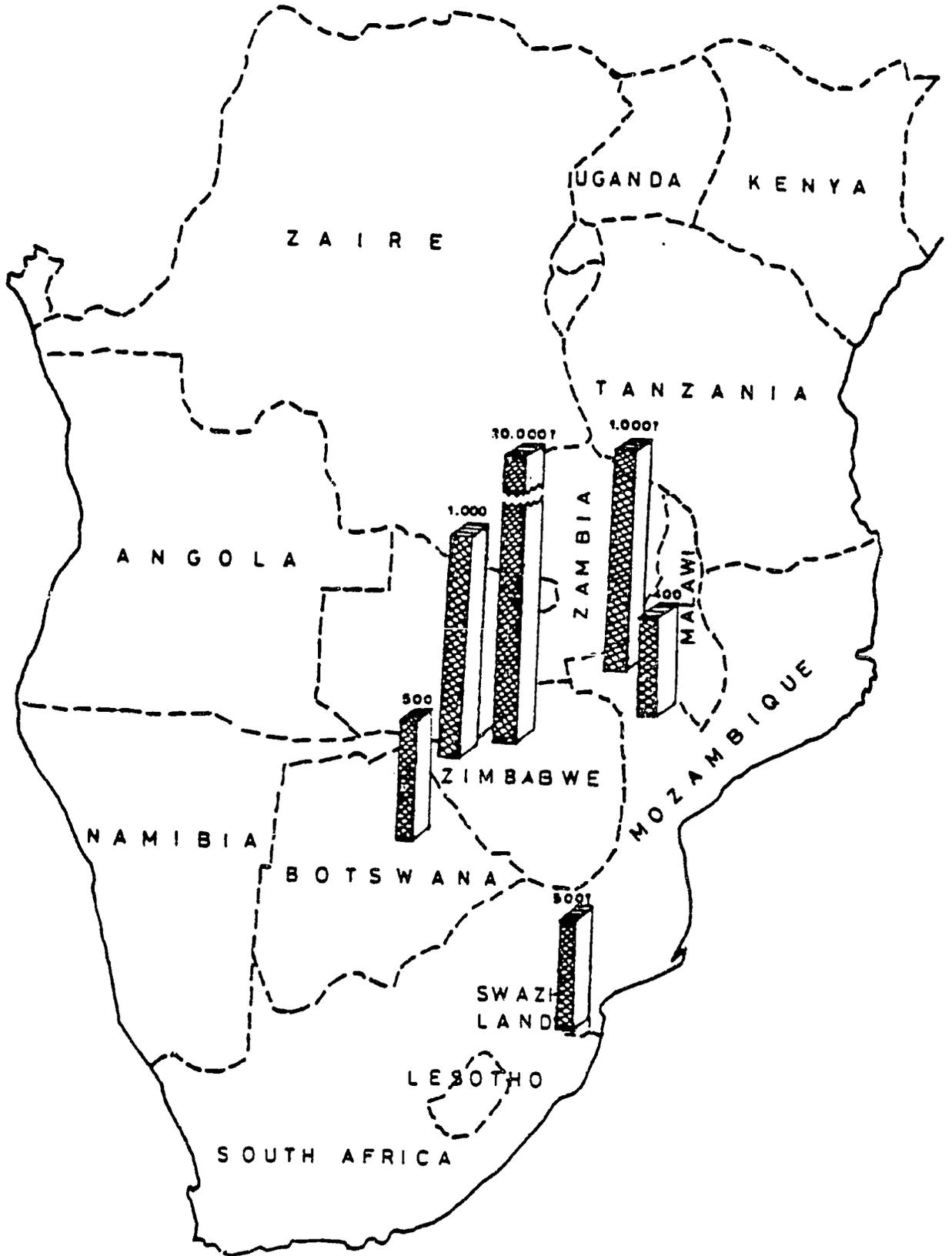


FIGURE 3.7

25

The quantities involved amounts, however, to at least 30-40 mill. tons per year or 5 times all present exports from the region. With a transport demand of this order of magnitude complete new transport facilities will be required. Reference is made to chapter 5.5.

In order to provide a co-ordinated plan for this development including all countries involved, a regional study seems to be appropriate. Project NO. 2.0.3, study on survey, exploitation and transport of minerals, has this purpose and should be given a very high priority.

The possibility of producing oil from part of the coal should also be investigated. This could save some transport investments.

The Consultants did not have time to collect all data on known deposits of coal and other minerals. The following summary is made on the basis of interviews and existing reports but is not complete.

Reference is made to Fig. 3.7.

BOTSWANA: Coal. The coal mine at Morupule could probably produce 5 mill. tons of high quality coal per year from 1985 and possibly 10 mill. tons later. Information may be obtained from Shell Coal International and the Anglo-American Corporation.

Copper. The present copper mines at Selebi-Pikwe produce 40.000 tons of refined copper per year. New copper mines are investigated at Matsitane and Bushman between Francistown and Nata. An ore body of 7 mill. tons is proved and investigations continue. The double quantity is needed to justify opening a mine with a 20 year lifetime producing 750.000 tons of ore per annum. Falconbridge Explorations is involved.

Soda Ash. Several studies are made of the deposits in the Makgadikgadi depression (see map Fig. App. 1.2). Production of 400.000-1.000.000 tons per year may be feasible if cheap railway transport to port is available.

MOZAMBIQUE: Coal. The coal mine in Moatize have deposits of about 400 mill. tons and the area northwest of Cahora Bassa may have even more. A production of 4 mill. tons in 1985 and 10 mill. tons in 1990 is included in our forecasts.

Other resources. Iron, asbestos, bauxit, copper and natural gas is identified. Too little information exist to evaluate feasibility of mining.

SWAZILAND: Coal. No information has been collected on the size of deposits. Three international companies are, however, preparing mining which will provide 2 mill. tons per year by 1985 and probably more later on.

ZAMBIA: Copper. New copper mines may be opened at Lumwana, but production in the old copperbelt is diminishing. A total increase of 4% per year is included in our forecast. Reference is made to App. 1.8.1.

Coal. The mines at Maamba can produce 1 mill. tons per year. An export of a few hundred tons is included in our forecast.

ZIMBABWE: Coal. The Ministry of Mines in Salisbury has informed us, that nearly unlimited resources of coal are found in the Wankie Area and in the area south of Lake Kariba. The Geological Surveys Department confirmed this information and provided a memorandum, describing the deposits in as much detail as possible at the present. (Reference is made to the bibliography, appendix 2).

The Wankie Area, where present production takes place, have reserves of more than 1000 mill. tons, and the deposits of other coalfields are probably 20 times as large. A production of 5 mill. tons per year in 1985, 10 mill. tons in 1990 and maybe 20 mill. tons in the 1990's is possible and feasible if the transport to ports is available and if the big investments in mines can be financed.

Other minerals. Zimbabwe is mining iron ore, chrome ore and copper. The transport of these minerals could be co-ordinated with the coal transports.

4. ROADS AND ROAD TRANSPORT

4.1 The role of the road in the transport system

The role of the road for transports is mainly for the following purposes:

- 1) Short distance transports of people and goods
- 2) Feeder traffic to transport terminals, railways and ports
- 3) Special transports of e. g. fresh products which need quick delivery
- 4) Special transports "door-to-door" or with special timing demands
- 5) Transports between places where railways are not available.

As a conclusion of this, the road will serve a high portion of the short distance transports but only small amounts of the long distance transports.

Another conclusion is that the road network has to be small-meshed in order to serve the people, the production and the development. The ability of the road to penetrate all land where people are living is a main advantage for road transports, which can be continuous from also small production areas to markets or terminals.

For big transport volumes, e. g. coal or other bulk, road transportation is not suitable.

It is within the region a generally expressed goal to direct as much as possible of all transports to rail. It is desirable to utilize existing railway lines as much as possible. It is also desirable to keep the energy and fuel consumption on a low level, and road transport consumes more energy per ton-kilometer than does rail transport.

Summarizing the role of the road in the transport system the following conclusions are generally applicable:

The roads carry the largest part of all ton- and passenger-kilometers due to the fact that of all transports, the short distance transports are dominating.

The road system offers very flexible transport services geographically and in time. It is essential that the road network is continuous with a hierarchical organization. The main road network forms the skeleton to which roads or road networks of lower grades are connected.

As regards the regional importance of roads it can generally be said that the volumes of international transports on road are low, but that the regional roads anyway may be viable due to the service they will at the same time offer to domestic traffic.

4.2 The existing regional road network

Road maps over Southern Africa show a continuous main road network. However, when the roads are studied more closely they turn out to be of much different standard.

Most of the proposed projects aim at the increase of the standard of existing road links. Some of these are of very low standard, e. g. earthroads, of which some are only passable with four-wheel-drive vehicles in the dry season.

The maintenance of the roads offer special problems. Some of the projects include road sections which have been broken down due to insufficient maintenance. Lack of skilled personnel, lack of equipment and lack of spareparts and repair facilities for equipment are serious problems for the road maintenance in many of the countries in the region.

There is also in some areas a serious lack of local material suitable for road construction and maintenance. This is sometimes the reason for choice of bitumen standard though the traffic volumes are so low that the savings in vehicle operation costs can not justify the higher costs of a bituminization.

4.3 Future road standard

For the planning of a future regional road network some regionally approved guidelines might be valuable.

With the development of international road transportation the following fields might be considered for standardization in regional co-operation:

- . Regulation on maximum axle loads, vehicle weights and vehicle sizes
- . Speed limits
- . Road signs
- . Design standards for roads and bridges
- . Requirements for driver's licenses and vehicle standard for regional operations.

It is desirable that the various links of the regional main road network have a similar standard.

The goal should be a road network of two-lane, bituminized standard. However, where the estimated future traffic volumes are low, usually in the magnitude below 200 vehicles per day, a lower standard may be possible. The least standard of the main road network should be roads constructed to engineered gravel standard, passable by usual motor vehicles independent of the weather.

For the choice of road standard the maintenance problem has to be considered. A high construction standard may give low maintenance costs while a low construction standard may require higher maintenance costs.

The availability of suitable material and maintenance resources have to be included in these considerations.

For the road crossings of rivers there is a similar problem. Bridges require high investments but low maintenance costs and offer a regular 24 hour service. Ferries require usually lower investments but higher operation costs and skilled operators. The ferry-services are also more irregular and unreliable.

4.4 Training

It is a general observation that training of personnel is essential for safe and economic road traffic and transports. The following three areas should be considered.

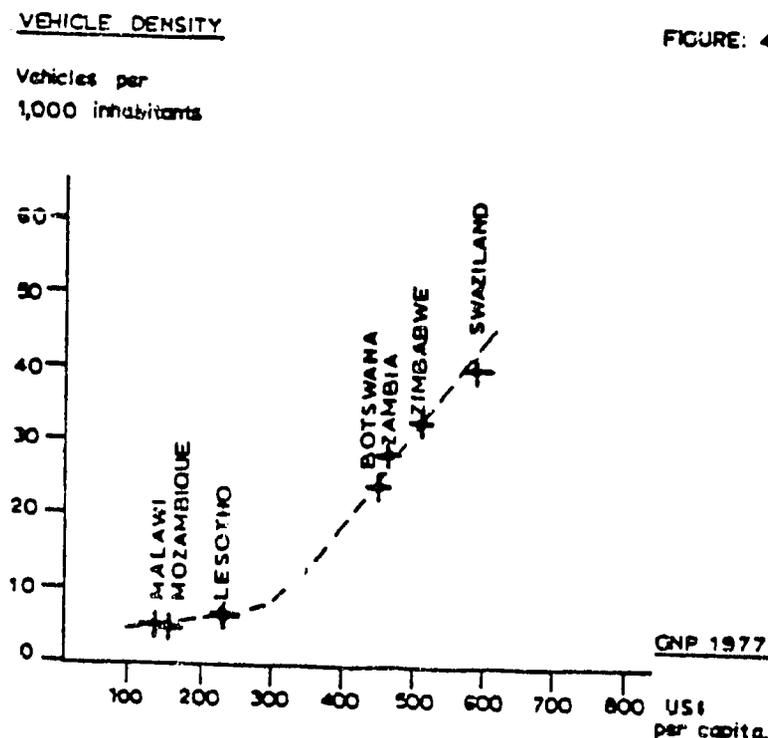
Vehicle operation: Lack of training causes high accident rates, due to careless driving. It also causes quick break-down of vehicles due to overloading and negligence of vehicle maintenance.

Vehicle maintenance: There seems to be a general lack of skilled mechanics and facilities for the maintenance of the vehicle fleet. This is a serious waste of capital and resources.

Road maintenance: Many roads within the region are in bad condition due to lacking maintenance. Training of engineers, foremen and workers should make the road-keeping more economic and effective.

4.5 Vehicle and traffic densities

Figure 4.1 shows the number of motor vehicles per 1,000 inhabitants in relation to the GNP 1977 in US dollars/capita for seven of the nine countries. There is a clear relationship, which may be interpreted as an indication of the development of the vehicle density with increasing GNP.



As the GNP is generally low in the region, the vehicle densities are low. Due to this fact the traffic volumes on the road networks are low except on roads near big cities and on feeder-roads to important ports.

The road traffic volumes passing borders between countries are generally low. At border stations for which statistics has been provided to the Consultants the traffic is below 100 vehicles per day at each station. The heavy vehicle traffic is mostly more than 50% of the total traffic passing borders.

4.6 Feasibility studies for road projects

Very few of the projects have been studied with respect to their economic feasibility. The standard of construction where design has been carried out is based on general design standards and simple traffic censuses and forecasts. This is often enough for the road designer but not for most financing institutions, which select projects to be financed on the basis of e. g. priorities or estimated rate of return.

However, it is difficult in the feasibility study of a road project to quantify all aspects of the road as mentioned in section 4.1. This applies in particular to international roads with low traffic volumes.

Therefore the comments by the Consultants on the projects are mainly in general terms instead of calculated figures. The comments may nevertheless indicate a decision or a need for further study.

4.7 Review of projects

26 road projects are proposed for financing, of which 17 are rehabilitation and upgrading of existing roads, 4 are construction of new roads and 5 are studies. The locations of the projects are indicated in Fig. 4.2. Table 4.1 shows the number of projects by country and priority class as well as the costs of the projects.

The Rehabilitation/Upgrading Projects cover a wide range of demand. Some projects include upgrading and realignment of poor earth roads to bituminized standard. Other projects are in fact rehabilitation to previous and reasonable standard of roads which have broken down due to insufficient maintenance.

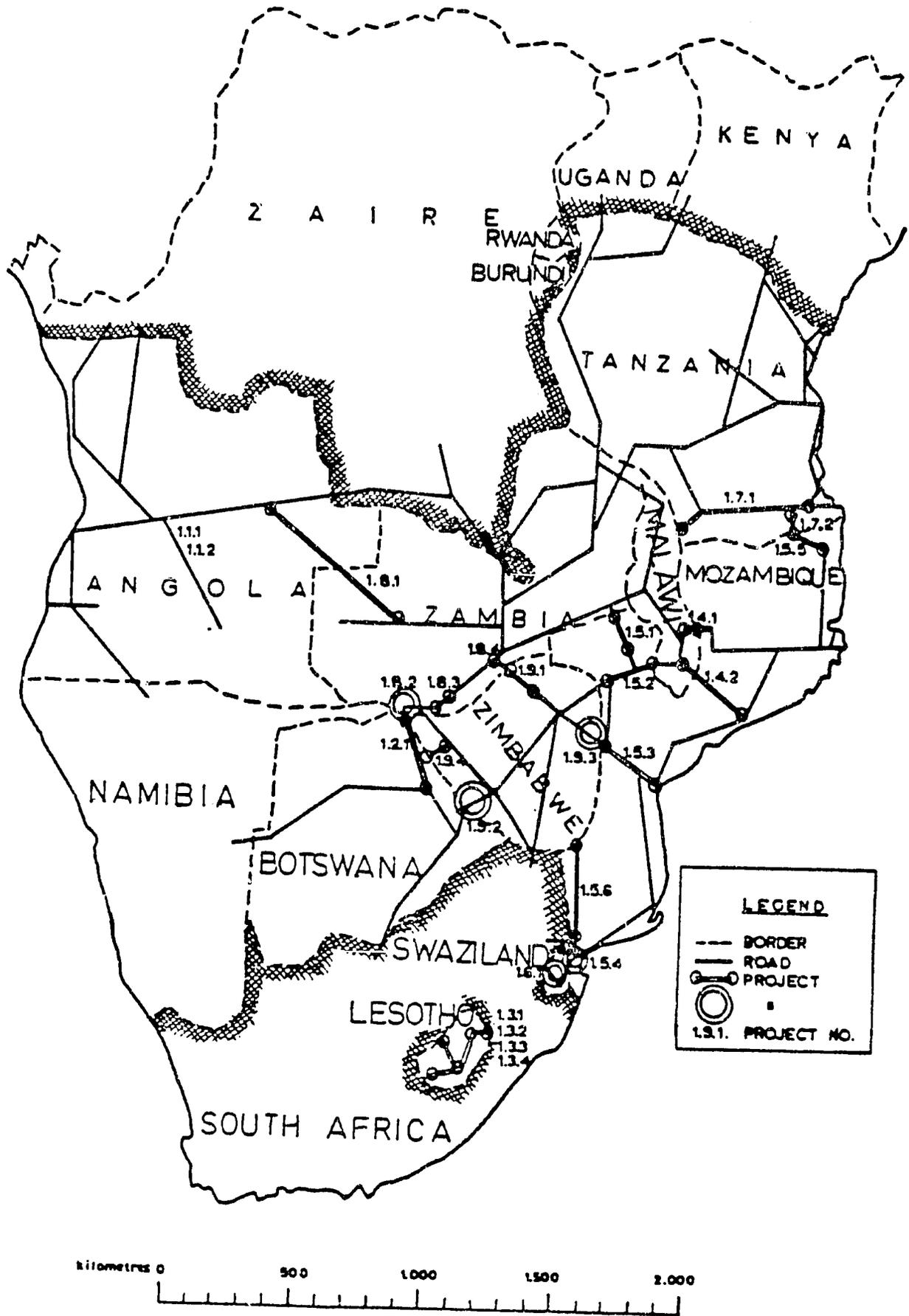
In the New Projects are included new road links between Zambia and Angola and between Tanzania and Mozambique. One new project, in Lesotho, has the same aim as three projects in the Rehabilitation/Upgrading group, which is to decrease the dependence on the South African transport system by creating a good road network within Lesotho.

Of the five Study Projects do two projects in Angola include 2 resp. 5 different roads.

The complete list of projects follows.

FIGURE 4.2

ROAD PROJECTS



APPROXIMATE SCALE-1:20,000,000

TABLE 4.1 SUMMARY OF ROAD PROJECTS
(Costs in million US dollars)

		PRIORITY CLASS				TOTAL	
		1	2	3	4	Number	Cost
ANGOLA	Number			1	2	3	
	Costs			50.0	1.8		51.8
BOTSWANA	Number	1			1	2	
	Costs	12.5			0.45		12.95
LESOTHO	Number	3		1		4	
	Costs	117.4		13.5			130.9
MALAWI	Number	2				2	
	Costs	55.0					55.0
MOZAMBIQUE	Number	5		1	1	7	
	Costs	81.3		30	0.1		111.4
SWAZILAND	Number	1				1	
	Costs	16.5					16.5
TANZANIA	Number	1		1		2	
	Costs	130.0		11.6			141.6
ZAMBIA	Number	2		1	1	4	
	Costs	21.3		50.0	0.45		71.75
ZIMBABWE	Number	3			1	4	
	Costs	23.3			0.1		23.4
TOTAL	Number	17		4	5	26	
	Costs	457.3		155.1	2.9		615.3

Note: Joint projects have been noted for both countries involved. The sum of the numbers of projects for each country is therefore higher than the real number of projects. The costs of such projects have been split up on the countries.

ROADS

List of Projects

Project No.	Country	Title	Priority Class	Estimated Cost Million US dollars
1.1.1	Angola	Studies of the Tourbu-Nogui road and of the Soyo-N'zeto road	4	0.3
1.1.2	Angola	Studies of five roads	4	1.5
1.2.1	Botswana	Improvement of the Botswana-Zambia road, section Nata-Kazungula	1	12.5
1.3.1	Lesotho	Upgrading of the road Mophale's Hoek-Quthing-Qachas Nek	1	48.5
1.3.2	Lesotho	Upgrading and reconstruction of the road Taung-Mokhotlong-Sani Top	1	39.2
1.3.3	Lesotho	Upgrading of the road Thaba-Tseka-Taung-Mpiti	1	29.7
1.3.4	Lesotho	Construction of a new road Ramabanta-Semonkong-Sekake	3	13.5
1.4.1	Malawi	Mangochi-Chiponde-Mozambique border. Upgrading	1	22.0
1.4.2	Malawi/ Mozambique	Malawi: Blantyre-Mulanje-Mozambique: Milanje-Mocuba. Rehabilitation and upgrading	1	33.0 40.0
1.5.1	Mozambique	Rehabilitation of the Tete-Cassacatiza road, section Matundo-Chiuta	1	5.0
1.5.2	Mozambique	Rehabilitation of the Zimbabwe-Tete-Malawi road	1	12.0
1.5.3	Mozambique	Rehabilitation of the road Zimbabwe border at Machipanda-Chimoio-Beira	1	17.3
1.5.4	Mozambique	Rehabilitation of the road connection to Swaziland	1	7.0
1.5.5	Mozambique	Access road to the Unity Bridge to Tanzania	3	30.0
1.5.6	Mozambique	Study of a new road Moamba-Massingir-Mapai-Chicualacuala	4	0.1
1.6.1	Swaziland	Rehabilitation and upgrading of the road Siteki-Lomahasha on the Mozambique border	1	16.5

Project No.			Priority Class	Estimated Cost Million US dollars
1.7.1	Tanzania	Rehabilitation and upgrading of the Ntwara-Songea-Mbamba Bay road	1	130.0
1.7.2	Tanzania	Access road to the Unity Bridge to Mozambique	3	11.6
1.8.1	Angola/ Zambia	Angola-Zambia road link	3	100.0
1.8.2	Botswana/ Zambia	Kazungula bridge	4	0.9
1.8.3	Zambia	Upgrading of the Lusaka-Livingstone road, section Zimba-Livingstone	1	13.0
1.8.4	Zambia	Rehabilitation of the road Kafue-Chirundu	1	8.3
1.9.1	Zimbabwe	Rehabilitation of the Salisbury-Chirundu road on three sections	1	16.5
1.9.2	Zimbabwe	Upgrading of the road Plumtree-Botswana border	1	1.8
1.9.3	Zimbabwe	Rehabilitation of the Salisbury-Umtali road	1	5.0
1.9.4	Zimbabwe	Construction of a road link Matetsi (Bulawayo-Victoria Falls road) - Pandamatenga (Botswana border)	4	0.1
	Total	26 projects		<hr/> 615.3

5. RAILWAYS AND RAIL TRANSPORT

5.1 The existing network

The total length of the railway in the region is about 13.000 km. As can be seen on the map, fig. 5.1, the existing railway network provides good connections to the sea for all the countries except Lesotho. This is in particular true for the eastern part of the region. The "in-region" connections are almost all shorter than alternative connections to South African ports.

The landlocked countries, Botswana, Zimbabwe, Zambia and Malawi, have rail access to at least two ports.

The importance of the ports and railways in Mozambique is clearly visible as the railways to Nacala, Beira and Maputo ports are the main arteries for Mozambique, Botswana, Zimbabwe, Malawi and to certain extent also Zambia.

When the system of existing railways and ports is brought up to a satisfactory standard as regards both infrastructure and operation, it will have a capacity well above the total import/export demand of the region and can operate as an independent railway network.

Consequently, from a capacity point of view, construction of additional railway lines seems not required in the near future apart from possible new lines for heavy mineral transports.

This is also the view of the railway administrations in Zambia, Zimbabwe/Botswana, Mozambique, Malawi and Zaire. The general managers for these railways agreed in their annual meeting in Bulawayo in August 1980 that the immediate efforts should be concentrated on rehabilitation and improvement of the existing railways rather than on construction of new lines, which, in fact, would only increase the present dominating problem in almost all the administrations: lack of educated staff.

5.2 Construction works

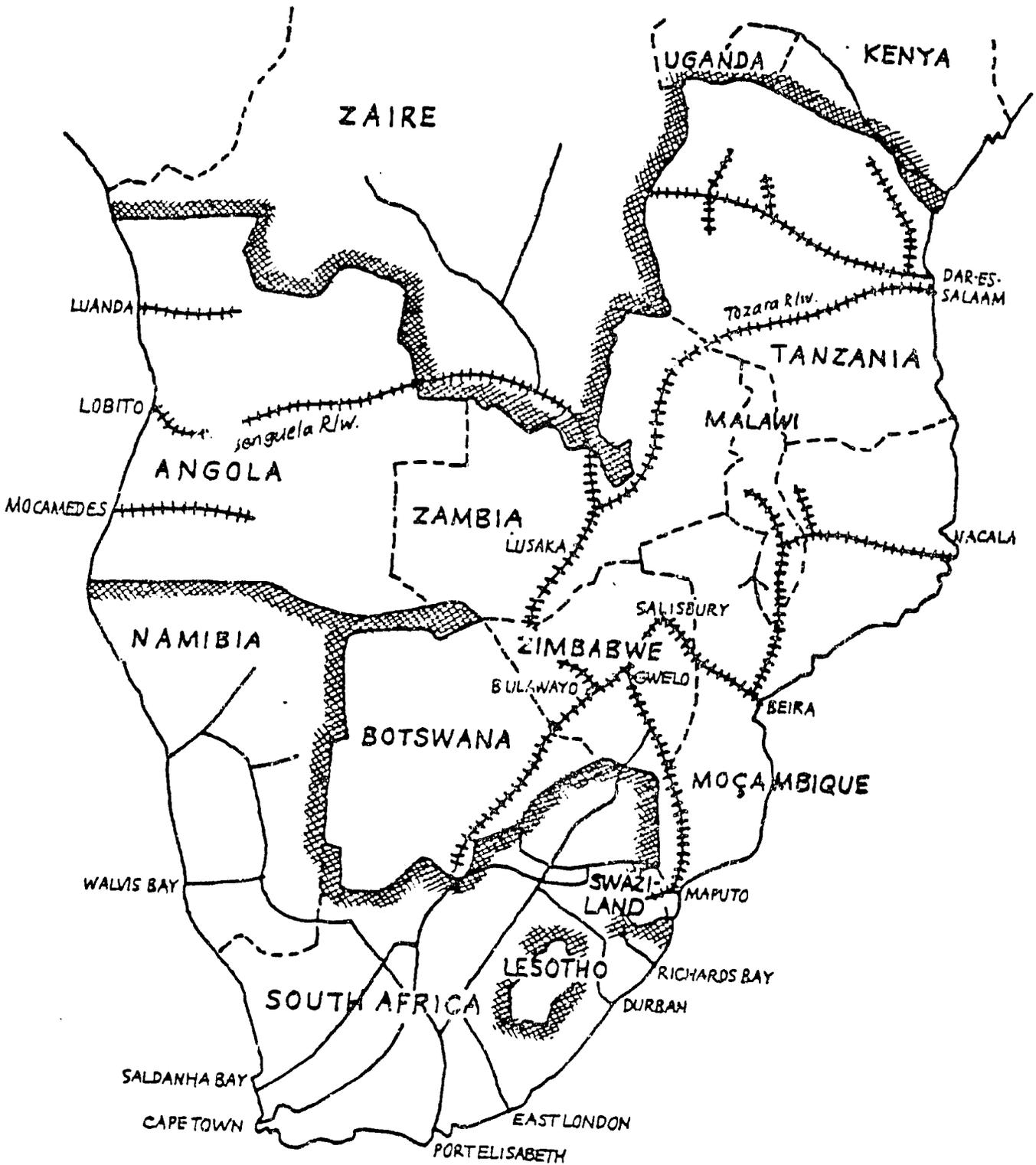
The major part of the railway projects submitted by the member states deals with rehabilitation works as several lines are in very poor condition due to many years of neglected maintenance, damage by war etc.

Generally the railways have been constructed to a low standard in the colonial time. Gradients are often steep and curves are sharp and drainage and erosion problems are frequent.

In planning and execution of rehabilitation works it should be carefully investigated to which extent it is feasible to incorporate alignment improvements in the rehabilitation works in order to reduce operation and maintenance costs. Due attention should also be paid to the question of expansion of crossing loops and establishment of additional crossing stations in order to increase the capacity.

It should be noted that the value of rehabilitation will be lost, if the rehabilitation is not followed up by establishment of an effective maintenance organization.

FIGURE 5.1 EXISTING MAIN RAILWAY LINES



----- Railways within the region

———— Other railways

5.3 Operation

Due to various reasons, mainly lack of educated staff and insufficient training of staff, the operation and performance of most of the railways in the region is not satisfactory.

The questions of temporary employment of foreign key-staff and training of local staff at all levels should have a very high priority.

The turn-around times of wagons are in many cases extremely long resulting in a constant lack of transport capacity. The reasons are many as, for instance, lack of available motive power, use of wagons for storage, lack of maintenance staff and spare parts, low efficiency in the ports, unsuitable regulations and hire rates etc. The importance of reducing the turn-around times, which save investments and increase revenues, can hardly be overstressed and should be carefully studied.

5.4 Co-ordination and standardization

The railway administrations of the region are organized in different international and regional organizations. Some are members of UIC (Union Internationale de Chemins des Fer) and of UAR (Union of African Railways). The railways of the five countries Zambia, Zimbabwe, Mozambique, Malawi and Zaire maintain regular meetings for traffic planning and the general managers have annual meetings for discussion of questions of common interest.

However, a more formalized organization of the railways within the region and establishment of a permanent secretariate would be a great advantage, particularly for standardization, and could save technical research and development work in the individual railway administrations.

As regards standardization some potential items would be:

Structure and loading gauge, axle load, rail sections, types of turn-outs, signals and signalled speed steps, electrification, types of wagons, components for motive power and rolling stock, brakes, rules for maintenance of foreign wagons, freight rates, regulations for use of wagons etc.

As an example table 5.1 below shows the differences in views on future axle load and future rail sections in the various administrations.

Table 5.1: Axle load and rail sections

Railway	Future axle load t.	Future rail section
Angola	Not given	40 kg/, (BS 80A=UIC 40)
Botswana	18,6	45 kg/m
Malawi	16,5 (may be 18)	40 kg/m (BS 80A=UIC 40)
Mozambique	20	45 kg/m and UIC 54
Tazara	20	45 kg/m (Chinese)
Zambia	20	45 kg/m (BS 90)

The present time, just before large rehabilitation works are going to start, would be ideal for standardization of axle loads and rail sections.

For axle loads the advantage of unification is obvious, as the wagons are operated all over the network.

As regards rails it is getting more and more difficult and expensive to obtain special rail sections in small quantities. By standardizing to one or two types of generally available rail sections, the region would form a large market and lower prices could be obtained.

5.5 Possible new railways

Even though the trend is to utilize existing infrastructure rather than to construct new railway lines, the huge mineral deposits found within the region could create such transport demands that new railway links would be feasible.

In this respect it should be noted that there is a significant difference between normal freight traffic and heavy mineral traffic.

In normal freight, traffic trains are usually of size 1.000-2.000 tons and composed of different wagons according to requirements and are serving different points of the network.

In mineral traffic, trains may be much larger, 5.000-20.000 tons and are worked as unit trains from the mines to the port of shipment. In order to minimize the transportation costs the railway must have small gradients and a good alignment.

The existing railways, originally designed to a low standard for light traffic, cannot meet these requirements even after rehabilitation. Further, mixing normal traffic with large scale mineral traffic will give capacity problems.

5.6 Summary of projects

A total of 25 projects at an estimated cost of about US dollars 592.2 million are being proposed for the railways sub-sector. The projects are summarized in table 5.2 and presented individually in the project list following the table.

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TABLE 5.2 SUMMARY OF RAILWAY PROJECTS
(Costs in million US dollars)

Country		Priority Class				Total	
		1	2	3	4	Number	Cost
Regional	Number				3	3	
	Costs				5.0		5.0
Angola	Number	1			1	2	
	Costs	60.0			1.0		61.0
Botswana	Number	2				2	
	Costs	103.8					103.8
Lesotho	Number			2		2	
	Costs			6.0			6.0
Malawi	Number	1		1		2	
	Costs	20.5		26.0			46.5
Mozambique	Number	5 1)				6	
	Costs	275.7			1		276.4
Tanzania	Number	2 2)		5 2)		7	
	Costs	50.0		43.0			93.0
Zambia	Number				1	1	
	Costs				0.5		0.5
Total	Number	11		8	6	25	
	Costs	510.0		75.0	7.2		592.2

1) Includes one project partly located in Swaziland, but administered by Mozambique.

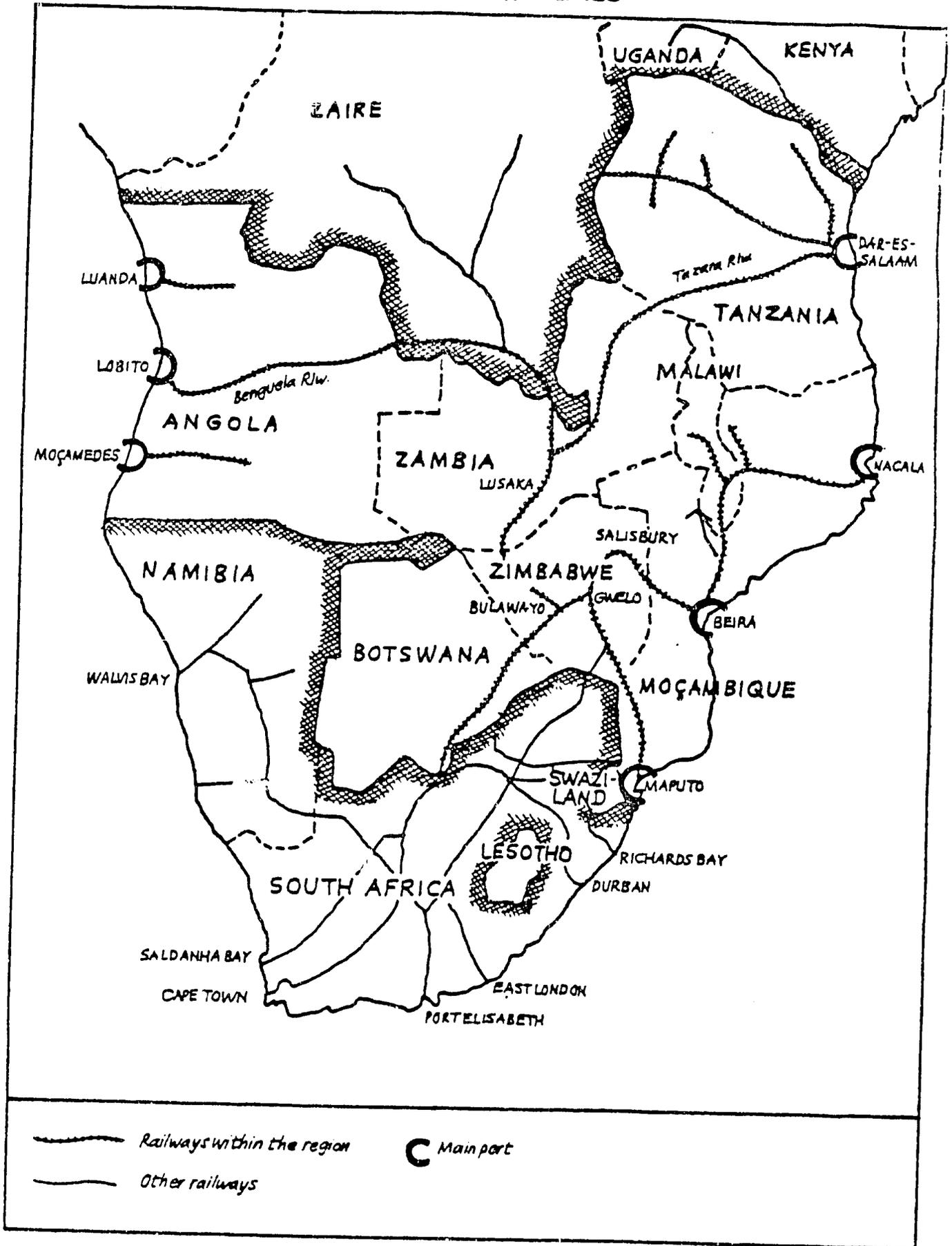
2) All the projects are submitted by Tanzania, but are for Tazara railway, which is owned 50% by Tanzania, 50% by Zambia.

RAILWAYS
LIST OF PROJECTS

Project No.	Country	Title	Priority Class	Estimated Cost Million US dollars
2.0.1	Regional	Study on railway rolling stock	4	1.0
2.0.2	Regional	Study on railway training programmes	4	1.0
2.0.3	Regional	Study on survey, exploitation and transportation of minerals	4	3.0
2.1.1	Angola	Rehabilitation of the Benguela railway	1	60.0
2.1.2	Angola	Pre-feasibility study for new north-south railway links	4	1.0
2.2.1	Botswana	Track renewal, 715 km	1	100.0
2.2.2	Botswana	Rehabilitation of telecommunications facilities	1	3.8
2.3.1	Lesotho	Customs terminal with container facilities	3	1.0
2.3.2	Lesotho	Supply of railway rolling stock	3	5.0
2.4.1	Malawi	Rehabilitation Balaka-Southern Border, 312 km	1	20.5
2.4.2	Malawi	Supply of railway rolling stock	3	26.0
2.5.1	Mozambique/Swaziland	Rehabilitation Maputo-Swaziland 145 km	1	30.0
2.5.2	Mozambique/Swaziland	Rehabilitation of the Border station by establishment of an exchange yard	1	3.3
2.5.3	Mozambique	Rehabilitation Almada-Machipanda on the Beira-Zimbabwe railway, 100 km	1	20.0

Project No.	Country	Title	Priority Class	Estimated Cost Million US dollars
2.5.4	Mozambique	Rehabilitation of 67 km of the Beira-Malawi railway	1	22.4
2.5.5	Mozambique	Rehabilitation of the Nacala-Malawi border railway, 615 km	1	200.0
2.5.6	Mozambique/ Zimbabwe	Feasibility study for electrification of the Salisbury-Maputo and Maputo Swaziland railways	4	0.7
2.7.1	Tanzania/ Zambia	Rehabilitation works at TAZARA railway	1	25.0
2.7.2	Tanzania/ Zambia	Supply of 25 nos of main line locomotives for TAZARA railway	1	25.0
2.7.3	Tanzania/ Zambia	Supply of wagons for TAZARA railway	3	20.0
2.7.4	Tanzania/ Zambia	Terminal facilities at New Kapiri Mposhi station, TAZARA railway	3	10.0
2.7.5	Tanzania/ Zambia	Supply of mechanical equipment to TAZARA railway	3	7.0
2.7.6	Tanzania/ Zambia	Supply of signalling and communications equipment to TAZARA railway	3	5.0
2.7.7	Tanzania/ Zambia	Training facilities for TAZARA railway	3	1.0
2.8.1	Zambia	Feasibility study for new rail links connecting Zambia with neighbouring countries and with ports	4	0.5
Total		25 projects		<hr/> 592.2

I-36 FIGURE 6.1 PORTS AND MAIN RAILWAY LINES



6. PORTS AND WATER TRANSPORT

6.1 Ports

Of the nine majority ruled states of the Southern African region Angola, Mozambique and Tanzania are maritime countries with ports serving also the transit needs of the landlocked ones, fig. 6.1.

On the western coast of the subcontinent the main ports are Luanda, Lobito and Moçamedes. Of these Lobito from a regional point of view is the most important one as it is the ocean terminus for the Benguela Railway. This railway was the main exit route for the copper exports from Zambia and Zaire. Zambia also relied on it for imports from the western world. During the civil war the railway track and bridges were destroyed at various points which has prevented the Zambian traffic from returning. The rehabilitation of the line is now put forth as a project for the Co-ordination Conference. When this is done Lobito is expected to regain its importance as a transit port, adequate cargo handling capacity assumed.

On the eastern coast the main ports are Dar es Salaam in Tanzania and the three Mozambique ports of Nacala, Beira and Maputo. Through the Tazara railway Dar es Salaam is connected with the railways of Zambia and Zimbabwe, and is thus able to serve as a transit port for these countries. However, at least for Zimbabwe, the Mozambique ports of Beira and Maputo seem to be the more natural outlets. The port of Nacala is the terminus of the Nacala - Malawi railway which through Malawi railway links it to the Mozambique central railway system and also through Malawi with the Zambian border. The importance of the Mozambique ports for the external trade of the region is shown by table 3.3 and the figures 3.3 and 3.4.

Most of the ports are at present suffering from deficiencies in several aspects but the most pressing problems of the western ports are rather different from those of the ports in the east. So the ports of Luanda and Lobito both are suffering from congestion, mainly emanating from low productivity. This seems to result from the following causes:

- Inefficient management and operation
- Inadequate and dilapidating storage facilities
- Inadequate and faulty handling equipment
- Shortage of skilled manpower and staff.

Congestion of storage capacity is frequently more due to the slow turn-around of goods in transit, lack of co-ordination of related operations and complexity of administrative formalities than to inadequacy of the infrastructure. For that reason the question of assistance to the port management authorities, the implementation of training programmes for the staff on all levels as well as temporary employment of expatriate key-staff should obtain high priority.

The problems of the Mozambique ports are not congestion but insufficient port infrastructure and water depth in entrance channels. Lack of modern cargo handling terminals with efficient equipment suited to the demands of present maritime traffic is also a problem. If the ports are to fulfill their role as main transit ports of the region and are to be able to handle the fast growing commodity flows these deficiencies as well as those of the railways must be remedied.

There is of course a shortage of skilled operational, technical and management staff especially on the medium level also here and staff training is certainly needed but in this case it should be possible - at least to a large extent - to draw on domestic resources.

6. Maritime transport

Most of the cargoes shipped out of the region are made up of heavy bulk commodities. The import except crude oil, petroleum products and some fertilizers is mainly general cargo. The vessels transporting the cargoes are to an overwhelmingly large extent owned by foreign shipping companies. Therefore there is no prospects of the vessels being in any way specially adapted to the conditions of the ports of the region. The composition of the fleet will be governed by the structure of the cargo flows and the transport relations. The type of ship to be used for a certain traffic is decided according to the volumes to be transported, the commodity mix and the sailing distances. The ports have to adapt their capacity according to the vessels or risk to loose the traffic or anyway to make it more expensive.

According to means of transport and ways of handling one can identify three main types of cargo, i. e. liquid bulk, dry bulk and general cargo. General cargo may be divided in two sub-groups, "semi-bulk" and "unitisable". Semi-bulk is cargo which is usually transported in large, homogenous quantities e. g. forrest products, steel and different kinds of chemicals and fertilizers. The rest is supposed to be suitable for making up in unit loads i. e. put into containers, on flats, on mafi trailers etc.

The different types of cargo are handled at different types of wharfs and terminals:

- Liquid bulk terminals
- Dry bulk terminals specially adapted for handling and stockpiling of bulk cargoes
- General cargo wharfs
 - for LO/LO: Wharfs with container cranes, adjacent handling and storing areas as well as suitable moving and stocking equipment
 - for RO/RO: Wharfs specially adapted for loading and discharging ships by rolling over a ramp which may be carried by the ships or based ashore
- Conventional wharfs for handling non-unitized and semi-bulk cargo traffic
- Special wharfs with handling equipment and storing facilities for one or more semi-bulk commodities.

According to this the different types of vessels then could be defined in the following way:

- Tankers for liquid bulk cargoes
- Dry bulk carriers for transporting dry bulk cargoes between two or anyway, a very limited number of ports

- General cargo vessels:
LO/LO and RO/RO, specially designed for transporting containers which are loaded and unloaded by lift on - lift off respectively roll on - roll off methods.
- Conventional vessels for goods in sacks, bags, drums etc. The ships may take a few containers, generally as deck cargo.
- Special vessels for carrying semi-bulk cargos. These ships may be built for a certain type of commodity or group of commodities e. g. steel or forest products.

This classification is of course rather simplified as it does not take into account the combinations of types. It serves however the purpose of demonstrating the relationship between commodity, ship and wharf which must be considered when planning maritime transport facilities. One of the most important factors is to know the trends in shipbuilding as they give an indication on the future demand on port capacity.

The world tonnage is at present about 650 million DWT of which 260 million DWT are dry cargo vessels. This is distributed as follows:

Bulk (incl. ore)	49.2 %
Conventional (liner - tramp)	47 %
Unit load ships (LO/LO and RO/RO)	3.5 %
Others	0.3 %

Of the dry cargo ships 91.5 million DWT or 35% are delivered 1971 or later. Out of the unit load ships 7.7 million DWT or 85% were delivered during this period of time, of the bulkers 55.8 million DWT or 43% and of vessels for liner - or trampshipping 24.8 million DWT or 20%. About half of these are semi-container ships for lift on - lift off handling by ships' cranes. Therefore these are not quite comparable with vessels for strictly conventional shipping.

The bulkers are growing in size. The required draft being one of the critical questions for the development of Beira and Maputo, the relation between size and draft is demonstrated in fig. 6.2 where also the effect of part-loading on draft is shown.

6.3 Inland Water Transport

The use of the inland waterways for transport in the region is not very well developed. On Lake Malawi there is established shipping administered by Malawi railways but at present it is a purely national concern. The same goes for the navigation on the Angolan rivers.

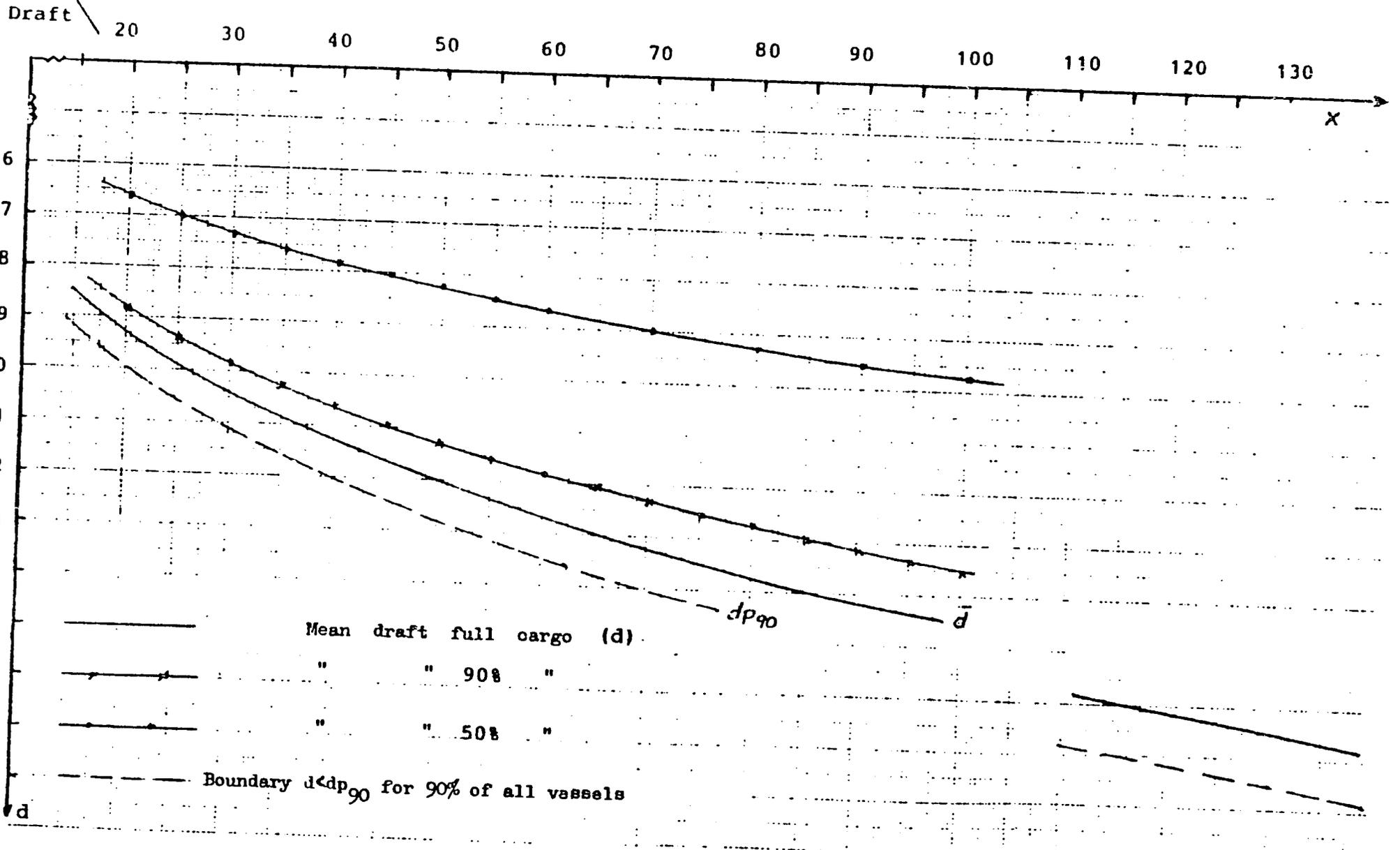
The use of the Zambezi River system for navigation which has been considered for at least 400 years but to date it has only been developed on the lower part of the Zambezi as far as Tete and on the lower part of its tributary, the Shire, as far as Chiromo. Although several studies have shown that it is technical feasible to use the river for navigational purposes the economic feasibility of such a project has not yet been proven.

Figure 6.2

Bulk vessels

Mean drafts

1000 dwt



The problems seem to fall under four headings:

- a) the mouth of the river is difficult to access due to shallow waters and shifting sand bars. The ground conditions in the delta seem to render the establishment of heavy infrastructure very costly and may be unfeasible;
- b) the shallow water during the dry season;
- c) the passage of the Cahora Bassa and Boroma gorges;
- d) the large drawdown of the Cahora Bassa reservoir which can be as much as 25 meters. This poses problems for the establishment of ports on the shores of the reservoirs if it is to be used for navigation.

Generally, the development of waterways for navigation poses serious problems, as the hydrological and engineering investments are very costly. For this reason detailed studies should be done before any investment decision is taken.

6.4 Summary of projects

Table 6.1 is a summary of the proposed ports and water transport projects showing number of projects and costs by country. The total number of projects is 8 and the total estimated cost 371.2 million dollars.

TABLE 6.1 SUMMARY OF PORTS AND WATER PROJECTS

(Costs in million US dollars)

COUNTRY		PRIORITY CLASS				TOTAL	
		1	2	3	4	Number	Cost
Regional	Number				1	1	
	Costs				0.2		0.2
Angola	Number				2	2	
	Costs				1.6		1.6
Mozambique	Number	3				3	
	Costs	368.7					368.7
Tanzania	Number				1	1	
	Costs				0.4		0.4
Zambia	Number				1	1	
	Costs				0.3		0.3
Total	Number	3			5	8	
	Costs	368.7			2.5		371.2

PORTS AND WATER TRANSPORT

List of projects:

Project No.	Country	Title	Priority Class	Estimated Cost Million US dollars
3.0.1	Regional	Southern African Shipping Line	4	0.2
3.1.1	Angola	Master plan for the port of Lobito	4	1.4
3.1.2	Angola	Ports of Luanda and Moçamedes, Rehabilitation and management assistance (study	4	0.2
3.5.1	Moçambique	Increase in capacity of the port of Maputo	1	183.3
3.5.2	Moçambique	Increase in capacity of the port of Beira	1	158.3
3.5.3	Moçambique	Design and construction of container terminal at the port of Nacala	1	27.1
3.7.1	Tanzania	Development of navigation on Lake Malawi/Nyassa	4	0.4
3.8.1	Zambia	Navigability of the Zambezi River	4	0.3
	Total	8 projects		<hr/> 371.2

7. AIRPORTS AND AIR TRANSPORT

7.1 Air transport services

Air transport in the Region has up to now been developed and used only to a fairly limited extent. However, the scope of activities shows a different picture with regard to domestic, regional and intercontinental traffic respectively.

In most of the countries domestic air transport is of great importance in facilitating the movement of passengers and goods between the various parts of the country, and in some cases it is even vital due to the absence of proper road or rail connections.

Direct air services between the nine countries of the Region are today either non-existent or limited to a few flights per week as shown in the below table.

Direct flights per week between the capitals of the 9 countries

FROM TO	ANG	BOT	LES	MAL	MOZ	SWA	TAN	ZAM	ZIM
ANG					2			2	
BOT			2					3	
LES		2			2	2			
MAL							3	5	4
NOZ	2		2			2	2	1	1
SWA			2		2			3	
TAN				3	2			3	
ZAM	2	3		5	1	3	3		4
ZIM				4	1			4	
Total	4	5	6	12	10	7	8	20	9

Reference: ABC, May 1980

Air transport between the Region and other African countries, Europe and the Near-East exists to a certain extent, whereas no routes are operated to North - and South-America and the far-East. In most cases, however, frequencies are limited to one or two flights per week, and for many trips to/from the Region the most convenient connection is via Johannesburg.

The possibility of establishing another major gateway to the Region by consolidating the services to Europe and developing an appropriate intra-regional feeder network should be explored.

7.2 Air carriers

Each of the nine countries has its own national air carrier. However, they are all facing various problems including those of financing, operation, maintenance and training. As many of the problems are common to several of the airlines, and also to some extent associated with the limited scale of operations, there is considerable scope for collaboration and co-ordination.

It is suggested that a pre-feasibility study be conducted to establish the most promising areas for collaborations, to be followed by the preparation of plans for the implementation of relevant projects.

7.3 Infrastructure

Generally speaking the airport infrastructure of the Region is designed for the types of aircraft, the routes and the passenger volumes of a decade or more ago, and is not suited for the new generation of aircraft which are in use or gradually being introduced by the airlines.

The necessary improvements include extension of runways, strengthening of runways, taxiways and aprons, landing aids and airport lighting, passenger and cargo terminals and fire and rescue services.

Navigational aids at both airports and en route are lagging behind in development, and so are the telecommunication connections between ground stations and between ground stations and aircraft.

Figure 7.1 shows the airports in the Region for which major improvement or construction projects are presented in this report.

Other proposed projects on lighting, navigational aids, communications, rescue and fire fighting etc. concern another 10 airports in the Region.

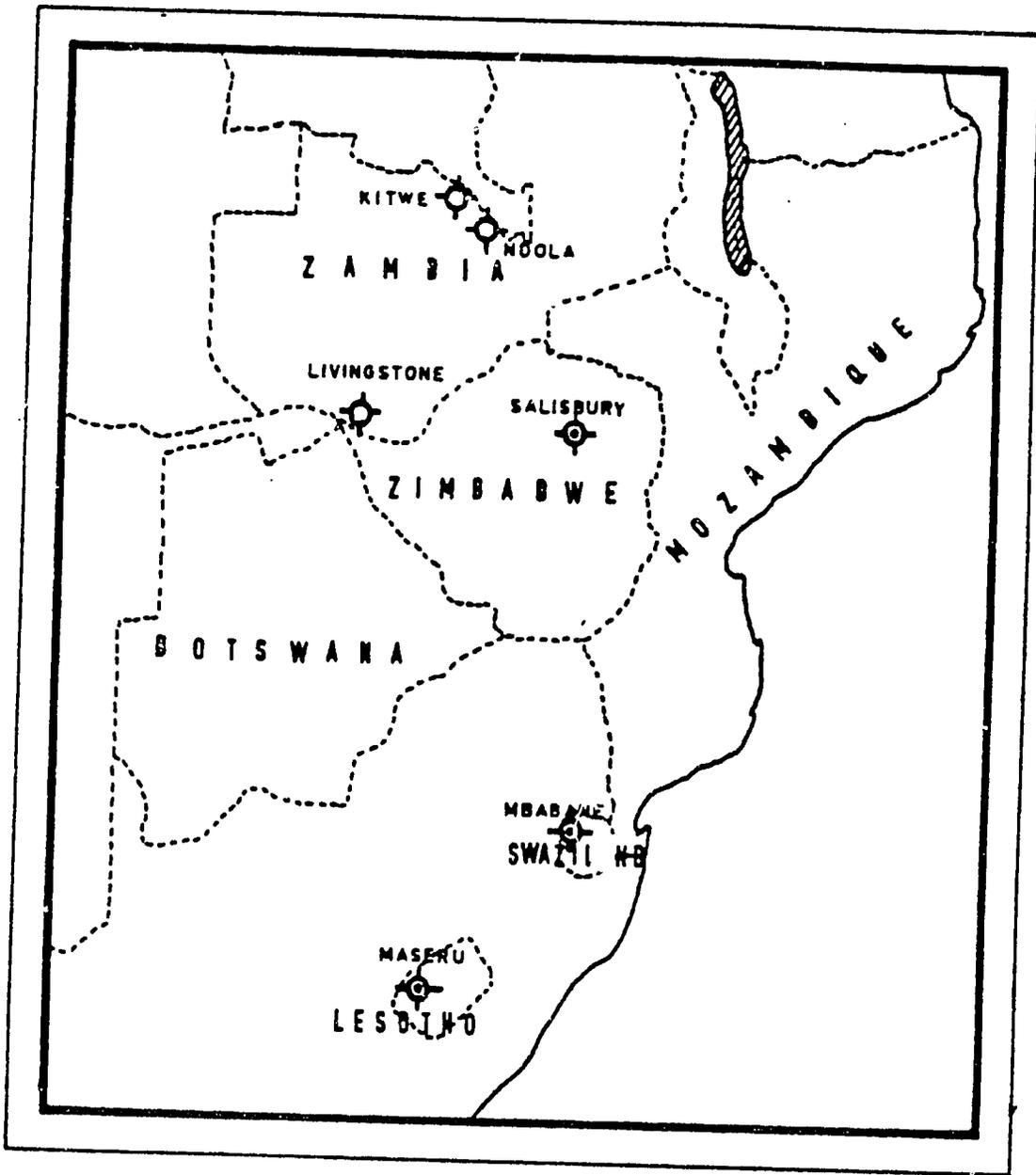
Even when facilities and equipment are of acceptable design and type they are not always able to fulfill their functions properly, due to lack of maintenance or spare parts. Thus it is very important to put more emphasis on maintenance in order to preserve the large investments already made, as well as for operational and safety reasons.

7.4 Manpower and training

One of the most severe problems facing the civil aviation departments in the Region is the lack of sufficiently qualified staff. Thus there is a considerable demand for training at all levels, and although there is a number of training facilities in the Region, they are not sufficient nor are there enough numbers of qualified instructors.

In order to utilize the available and additional resources to their fullest extent it is proposed that a study be carried out to define the most promising areas for co-operation between the civil aviation departments in the nine countries.

FIGURE 7.1 MAJOR AIRPORT PROJECTS



7.5 Planning

Due to lack of staff in the aviation sector forward planning and development activities have generally received only limited attention. Considering the large investments to be undertaken during the coming years, and the significant contribution to the development of the region which may occur from improved air services, it is important that appropriate plans comprising short, medium and long term development be prepared, even if it may be necessary to call upon foreign assistance for an initial period of time.

7.6 Summary of projects

A total of 12 projects at an estimated cost of about US dollars 189 million are being proposed for the airports and air transport sub-sector. The projects are summarized in table 7.1 and presented individually in the project list following the table.

TABLE 7.1: SUMMARY OF AVIATION PROJECTS
(Costs in million US dollars)

Country		Priority Class				Total	
		1	2	3	4	Nos.	Cost
Regional	Number				2	2	
	Cost				0.24		0.24
Lesotho	Number			1 1)		1	
	Cost			14.00			14.00
Mozambique	Number	2				2	
	Cost	8.00					8.00
Swaziland	Number	2				2	
	Cost	15.60					15.60
Zambia	Number	3				3	
	Cost	39.80					39.80
Zimbabwe	Number	2				2	
	Cost	111.00					111.00
Total	Number	9		1	2	12	
	Cost	174.40		14.00	0.24		188.64

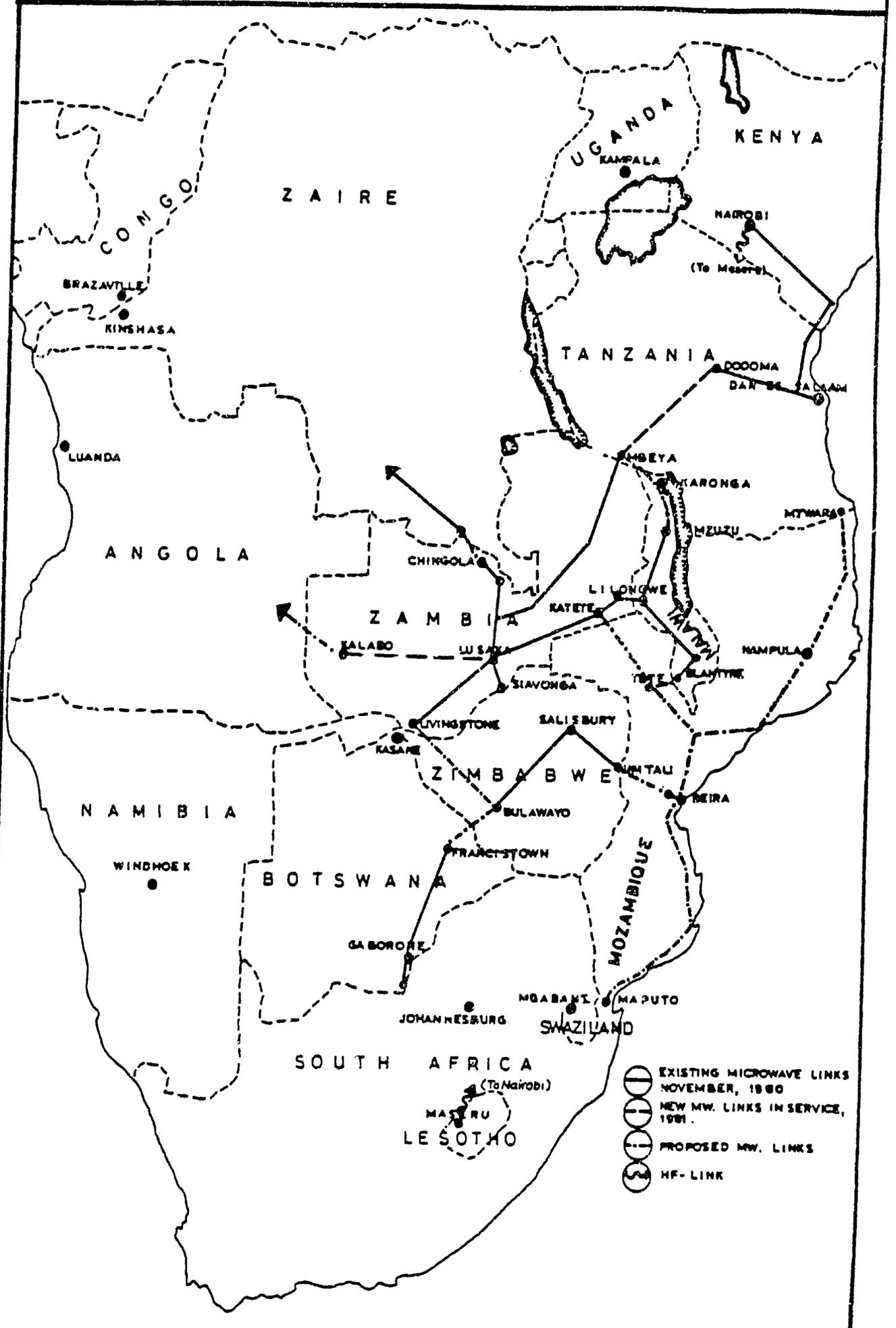
1) The total cost of this project is estimated at US dollars 55-60 million, but only US dollars 14 million are not yet committed.

AIRPORTS AND AIR TRANSPORT

LIST OF PROJECTS

Project No.	Country	Title	Priority Class	Estimated Cost Million US dollars
4.0.1	Regional	Flight testing of navigation aids	4	0.04
4.0.2	Regional	Feasibility study on co-operation in civil aviation	4	0.20
4.3.1	Lesotho	New airport	3	14.00
4.5.1	Mozambique	Rehabilitation of airport lighting	1	5.00
4.5.2	Mozambique	Navigation and landing aids	1	3.00
4.6.1	Swaziland	Improvement of Matsapa airport	1	15.00
4.6.2	Swaziland	Navigations aids	1	0.60
4.8.1	Zambia	Improvement of Livingstone airport	1	13.00
4.8.2	Zambia	Improvement of Ndola airport	1	13.20
4.8.3	Zambia	Improvement of Southdowns airport (Kitwe)	1	13.60
4.9.1	Zimbabwe	Airport rescue and fire service: Re-equipment	1	11.00
4.9.2	Zimbabwe	New Salisbury Airport Terminal	1	100.00
Total		12 projects		<u>188.64</u>

FIGURE 8.1. EXISTING MICROWAVE LINKS, ONGOING PROJECTS AND PROPOSED MW. LINKS IN SOUTHERN AFRICA



8. TELECOMMUNICATIONS

8.1 General

Some fifteen years ago the International Telecommunication Union (ITU) started planning the Panafrikan Telecommunication (Panafitel) Network. The main objective of the Panafitel project was to build up reliable terrestrial telecommunication systems to facilitate the establishment of high-quality telephone and telex connections between any two African countries without the need to go through centres outside Africa. The part of the Panafitel network being in service as at the end of 1980 in Southern Africa is shown on the map figure 8.1.

The introduction on a large scale of the Telecommunication Satellite System some 5 years ago probably had a delaying effect on the implementation of the Panafitel network. However, in order to achieve the most economical network the terrestrial and the spatial (satellite) systems should be closely co-ordinated. As the inter-regional tele-traffic grows an increasing portion of the traffic will be routed through the terrestrial system, provided that the missing links be established.

The projects now proposed by the member states of the Southern Africa Transport and Communications Commission may be seen as a major step towards the completion of the Panafitel network in the region.

8.2 National and regional networks as integral parts of a World-wide Telecommunication System

The national and regional telecommunication networks should be considered as integral parts of a world-wide telecommunication system. In all international relations it is necessary to establish and follow certain rules, and this applies in the highest degree to telecommunications. The International Telecommunication Union (ITU) and its Consultative Committees CCITT (for telephone and telegraph) and CCIR (for radio) therefore have issued a lot of definitions, descriptions, rules and recommendations concerning design and operation of telecommunication networks. Another international organization, the Intelsat, which is the organization in charge of the establishing and operation of the (most important) international telecommunication satellite system, has also laid down certain rules - for the design and operation of earth stations.

A national network should be based on well conceived fundamental plans and the recommendations issued by the ITU should, where applicable, be followed unless certain circumstances justify deviation.

Telecommunication services comprise many branches, the following being the most common:

- Telephone service
- Telex and teleprinter service
- Data service
- Facsimile service

A modern telecommunication system should be designed in such a way that it can provide all these services.

In this connection it may be pertinent to mention that Civil Aviation requires fast and reliable telephone, teleprinter and data communications.

8.3 The regional network

The regional telecommunication system, which is composed of the arteries carrying the inter-regional (international) traffic in the national networks, should be built up as an integrated, transparent network so as to minimize the need for interface equipment and to facilitate diversity routing. A regional network cannot be fully developed if the national networks are unable to handle the traffic offered from other countries. The first step towards a sufficient and reliable regional network may therefore be to review the national networks and overhaul (upgrade) certain parts, which are not up to standard. Only where and when the national networks on each side of a border can handle the forecast interstate traffic, it would be justified to carry out a cross-border project.

A prerequisite for the introduction of International Direct Dialling throughout the region is that the regional network has sufficient capacity.

8.4 Technical uniformity

The telecommunication networks in the member states of the Commission are at various stages of development and the cost for bringing the networks up to the same technical level would therefore be enormous. However, if the existing network in a country requires an extensive modernization it might be justified to consider a complete renewal of the whole system and adopt digital switching and transmission instead of analogues, thereby skipping one or two generations of technology.

When a large number of projects of the same kind are to be carried out in a few years time it may be advantageous to try to reach technical uniformity at least in new integrated parts of the regional network.

8.5 Planning and co-ordination of projects

The actual projects should be considered as parts of one regional project and therefore it is of the utmost importance that both planning and implementation of the projects are well co-ordinated in time and space. Otherwise time and money may be wasted.

There are other questions that have to be considered before the projects can be implemented and those are:

- dimensioning of routes and exchanges (traffic engineering)
- choice of signalling system(s)
- choice of transmission paths (diversity)
- routing of calls in the region (regional routing plan)

- unified tariffs for inter-regional traffic
- establishing International Maintenance Centres (IMC)
- training of engineers and technicians for the operation and maintenance of new plants.

8.6 Project implementation

Figure 8.2 shows a realistic time-schedule for the implementation (from preliminary decision to commissioning) of the proposed telecommunication projects. As can be seen the total time required for a project is estimated at 51-54 months. Although some smaller projects can be carried out in a shorter time, the presented time-schedule may be used as a guideline for the implementation.

8.7 Project viability

The telecommunication system of a country may be compared with the nervous system of a human being. Without its nervous system a human being cannot exist and the same applies to a modern country without an adequate telecommunication system.

Certain parts of a national telecommunication system may not be found viable, if strict economic criteria are applied. However, considering the total benefit for the commercial and social life of a country, which the telecommunication facilities involve, even non-viable projects may be justified. The same applies to a regional telecommunication system.

8.8 Cost apportionment

The teletraffic flow on a high capacity link between two countries usually tapers off towards the border, which means that only a fraction of the maximum traffic flow, say 5-10%, is interstate (inter-regional) traffic. Consequently as much as 90-80% of the total investment cost for the link should be charged to the national network. So if a telecommunication route, serving a border region of a country, is extended across the border of the neighbouring country one gets a cheap regional link. When planning the regional network, one should take this into consideration.

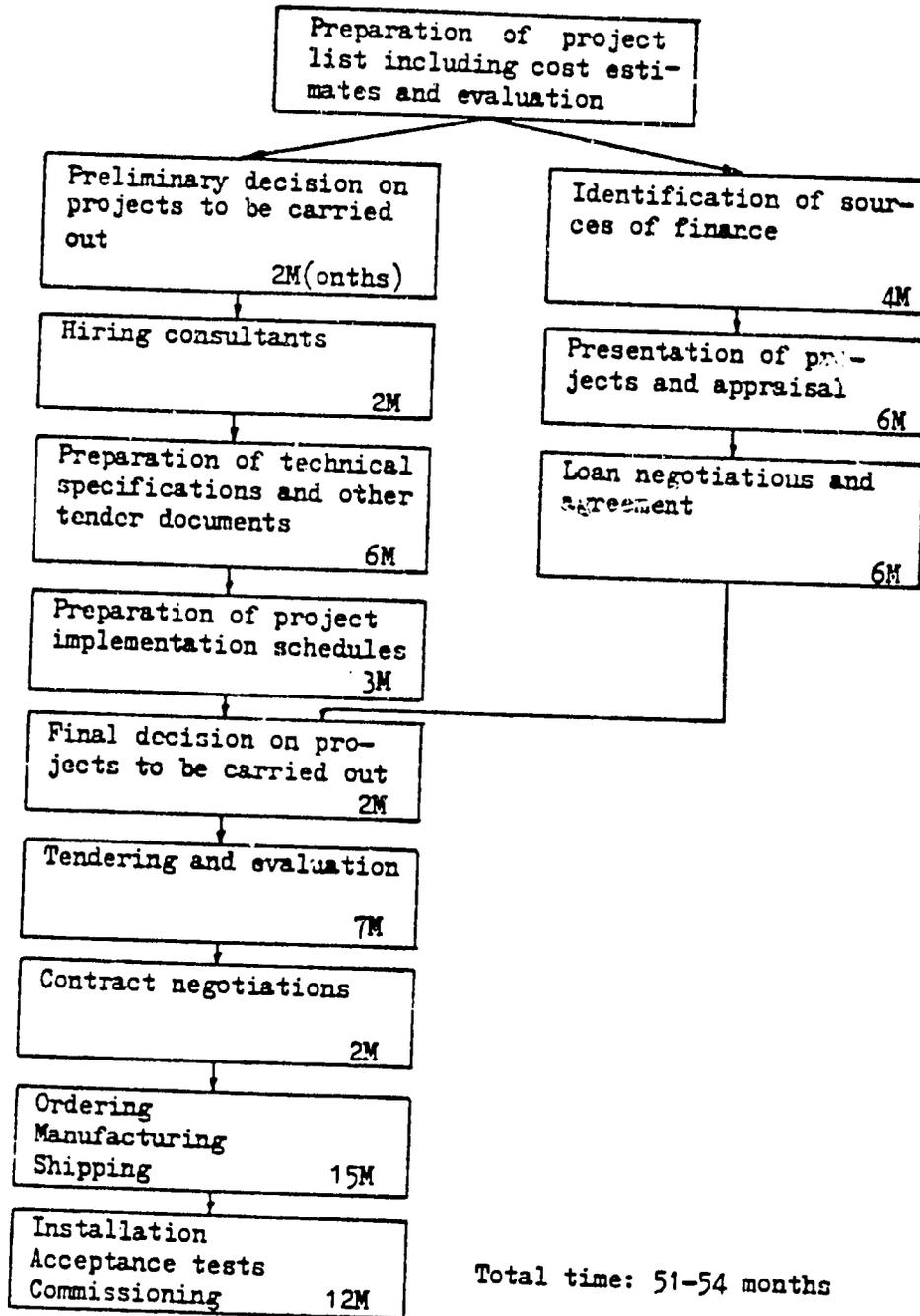
8.9 The Earth Station problem

By the time the terrestrial high capacity regional network has been completed, there will be a considerable "earth station overcapacity" in the region, if all ongoing and proposed projects are carried out. This will have a negative influence on the viability of the stations, particularly the last ones to be installed. Figure 8.3 shows existing earth stations, as well as ongoing projects and proposed stations.

Earth stations are very well suited for joint use as the initial investment cost is high and the incremental cost for additional circuits comparatively low. The ideal solution of the problem would be to have two standard A earth stations somewhere in the centre of the region, one facing the Indian Ocean satellite and the other one the Atlantic Ocean satellite. These two stations should be connected to the regional network over suitable International Telephone Switching Centres.

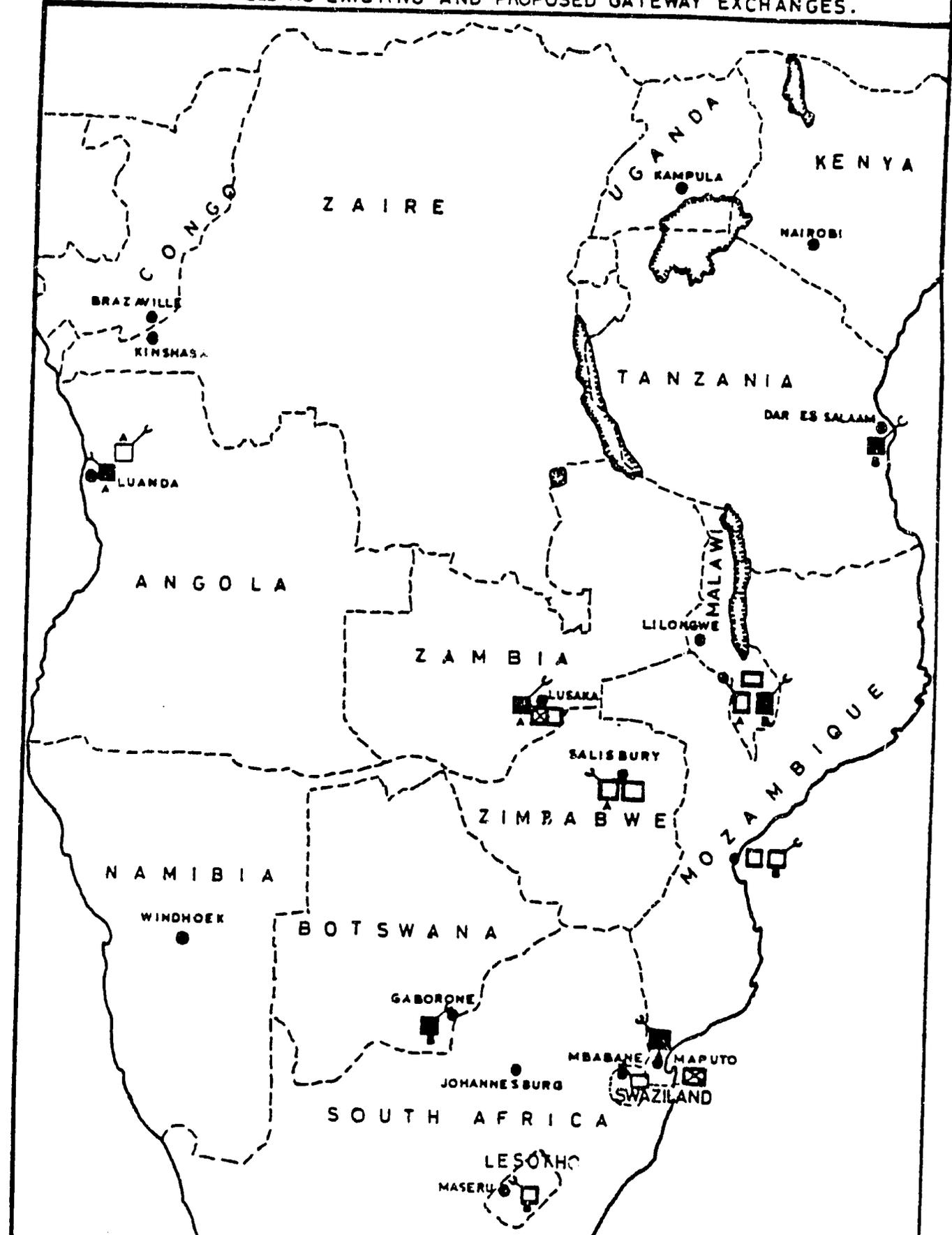
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Figure 8.2: Implementation schedule



Total time: 51-54 months

FIGURE B3 MAP SHOWING EXISTING AND PROPOSED EARTH STATIONS, AS I-53
 WELL AS EXISTING AND PROPOSED GATEWAY EXCHANGES.



- | | | | |
|--|--|--|---|
| | Earth Station, std A, facing Atlantic Ocean (A/O) satellite. | | Std B, I/O |
| | Std B facing Indian Ocean (I/O) satellite | | Existing ITSC (International Telephone Switching Centre) |
| | Proposed earth station, std B, A/O | | Proposed ITSC or extension of existing ITSC (or ongoing project). |

8.10 Summary of projects

Table 8.1 is a summary of all proposed telecommunication projects showing number of projects and costs by country. The total number of projects is 25 and the total estimated cost 119.55 million US dollars.

TABLE 8.1 SUMMARY OF TELECOMMUNICATION PROJECTS
Costs in million US dollars

COUNTRY		PRIORITY CLASS				TOTAL	
		1	2	3	4	Number	Cost
REGIONAL	Number				1	1	
	Costs				1.0		1.0
ANGOLA	Number		1			1	
	Costs		12.0				12.0
BOTSWANA	Number	1	1			2	
	Costs	0.2	0.9				1.1
LESOTHO	Number		1			1	
	Costs		?				?
MALAWI	Number		2			2	
	Costs		4.2				4.2
MOZAMBIQUE	Number	1	9			10	
	Costs	0.6	66.55				67.15
SWAZILAND	Number		1			1	
	Costs		3.0				3.0
TANZANIA	Number		2			2	
	Costs		2.0				2.0
ZAMBIA	Number	1	6			7	
	Costs	-	7.6				7.6
ZIMBABWE	Number	2	5			7	
	Costs	0.25	21.25				21.50
TOTAL	Number	3	21		1	25	
	Costs	1.05	117.50		1.0		119.55

Note: Joint projects have been listed for both countries involved. The sum of the numbers of projects for each country is therefore higher than the real number of projects. The costs of such projects have been split up on the countries.

TELECOMMUNICATIONS

LIST OF PROJECTS

Project NO.	Country	Title	Priority Class	Estimated Cost million US dollars
5.0.1	Many countries (Botswana)	African domestic satellite system (AFROSAT)	4	1.0
5.1.1	Angola	Earth station, standard A, facing Indian Ocean satellite	2	12.0
5.2.1	Botswana/ Zimbabwe	Microwave link Francis- town-Bulawayo	2	1.15
5.3.1	Lesotho/ Zimbabwe	Four satellite circuits Maseru-Salisbury	2	
5.5.1	Mozambique	Earth station, standard B, at Beira	2	3.0
5.5.2	Mozambique	International Telephone Switching Centre at Beira	2	2.5
5.5.3(1-7)	Mozambique	National microwave backbone network with connections to neigh- bouring countries. /Including 7 sub-pro- jects 5.5.3(1)-5.5.3 (7)/	2	(63.25) Sum of costs for sub-pro- jects
5.5.3(1)	Mozambique	Microwave link Beira- Tete	2	7.8
5.5.3(2)	Mozambique	Microwave link Beira- Nampula	2	16.5
5.5.3(3)	Mozambique	Microwave link Maputo- Beira	2	21.75
5.5.3(4)	Mozambique/ Malawi	Microwave link Tete- Blantyre	2	2.5
5.5.3(5)	Mozambique/ Tanzania	Microwave link Nampu- la-Mtwara	2	7.5
5.5.3(6)	Mozambique/ Zambia	Microwave link Tete- Katete	2	4.5
5.5.3(7)	Mozambique/ Zimbabwe	Microwave link M.Xi- luvo-Umtali	2	2.7

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Project No.	Country	Title	Priority Class	Estimated Cost million US dollars
5.5.4	Mozambique/ Zimbabwe	Upgrading of the open wire carrier system Beira-Umtali	1	0.6
5.6.1	Swaziland	Earth station, standard B	2	3.0
5.7.1	Tanzania/ Malawi	Microwave link Mbeya-Karonga-Mzuzu	2	4.5
5.8.1	Zambia	Extension of the International Telephone Switching Centre in Lusaka	2	3.3
5.8.2	Zambia	Expansion of the earth station at Mwembeshi (Lusaka)	2	2.1
5.8.3	Zambia/ Zaire	Microwave terminal at Chin-gola to complete the link Zambia-Zaire	2	0.15
5.8.4	Zambia/ Angola	Microwave link and tropo-scatter Kalabo-Angolan border	2	1.65
5.9.1	Zimbabwe	International Telephone Switching Centre (Gate-way exchange)	2	1.6
5.9.2	Zimbabwe	Earth station, standard A facing Atlantic Ocean satellite	2	12.8
5.9.3	Zimbabwe/ Zambia	Microwave link Bulawayo-Livingstone	2	5.7
5.9.4	Botswana/ Zimbabwe	Upgrading of open wire carrier system Bulawayo-Francistown	1	0.45
5.9.5	Zimbabwe/ Zambia	Restoration of open wire line and carrier equip-ment Salisbury-Lusaka	1	-
Total		25 projects		<hr/> 119.55

PART II
PROJECT DESCRIPTIONS

PROJECT NO. O.O.1

REGIONAL: TECHNICAL ASSISTANCE TO THE SOUTHERN AFRICA TRANSPORT AND COMMUNICATIONS COMMISSION

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Governments

Sub-sector: Multi-modal

Order of priority: Priority class 4: Studies

Nature of the project: Technical assistance comprising experts in various fields to staff the Technical Units of the Southern Africa Transport and Communications Commission

Cost of the project: US dollars 2,5 million

Financing required: Entire amount

Duration: 2 years

Desirable start: January 1981

Project authority: Southern Africa Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The Convention of the Establishment of the Southern Africa Transport and Communications Commission establishes the following three principal organs:

- a Committee of Ministers
- a Co-ordinating Committee
- Technical Units

The Technical Units shall be located in Maputo and shall be composed of technical experts operating on a permanent basis. The work will include e. g. collection and analysis of data on regional transport demand and supply, preparation of recommendations to the Co-ordinating Committee on policy and programmes and assistance to the member states.

It is the aim of this project to provide the necessary numbers of qualified experts for a proper and timely performance of all activities assigned to the Technical Units.

2.2 Nature of the project

The team of experts to be provided is tentatively expected to include on a permanent basis:

- one Chief Transport Planner (team leader)
- one General Economist
- one Transport Economist

REGIONAL:
Project No. O.O.1

- one Railway Expert
- one Ports and Water Transport Expert
- one Highway Expert
- one Aviation Expert
- one Telecommunications Expert

Additional experts may be required on an ad hoc basis. For the purpose of budgeting it is assumed that two such experts will be needed on the average.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

This project will benefit the Region in terms of better project preparation and co-ordination and thus more efficient resource utilization. Based on the sectoral descriptions presented in Part I of this report and the projects proposed in Part II, it is obvious that there are considerable savings to be gained from increased collaboration between the member states in the fields of transport and communications.

3.2 Cost

The annual cost of the proposed team, based on a contract with a consultant firm which would be responsible for currently providing the necessary experts, is estimated at US dollars 2,5 million for 2 years. This includes fees, travel to/from Maputo and living allowances but not housing costs, local and regional travel and office expenses.

PROJECT No. 1.1.1

ANGOLA: STUDIES OF THE TOURBOU - NOGUI ROAD AND OF THE SOYO - N'ZETO ROAD

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Roads

Order of priority: Priority class 4: Studies

Nature of the project: To study the feasibility of the Tourbou - Nogui road (180 km) and of the Soyo - N'Zeto road (133 km). Both the roads are located in the northern Angola near the Congo and Zaire.

Cost of the project: About US dollars 150,000 for each of the feasibility studies

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 6 months

Desirable start: 1981

Project authority: Ministry of Works

2. COMMENTS BY THE CONSULTANTS

The two roads have been included as construction projects in the report "United Nations Transport and Communications Decade for Africa 1978-1988", project no. ROP-05. In accordance with the request by the Angolan authorities, feasibility studies for the above projects are included here, although they derive their regional importance primarily from non-member states.

PROJECT NO. 1.1.2

ANGOLA: STUDIES OF FIVE ROADS

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Roads

Order of priority: Priority class 4: Studies

Nature of the project: To study the feasibility of the following five roads:

- Ombaca - Lucira (Namibian border), 402 km
- Nova Chaves - Luan (Zaire border), 120 km
- Quimbele - Saca (Zaire border), 100 km
- Negage - Bansa Sosso (zaire border), 200 km
- Cuito Canavale - Luiana (near the Zambian border), 650 km

Cost of the project: US dollars 1.5 million

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 12 months

Desirable start: 1981

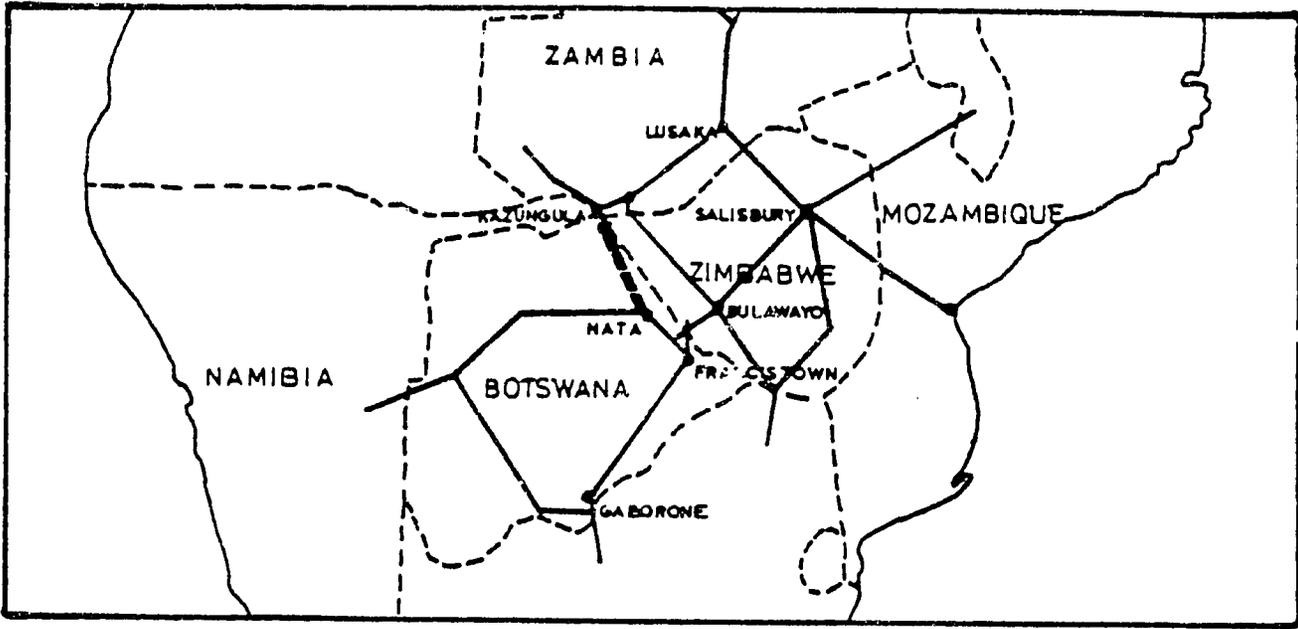
Project authority: Ministry of Works

2. COMMENTS BY THE CONSULTANTS

This project has been included as a construction project in the report "United Nations Transport and Communications Decade for Africa, 1978-1988", project no. ROP-79. In accordance with the request by the Angolan authorities, feasibility studies for the five road projects are included here, although they derive their regional importance primarily from non-member states.

PROJECT NO. 1.2.1

BOTSWANA: IMPROVEMENT OF THE BOTSWANA - ZAMBIA ROAD, SECTION NATA - KAZUNGULA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Botswana

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Ugrading

Nature of the project: Upgrading to two-lane bitumen standard, partly realignment of in Phase I 180 km from Nata, in Phase II 120 km to Kazungula.

Cost of the project: Total US dollars 25.5 million

Financing required: Financed by EDF and the Botswana Government about US dollars 13 million. Further financing required about US dollars 12.5 million

Duration: 20 + 13 months

Desirable start: Phase I: January 1981
Phase II: January 1982

Project authority: Ministry of Works and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the road is to serve four main categories of traffic:

1. Tourist traffic, especially attracted to the Chobe National Park
2. Cargo and passenger transports between Botswana and Zambia and other countries to the north
3. Traffic generated by existing and potential future development along the road
4. Transit traffic through Botswana to Zambia and other countries to the north.

2.2 Nature of the project

The existing road is of earth and gravel standard. The improvement has been designed with a 6.0 m wide bituminized surface and 0.7 m wide shoulders on each side.

The terrain offers no problems for the alignment. There is a lack of good road construction material along the road.

2.3 Current status of the project

The contract on Phase I, which has been financed by EDF, will be awarded in November 1980, the works to start in January 1981. The Phase II is planned to start in January 1982. All detailed design is finished.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

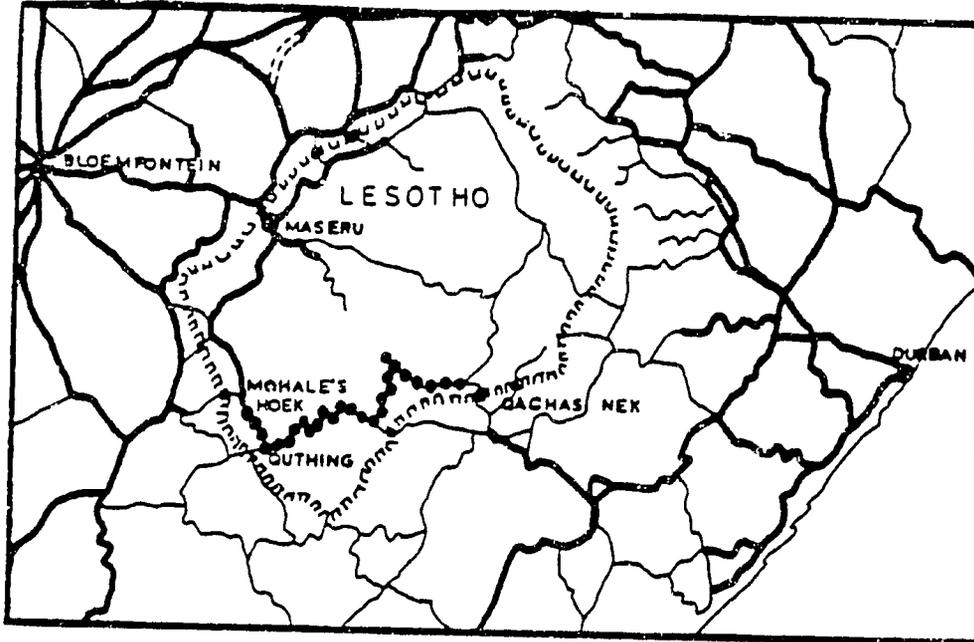
The consultants TAMS, Tippets-Abbett-McCarthy-Stratton, Nairobi, Kenya, have carried out a feasibility study, dated 1977. The study showed that a bituminized road should be feasible with an estimated Internal Rate of Return 10.6 - 14.7%. In the Traffic Forecast the 1999 traffic was estimated at an average daily traffic of 293 vehicles.

3.2 Cost

The contract for Phase I will cost about US dollars 14.2 million. The Phase II is estimated to cost about US dollars 11.3 million. Of the total costs about US dollars 13 million are covered. Rest to be financed about US dollars 12.5 million. (Available information on these figures is a little uncertain.)

PROJECT NO. 1.3.1

LESOTHO: UPGRADING OF THE ROAD MOHALE'S HOEK - QUTHING - QUACHAS NEK



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Lesotho
- Sub-sector: Roads
- Order of priority: Priority class 1: Rehabilitation/Upgrading
- Nature of the project: To upgrade to two-lane paved standard the road Mohale's Hoek - Quthing - Quachas Nek, 205 km, as part of the Lesotho Southern Perimeter Road.
- Cost of the project: US dollars 48.5 million (1980/81 value)
- Foreign currency part: Approx. 50%
- Financing required: EDF has granted about US dollars 14.8 million. The shortfall to be financed is US dollars 33.7 million.
- Duration: 5 years
- Desirable start: 1980/81
- Project authority: Ministry of Transport, Telecommunications and Postal Services

2. DESCRIPTION OF THE PROJECT

2.1 Aims and objectives

The overall aim is to decrease Lesotho's dependence on the South African transport network. The road will be a means to accelerate the development of southern and south-eastern Lesotho and to integrate these regions more fully into the national economy of Lesotho.

2.2 Nature of the project

The Mochale's Hoek - Quthing - Qachas Nek road is part of the Lesotho Southern Perimeter Road. The existing road is an earth and gravel road which needs realignment and upgrading. The standard is planned to be a two-lane bituminized road.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The traffic along the road section varies between 328 and 136 vehicles per day according to the Traffic Survey 1979. A forecast for 1985 has given figures varying between 1,200 and 400 vehicles per day.

The total road length will be reduced by about 30 km due to realignment. No quantification of the benefits is available.

3.2 Costs

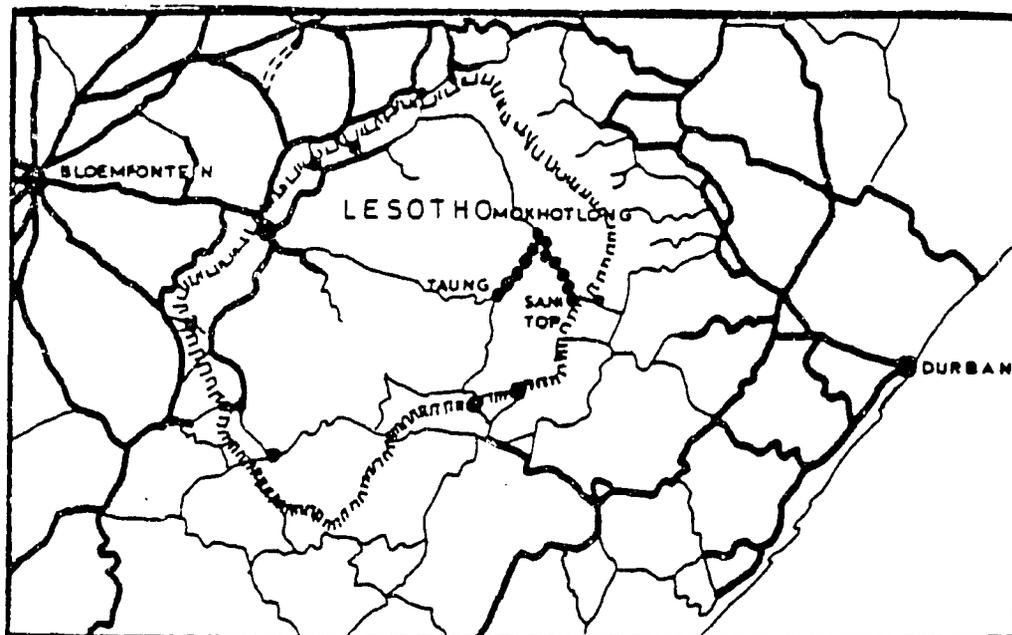
The costs of the project have been estimated to US dollars 48.5 million. EDF has granted about 14.8 million of this.

3.3 Comments by the Consultants

The project is considered to be important for the internal transports within Lesotho and is likely to decrease the dependence on the South African transport system.

PROJECT NO. 1.3.2

LESOTHO: UPGRADING AND RECONSTRUCTION OF THE ROAD TAUNG - MOKHOTLONG - SANI TOP



1. IDENTIFICATION AND SUMMARY

Origin of the project:	Submitted by the Government of Lesotho
Sub-sector:	Roads
Order of priority:	Priority class 1: Rehabilitation/Upgrading
Nature of the project:	To reconstruct the existing track to classified road standard, 121 km.
Cost of the project:	US dollars 39.2 million
Foreign currency part:	Approx. 40%
Financing required:	Entire amount
Duration:	6 years
Desirable start:	1981
Project authority:	Ministry of Transport, Telecommunications and Postal Services

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to connect the eastern part of the country with the district headquarters at Thaba - Tseka and with the road to Maseru.

The project is part of a scheme to reduce the dependence on the South African transport system.

2.2 Nature of the project

The existing road is a simple track. It is planned to be constructed to partly gravel, partly bitumen standard with a 3,5 m wide carriageway on a 6 m wide formation.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The traffic volumes have been forecast for 1985. The average daily traffic should be 160 vehicles between Taung and Mokhotlong and 75 between Mokhotlong and Sani Top. The benefits have not been estimated in economic values.

3.2 Costs

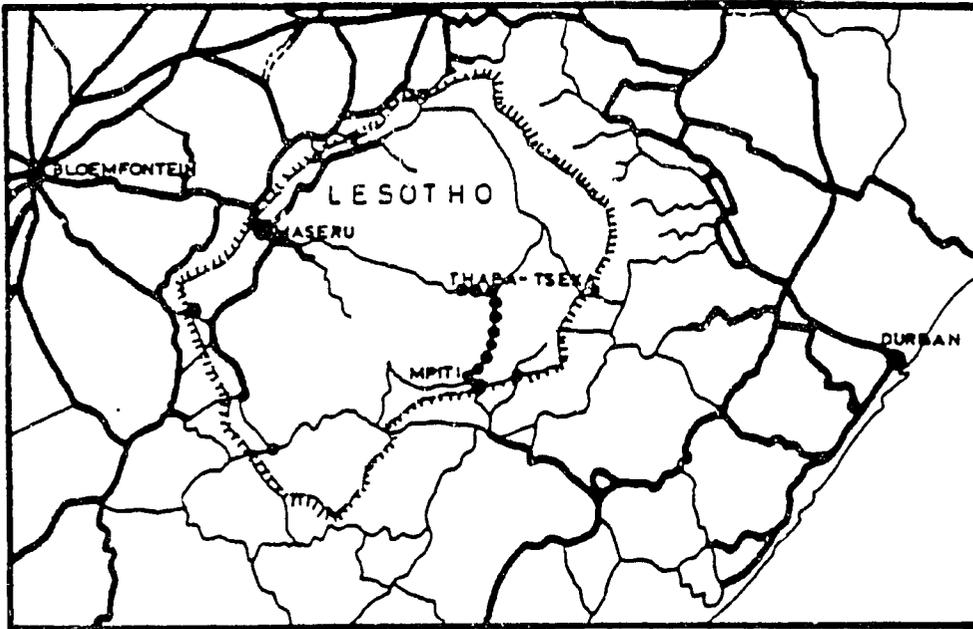
The costs have been estimated to about US dollars 39.2 million in 1979 value.

3.3 Comments by the Consultants

For the independence of a country, situated as an enclave, it is essential that the internal road connections are good. The road link may also be of importance for the connection to Durban, which is the nearest port of Lesotho.

PROJECT NO. 1.3.3

LESOTHO: UPGRADING OF THE ROAD THABA-TSEKA - TAUNG - MPITI



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To upgrade to all-weather standard the road Thaba-Tseka - Taung - Mpiti, 110 km.

Cost of the project: US dollars 29.7 million

Foreign currency part: Approx. 40%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1982

Project authority: Ministry of Transport, Telecommunications and Postal Services

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The object is part of a scheme to reduce the dependence on the South African transport system. This road section is part of a north-south road connection in the eastern Lesotho.

2.2 Nature of the project

The existing road is a simple track in bad condition. A low-level bridge is not passable during the rainy season. Stream crossings and drainage have to be reconstructed. The future standard should be decided based on feasibility and engineering studies to be carried out.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No estimates have been made of the benefits of the project. According to a traffic forecast the 1985 average daily traffic should be 150-300 vehicles.

3.2 Costs

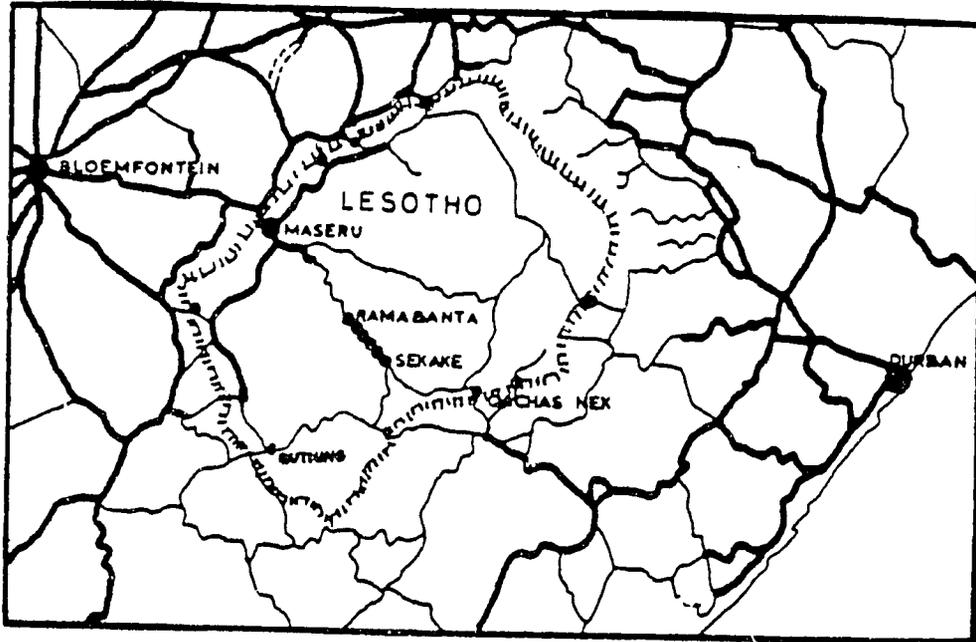
The costs have been roughly estimated by the Consultants to about US dollars 29.7 million. A more reliable estimate should be based on further information.

3.3 Comments by the Consultants

The road link is an important part of the road network of Lesotho. It will form a link in the perimeter road running inside the border.

PROJECT NO. 1.3.4

LESOTHO: CONSTRUCTION OF A NEW ROAD RAMABANTA - SEMONKONG - SEKAKE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Roads

Order of priority: Priority class 3: New projects

Nature of the project: Upgrading to road standard of the existing track Ramabanta - Semonkong, about 40 km, and construction of a new road Semonkong - Sekake, about 40 km.

Cost of the project: About US dollars 13.5 million

Foreign currency part: About 40%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1983

Project authority: Ministry of Transport, Telecommunications and Postal Services

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The road is connecting the south-eastern part of the Lesotho Perimeter Road directly to Maseru, thus integrating this part of the country with the capital. The connection will reduce the dependence on the South African transport system.

2.2 Nature of the project

The existing track Ramabanta - Semonkong is passable by four-wheel drive vehicles only in good weather. Between Semonkong and Sekake there is no road at all. The planned road should be built to standard based on feasibility and engineering studies.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefit

No benefit analysis has been carried out. The road will shorten the distance between Sekake, on the southern perimeter road, and Maseru by about 50% or 140 km compared to the route via Quthing - Mafeteng.

The traffic forecast has given traffic figures between 75 and 280 vehicles per day in 1985.

Besides, the road will provide access to a hitherto disadvantaged area of the hinterland.

3.2 Costs

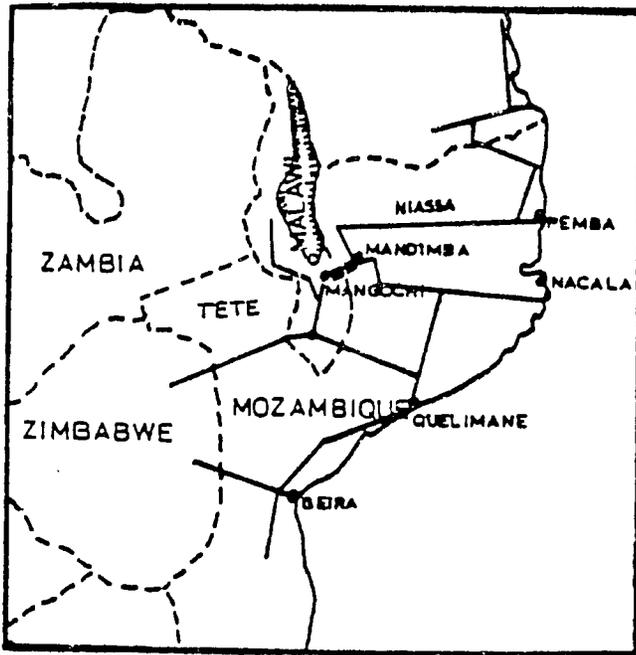
The costs have been roughly estimated by the Consultants to about US dollars 13.5 million. Further information is needed for a more reliable cost estimate.

3.3 Comments by the Consultants

The traffic forecast and the considerable distance savings indicate that the project should have a good viability and be important for the independence of Lesotho and for the integration of the different parts of Lesotho.

PROJECT NO. 1.4.1

MALAWI: MANGOCHI - CHIPONDE - MOZAMBIQUE BORDER UPGRADING



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Malawi

Sub-sector: Roads

Order of priority: Priority class 1, Rehabilitation/Upgrading

Nature of the project: Upgrading to bituminized standard and partly realignment

Cost of the project: US dollars 22 million

Financing required: 90%

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Works and Supply

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The objective of this project is to open up a link from the central part of Malawi to Mozambique and the nearest ports, Pemba and Nacala.

Agricultural products and ongoing agricultural development schemes in the area are expected to form the basis for exports from Malawi. The road will be of importance in accelerating this development.

The road link is also expected to serve as a through-pass between various provinces of Mozambique, i. e. Niassa east of Malawi and Tete west of Malawi.

2.2 Nature and constituent parts of the project

The existing road has been realigned and improved on one section near Mangochi and one section above the escarpment to Namwera. The section up the escarpment has a very low standard with narrow hairpin bends, damaged surface and dangerous bridges. The section between Namwera and Chiponde is an earthroad in bad condition. The pass across the border is a track usable only by four-wheel drive vehicles.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The average daily traffic in 1977 was 119 vehicles at a point below the escarpment. This might in 1980 come to about 150 vehicles per day. According to records kept by the customs the border was in 1979 and 1980 passed by 3-13 vehicles per month. However, the road connection to the Mozambican highway network and the ports may be of significant importance to Malawi.

There are eastwards road connections from Malawi via Tanzania and in the southern tip of Malawi, 650 kms north and 200 kms south of the Chiponde border post respectively.

The creation of a classified road may therefore generate substantial traffic volumes.

3.2 Cost

The project cost in 1981 value is estimated at US dollars 22 million. Cost of feasibility study, including pre-study of the alignment up the escarpment, US dollars 0.5 million.

3.3 Comments by the Consultants

The upgrading and paving of the road may be economically justified for the road section Mangochi - Namwera. However, the section up the escarpment will be very expensive, and the alignment has to be thoroughly studied.

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MALAWI:
ProjectNo. 1.4.1

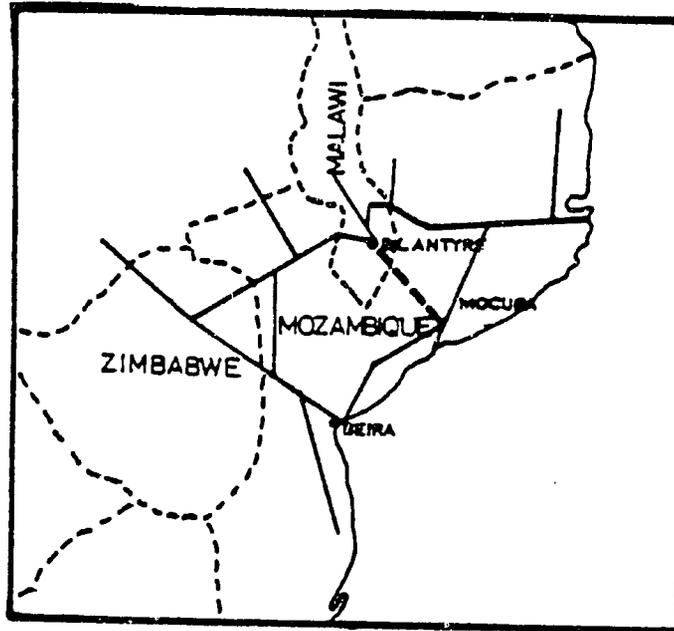
The upgrading of the road section between Namwera and the border is not likely to be feasible from an economic point of view, anyway not upgrading to more than gravel standard.

The overall feasibility of the project cannot be estimated without further study, which should give information on the regional importance of the road and form the basis for determining design standard, cost and financing.



PROJECT NO. 1.4.2

MALAWI: BLANTYRE - MULANJE - MOZAMBIQUE: MILANJE - MOCUBA
REHABILITATION AND UPGRADING



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Governments of Malawi and Mozambique

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and upgrade the existing road connection to bituminized standard.

Cost of the project: Malawi: US dollars 33 million (1980 value)
Mozambique: US dollars 40 million (1980 value)

Financing required: Malawi: 90%
Mozambique: 60%

Duration: About 4 years

Desirable start: 1981

Project authority: Malawi: Ministry of Works and Supply
Mozambique: Ministry of Public Works and Housing

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

To provide an all-weather road connection between Malawi and Mozambique constructed to class 1 bitumen standard. The road link will serve as a road transport facility for the trade between the two countries and serve as a link between the landlocked Malawi and the ports of Mozambique, especially Beira. The road passes in Malawi through rich agricultural areas which are under development for local consumption and export. The road is also of touristic interest. The road will be of domestic importance to both countries as well as of regional importance.

2.2 Nature of the project

The existing road in Malawi is a narrow bitumen main road which is not built for the existing traffic. The load bearing capacity is insufficient, the drainage cannot cope with the heavy rainfalls and the alignment is poor. Thus the maintenance costs are high.

In Mozambique the existing road is a 6 m road of mainly earth standard. Existing standard is described as "fair". Without special regard to regional interests the road has been included in the current Road Construction Plan for upgrading to gravel standard between 1979 and 1983.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The plan for improvement in Malawi is based on the high maintenance costs due to the fact that the road is not designed for the existing traffic and has served beyond its economic design life.

For the section in Mozambique, the National Transport Survey (VIAK 1978) suggests that upgrading to gravel standard should be feasible.

The traffic density on the Malawi section varies from more than 600 to less than 50 vehicles per day.

In Mozambique the traffic flow 1983 has been estimated not to exceed 100 vehicles per day. A traffic count in 1979 shows an average daily traffic of 30 trucks per day.

The border post was in 1979 passed by an average traffic of 3.6 vehicles per day.

3.2 Costs

The costs in 1980 value have been estimated to US dollars 33 million for the Malawi section and US dollars 40 million for the Mozambique section.

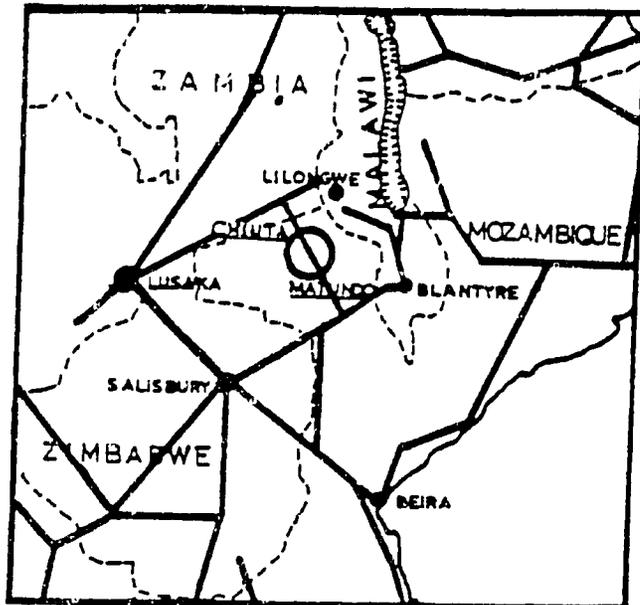
3.3 Comments by the Consultants

The road link Blantyre - Mozambique - Mocuba is judged to be of regional importance. The existing traffic flow crossing the border is low. It is probable that the proposed improvement of the road may increase

the traffic crossing the border considerably. It is expected that for most of the road section in Malawi an upgrading to bituminized standard should be feasible. This is probably not the case as regards the Mozambique section. However, in order to provide a route of uniform standard bitumenization of this section may also be considered.

PROJECT NO. 1.5.1

MOZAMBIQUE: REHABILITATION OF THE TETE - CASSACATIZA ROAD, SECTION MATUNDO - CHIUTA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate 86 km of the road Tete - Cassacatiza, section Matundo - Chiuta

Cost of the project: US dollars 5 million

Financing required: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The main direct road connection between Mozambique and Zambia, Tete-Cassacatiza-Katete on the Lusaka-Chipata road in Zambia, has during the last years been completed by the construction of the road section Bene-Cassacatiza and further on to Katete in Zambia.

One main objective of the route is to provide transport facilities between Zambia and the railway Moatize-Beira.

2.2 Nature of the project

The road section Matunda-Chiuta is asphalt-paved. It has a cross-section of 6.0 m wide carriageway and 1.5 m wide shoulders. The road has been damaged by heavy vehicle traffic and needs reinforcement.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No quantification of benefits has been made.

The traffic volumes can be estimated to be in the magnitude of 100-200 vehicles per day.

3.2 Costs

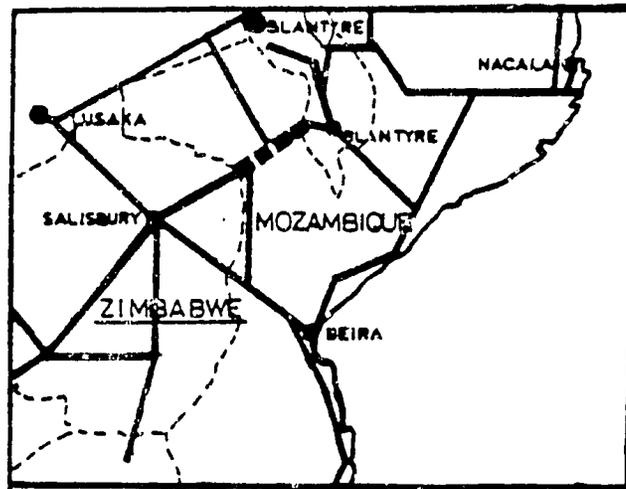
According to a preliminary estimate the costs will be about US dollars 5 million in 1980 value.

3.3 Comments by the Consultants

The project is vital for the Mozambique-Zambia transports. It can be expected that the heavy transports will increase after the completion of the Bene-Cassacatiza-Katete Road.

PROJECT NO. 1.5.2

MOZAMBIQUE: REHABILITATION OF THE ZIMBABWE - TETE - MALAWI ROAD



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Reinforcement and rehabilitation of the road
Zimbabwe border at Cuchamano - Tete - Moatize
- Zobué at the Malawi border, 273 km

Cost of the project: US dollars 12 million

Foreign currency part: Approx. 40%

Financing required: At least 40%

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to provide a road link of suitable standard for traffic Zimbabwe - Malawi, Mozambique - Zambia and Mozambique - Malawi. It is also part of the main road link to the Province of Tete.

2.2 Nature of the project

The road is asphalt-paved with a width of about 6 m. Sections of the road are broken down and the road needs reinforcement.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits have not been quantified in economic terms. The existing traffic is between 100 and 200 vehicles per day but considerably lower at the two borders. The number of trucks varies between 10 and 50 along the road section. Increased truck traffic between Zimbabwe and Malawi is expected along the road.

3.2 Costs

The costs have been preliminary estimated to US Dollars 12 million in 1980 value.

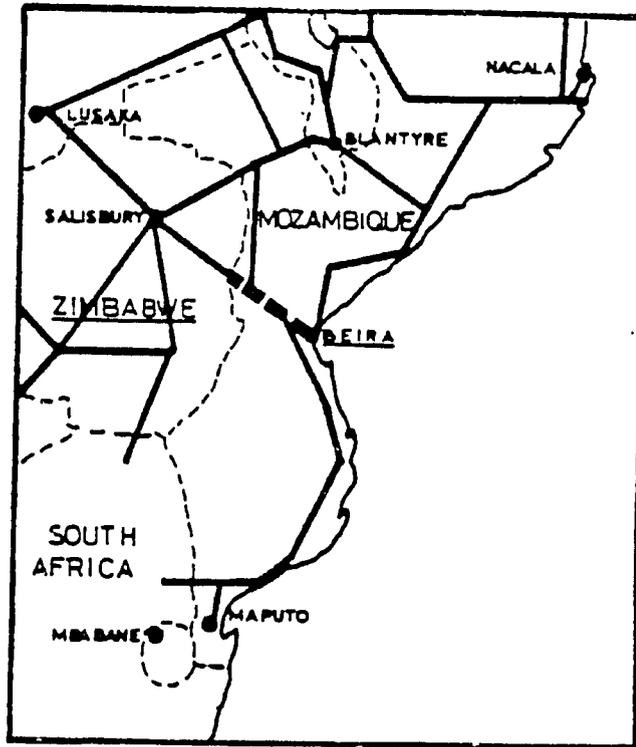
3.3 Comments by the Consultants

Looking at the map the regional importance of the road seems obvious.

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PROJECT NO. 1.5.3

MOZAMBIQUE: REHABILITATION OF THE ROAD ZIMBABWE BORDER AT MACHIPANDA -
CHIMOIO - BEIRA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Rehabilitation and reinforcement of the road in two phases.
Phase I: Zimbabwe border - Chimoio, 87 km
Phase II: Chimoio - Beira, 193 km

Cost of the project: Phase I: US dollars 5,3 million
Phase II: US dollars 12 million

Foreign currency part: Approx. 60%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

2.1 Aims and objectives

The road is the major arterial to the port of Beira and connects roads from south and north within Mozambique. It is carrying the road cargo transports from Zimbabwe to the port and also from Zambia and Malawi. The aim of the project is to provide a road of suitable standard for long-distance heavy traffic.

2.2 Nature of the project

The road is asphalt-paved with a width of about 6 m. It is partly in poor condition and needs reinforcement and rehabilitation.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No quantification in economic terms has been made. The road carries big traffic volumes, between Chimoio and Beira over 1,000 vehicles per day but considerably less between Chimoio and the Zimbabwe border. The number of trucks varies along the road section between 120 and 350. Especially the Zimbabwe traffic is expected to increase rapidly. The truck traffic from Zimbabwe is charged with 40 Zimbabwe dollars per vehicle.

3.2 Costs

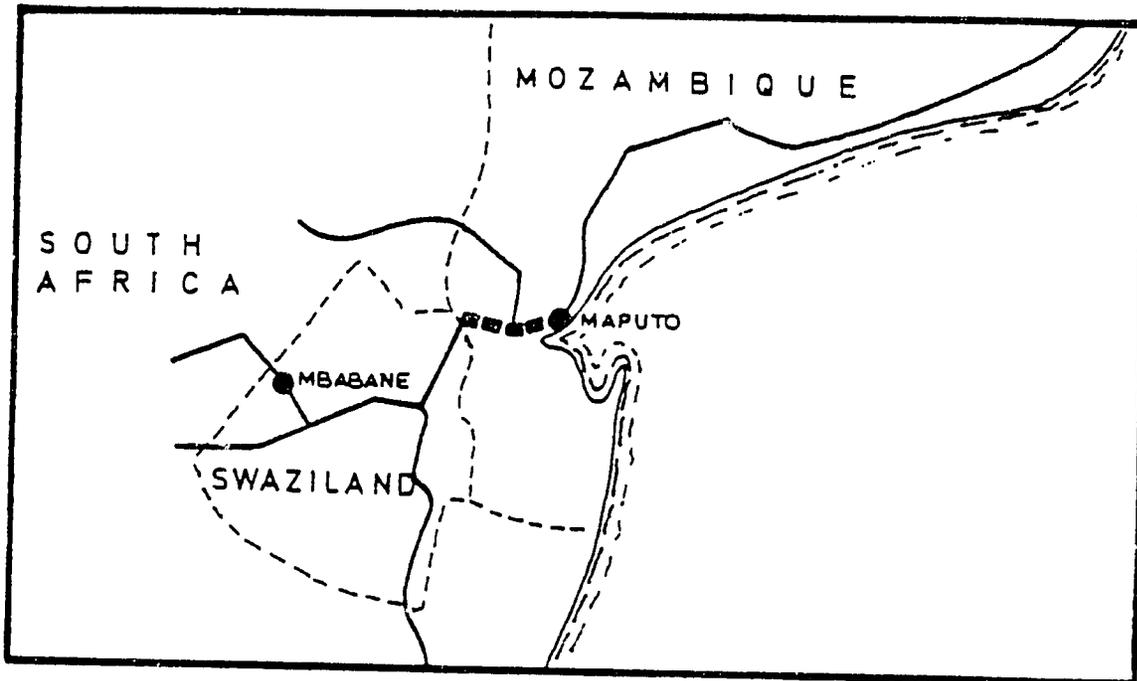
The costs have been preliminary estimated to:
in Phase I, section Zimbabwe - Chimoio: US dollars 5.3 million
in Phase II, section Chimoio - Beira: US dollars 12 million.

3.3 Comments by the Consultants

The need for a suitable standard of the road to Beira port is obvious. Possible improvement of the geometrical standard should be considered with respect to the big amount of heavy vehicles on the road, when the rehabilitation is designed in detail.

PROJECT NO. 1.5.4

MOZAMBIQUE: REHABILITATION OF THE ROAD CONNECTION TO SWAZILAND



1. IDENTIFICATION AND SUMMARY

Origin of the project:	Submitted by the Government of Mozambique
Sub-sector:	Roads
Order of priority:	Priority class 1: Rehabilitation/Upgrading
Nature of the project:	Rehabilitation and minor upgrading of the road Maputo - Boane - Namaacha - border to Swaziland, 75 km.
Cost of the project:	US dollars 7 million
Foreign currency part:	Approx. 60%
Financing required:	At least 60%
Duration:	One year
Desirable start:	1981
Project authority:	Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project aims at providing a road connection of a suitable standard between Swaziland and Maputo, primarily with its port facilities. The 33 km between Maputo and Boane is also part of the road connection between Maputo and South Africa.

2.2 Nature of the project

The existing road connection consists of an asphalt-paved road with, on about 62 km of the total 75 km, a heavily damaged surface, broken down along the edges and very bumpy. The width is less than 6 m along most of the section. Between Maputo and Matola, about 6 km of the road is widened to dual carriageway which carries a very dense and heavy traffic. The project includes rehabilitation, reinforcement and partly upgrading of the 62 km section of the road.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

As the existing road is in a very poor condition it can not be properly maintained without a thorough rehabilitation. The traffic volume varies between some hundred vehicles per day near Namaacha and several thousands near Maputo. The number of trucks is also high, 175 per day between Namaacha and Boane, 500 Boane - Matola and 1,500 Matola - Maputo. No quantification of benefits has been made.

3.2 Costs

The costs have been estimated to US dollars 4 million for the minimum urgent asphalt improvement and to US dollars 7 million if some desirable minor widening and realignment works are included.

3.3 Comments by the Consultants

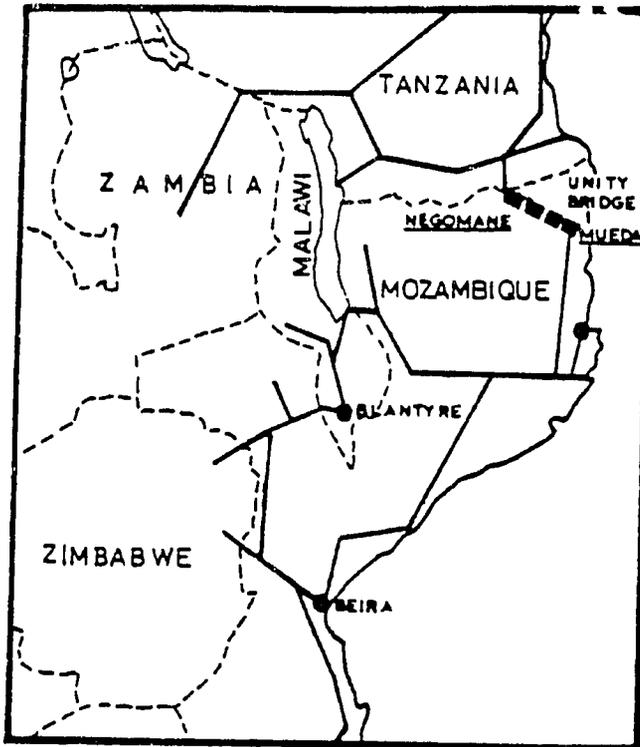
The project is urgent with respect to time savings, vehicle operating costs, maintenance costs and traffic safety. It is desirable to upgrade the road. The National Road Plan has proposed for primary roads a paved width of 7.5 m on a 12 m formation, which should be chosen as design standard.

As the road passes through rural areas with relatively high population density, the improvement of the road should consider the safety problems of pedestrians.

The mentioned improvement of the design standard might increase the costs above the mentioned estimate of US dollars 7 million. The feasibility of different levels of design standard should be studied.

PROJECT NO. 1.5.5

MOZAMBIQUE: ACCESS ROAD TO THE UNITY BRIDGE LINK TO TANZANIA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Roads

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To realign and reconstruct the road link Mueda - Negomane, 171 km, as access road to the planned Unity Bridge over Rio Rovuma to Tanzania.

Cost of the project: US dollars 30 million (1980 value)

Foreign currency part: Approx. 50%

Financing required: US dollars 30 million (1980 value)

Duration: 4 years

Desirable start: 1981

Project authority: Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The Unity Bridge will provide a fixed linkage between Tanzania and Mozambique. There are bilateral agreements on the construction of the bridge. The reconstruction of the road Mueda - Negomane is required in order to provide a suitable access road to the bridge.

2.2 Nature of the project

The existing road Mueda - Negomane is an earth road in a hilly terrain. It needs realignment and reconstruction to asphalt standard in order to be suitable for international traffic. The design work has been commenced.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The main benefit of the project is the role of it as part of the only fixed linkage between Mozambique and Tanzania.

No benefit analysis in economic terms is available. The existing traffic volumes are very low.

3.2 Costs

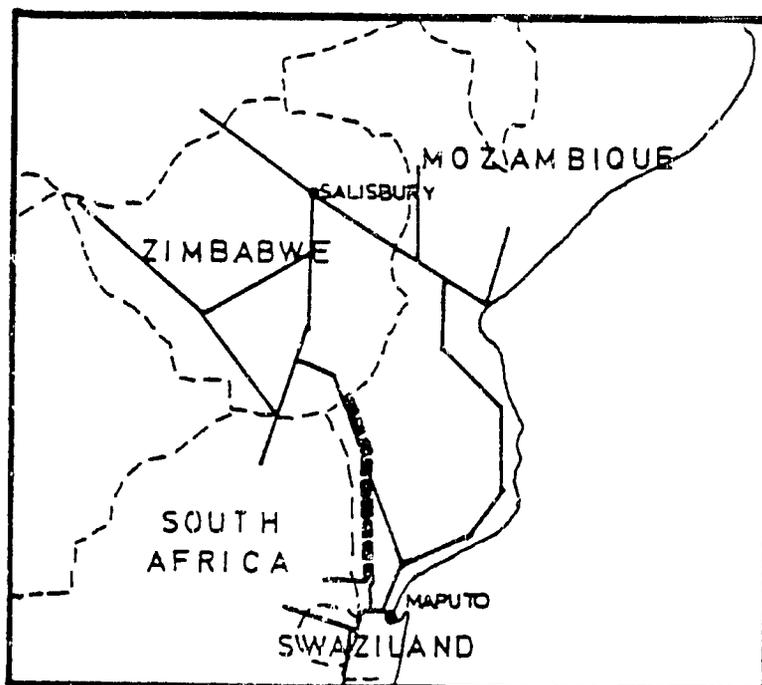
The costs have been roughly estimated to US dollars 30 million in 1980 value.

3.3 Comments by the Consultants

It is in the interest of Mozambique and Tanzania to link the two countries together with a bridge. The construction of an access road of suitable standard is a project of regional importance.

PROJECT NO. 1.5.6

MOZAMBIQUE: STUDY OF A NEW ROAD MOAMBA - MASSINGIR - MAPAI - CHICUALACUALA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Roads

Order of priority: Priority class 4: Study

Nature of the project: To study the feasibility of a road link connecting the southern part of Zimbabwe with the Maputo - Swaziland road.

Cost of the project: US dollars 150,000 for the study

Foreign currency part: 90%

Financing required: Entire amount

Duration: 4 months

Desirable start: 1981

Project authority: Ministry of Public Works and Housing

2. DESCRIPTION OF THE PROJECT

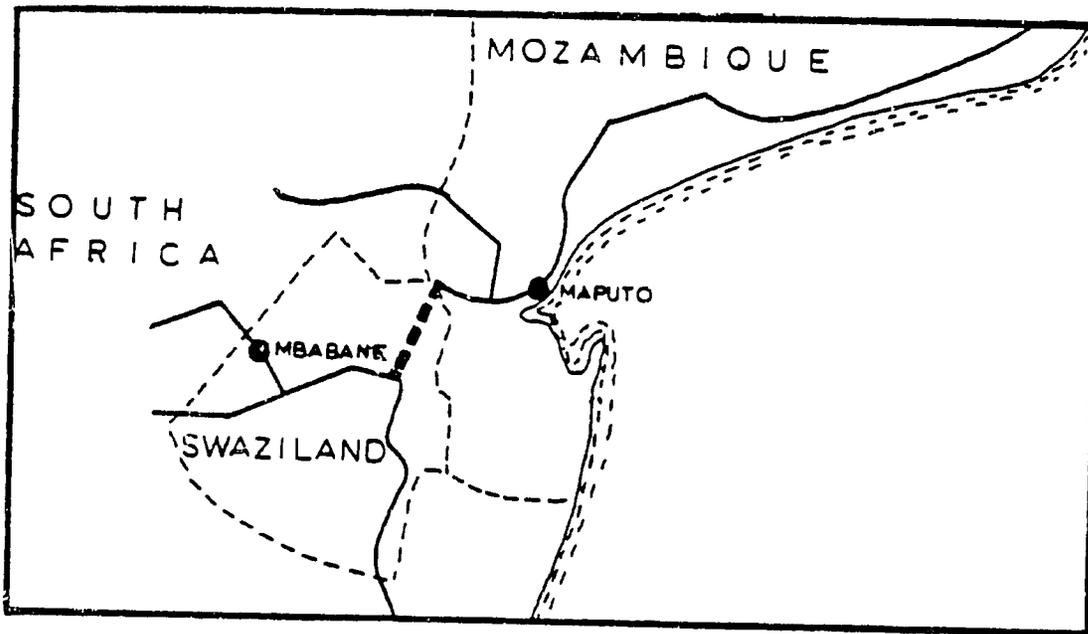
The project includes a feasibility study of a discussed new road which should serve the following purposes:

1. Provide a road link between the Maputo area and Zimbabwe
2. Provide a road link between Swaziland and Zimbabwe
3. Open up new areas for development
4. Link together a number of towns, villages and rural areas
5. Provide a by-pass west of the Maputo area.

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PROJECT NO. 1.G.1

SWAZILAND: REHABILITATION AND UPGRADING OF THE ROAD SITEKI - LOMASHA ON THE MOZAMBIQUE BORDER



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Swaziland

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To upgrade to two-lane bituminous standard the 52 km road section between the junction of MR7 at Siteki and Lomasha on the Mozambique border

Cost of the project: US dollars 16.5 million (1980 value)

Foreign currency part: Approx. 50%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Works, Power and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project is part of a systematic improvement scheme for the main road network in Swaziland. It will facilitate the agricultural development in the area and improve Swaziland's road connection with Mozambique.

2.2 Nature of the project

The existing road is of gravel standard. The design of the upgrading includes widening to 6.7 m asphalted carriageway on a 10.3 m formation. The road is running through the Hlane Game Reserve. It might be found in a current study of this Reserve that the road should be detoured around the game park. This should increase the costs with about 55%.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

A feasibility study carried out in 1976/77 confirms the need for the reconstruction and that it will be economically justified with a rate of return between 7.2 and 21.0% for various sections of the road.

3.2 Costs

The cost of the reconstruction works in 1980 value has been estimated at US dollars 16.5 million

Detouring of the road at the Hlane Game Reserve has been estimated to cost about US dollars 9.0 million more. The economic justification of such a detouring has to be considered with respect to the game park.

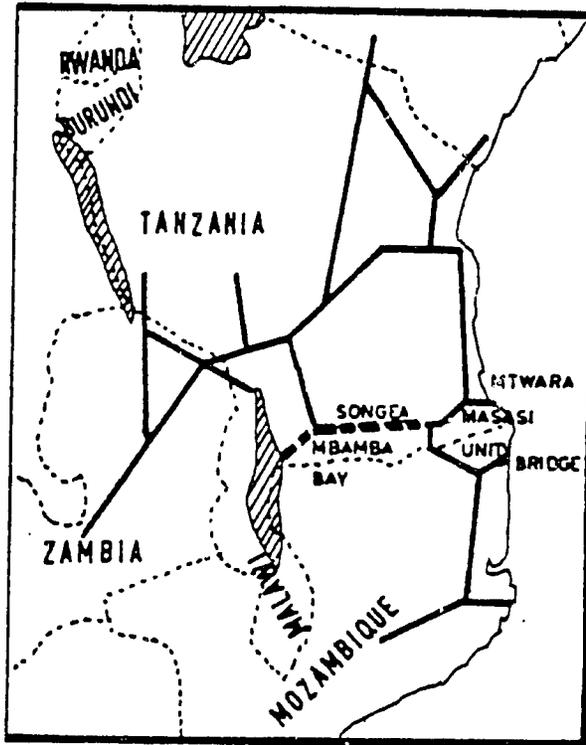
3.3 Comments by the Consultants

The landlocked Swaziland needs a good road link to the port of Maputo. The connecting road section within Mozambique has been proposed for rehabilitation in project 1.5.4.

102.

PROJECT 1.7.1

TANZANIA: REHABILITATION AND UPGRADING OF THE MtwARA - SONGEA - MBAMBA BAY ROAD



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and upgrade the Mtwara - Songea - Mbamba Bay road on the section Masasi - Songea - Mbamba Bay (605 km).

Cost of the project: US dollars 130 million
Feasibility study US dollars 1,0 million

Foreign currency part: Approx. 75%, study 90%

Financing required: Entire amount

Duration: 5 years

Desirable start: 1991

Project authority: Ministry of Works

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The main aim is to create the Southern Trunk Road carrying transports to the port of Mtwara. Via the road under construction Makambaku - Songea road transports from Zambia and Malawi will reach the trunk road. The section Mbamba Bay - Songea is intended to serve as feeder road to shipping services on Lake Malawi.

The main importance of the road will be to serve the rich agricultural zone in the south and south-west of Tanzania.

2.2 Nature of the project

The road section Mtwara - Masasi, 200 km, has been upgraded to bitumen standard in 1978. The existing road Masasi - Tunduru - Songea, 445 km, is partly earth, partly engineered gravel standard, 6.5 - 7 m wide, in a poor condition. The terrain is generally rolling to hilly. Reconstruction to bitumen standard will generally follow the existing road.

The existing road Songea - Mbamba Bay, 169 km, is gravelled on half of the length and the rest is earth. It is in a poor condition due to not engineered standard, e. g. lack of adequate drainage and unsafe wooden bridges across rivers. The terrain is rolling to hilly and include a mountainous stretch at the escarpment to the shore plain. It is planned to be upgraded to gravel in a first stage, and bitumen standard in a second stage. After realignment the road length will be reduced by 9 km to 160 km.

Design of both the road sections was completed in 1975.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

A study of the road section Songea - Masasi was carried out in 1971 by the consultants SWECO, Sweden. The study was not required to include economic feasibility calculations but an approximate estimate of rate of return gave a result about 13%.

The current traffic volumes are low, the average daily traffic does not exceed 100 vehicles per day of which 60-70% heavy vehicles.

3.2 Costs

The costs have been estimated to US dollars 86.8 million for the road section Masasi - Tunduru - Songea. The cost of upgrading the road Songea - Mbamba Bay to gravel standard is estimated to US dollars 25.2 million and for bitumen standard to US dollars 42.9 million. The cost estimates in 1979 value. The current price escalation is in the magnitude of 15-25% per year.

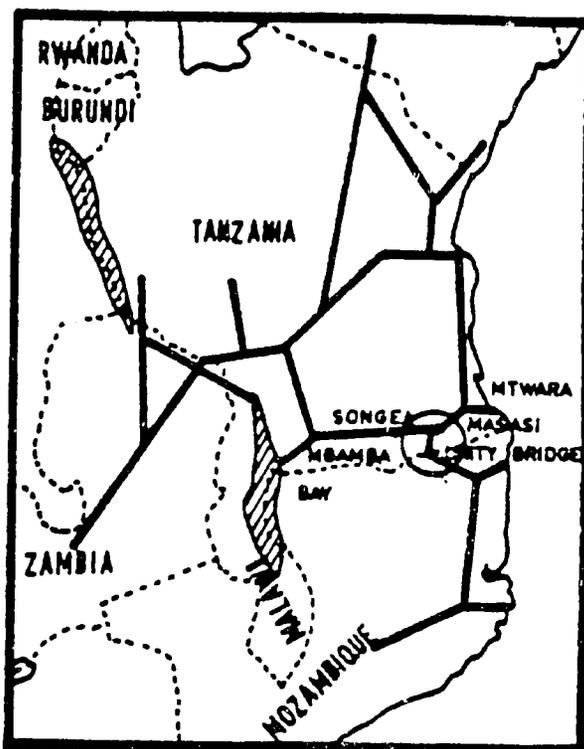
3.3 Comments by the Consultants

The study of 1971 of the Masasi - Songea section is out of date with respect to the later development. A new feasibility study should update the previous one and be extended over the section Songea - Mbamba Bay. The study should also include recommendations on the most feasible phasing or staging of the construction.

Though the project is considered to be of mainly national importance, it will have a certain regional impact.

PROJECT NO. 1.7.2

TANZANIA: ACCESS ROAD TO THE UNITY BRIDGE TO MOZAMBIQUE



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Tanzania
- Sub-sector: Roads
- Order of priority: Priority class 3: New projects
- Nature of the project: To construct a new road between the Mtwara - Masasi - Songea road and the planned Unity Bridge over the River Rovuma to Mozambique, about 55 km.
- Cost of the project: About US dollars 11.6 million (1979 value)
- Foreign currency part: About 75%
- Financing required: Entire amount
- Duration: 2 years
- Desirable start: 1981
- Project authority: Ministry of Works

1.0/3

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The Unity Bridge will provide a fixed linkage between Tanzania and Mozambique. There are bilateral agreements on the construction of the bridge. The project includes the access road to the bridge.

2.2 Nature of the project

Construction of a new road, preferably at such an early stage that it may serve as access road for the bridge construction works. The project includes 55 km new road. If the project will be commenced before the project 1.7.1, the Mtwara - Masasi - Songea road, it will be necessary to add 35 km of that project to this one, which in that case will cover 90 km from Masasi to Unity Bridge.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefit of the project is the role of it as part of the planned only fixed linkage between Mozambique and Tanzania. No benefit analysis is available.

3.2 Costs

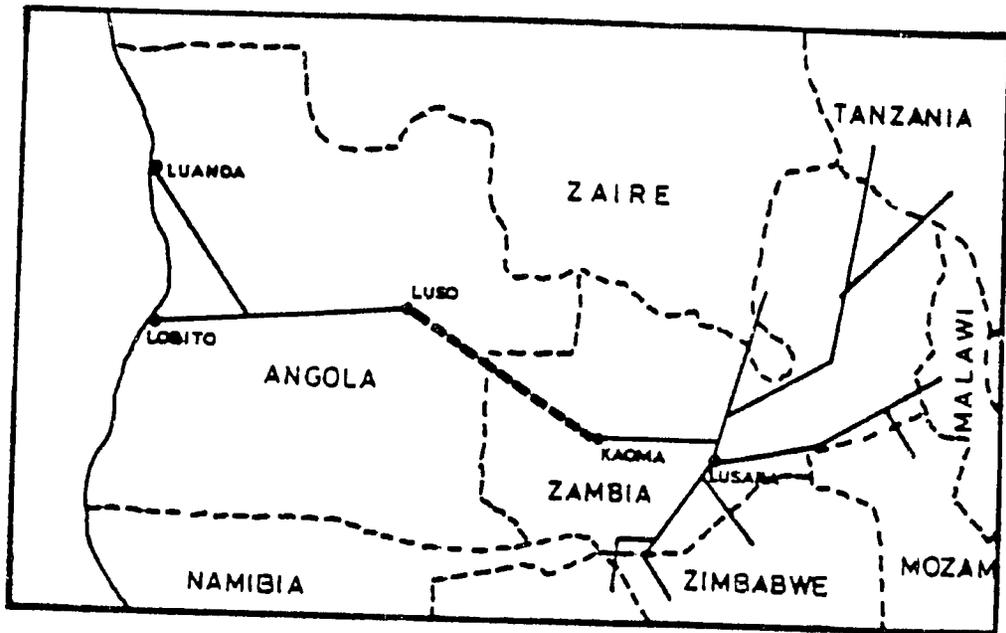
The costs have been estimated in 1979 value to US dollars 11.6 million. With addition of 35 km of the Masasi - Songea road, the total cost will be US dollars 19 million.

3.3 Comments by the Consultants

It is in the interest of Mozambique and Tanzania to link the two countries together with a bridge. The construction of an access road is a project of regional importance.

PROJECT NO. 1.8.1

ANGOLA/ZAMBIA: ANGOLA - ZAMBIA ROAD LINK (ABOUT 700KM)



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Roads

Order of priority: Priority class 3: New Transport Projects

Nature of the project: Construction of an all-weather heavy traffic road connecting Kaoma in Zambia with Luso in Angola

Cost of the project: Upgrading to paved standard about US dollars 100 million (1979 value)

Financing required: Entire amount

Duration: 4-5 years

Desirable start: A feasibility study financed by EDF was commenced by Hoff & Overgaard in 1979, preliminary findings submitted on the Zambian section 1980. Information on the Angolan section has up to now not been available to the consultant.

Project authority: Zambia: Ministry of Public Works
Angola: Ministry of Works

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and Objective

Bilaterally Angola and Zambia has agreed upon the need of effective traffic links between the two countries. For the landlocked Zambia a classified road connection to the Atlantic ports of Angola is of importance. The road also aims at opening up new development areas.

2.2 Nature and constituent parts of the project

The studied road corridor follows mainly existing unclassified gravel or earth roads, unusable in the rainy season. There is in Zambia one pontoon crossing the River Kabompo at Watopa. The soil material is mainly single-sized sand which demands special maintenance considerations. Informations on the Angola section are not available. The study has considered a two-lane bituminized road.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The preliminary findings of Hoff & Overgaard, based on information relating to Zambia only, show an expected traffic not exceeding 50 vehicles and less than 10 heavy vehicles per day within a foreseeable future.

For the land-locked Zambia the road may be of importance as stand-by capacity for road transports to the sea.

The road will form part of a continuous road connection between Lobito in Angola and Beira in Mozambique as a link in the trans-African highway network.

The road is expected to contribute to the political, strategic and economic integration of Zambia and Angola and of the region of southern Africa and will lessen the dominance of the region by South Africa.

3.2 Cost

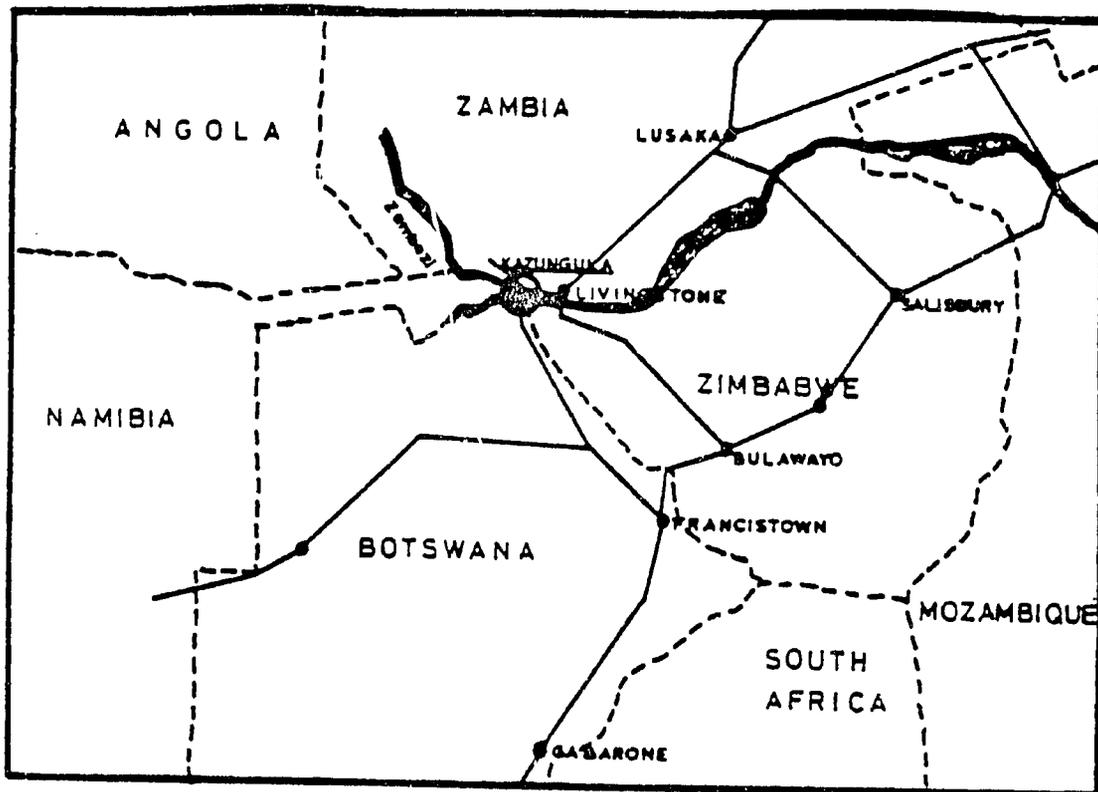
The construction cost is estimated to about US dollars 50 million for the Zambia section and a similar amount for the Angola section.

3.3 Comments by the Consultants

The project is not likely to be economically justified as has been found in the preliminary findings of the feasibility study by Hoff & Overgaard. The report does not deny the possibility that upgrading to gravel standard might be feasible. However the lack of suitable material in the vicinity will cause very high costs for the maintenance of a gravel road.

The financing of implementation of the project therefore has to be considered primarily on the basis of general political and regional goals.

BOTSWANA/ZAMBIA: KAZUNGULA BRIDGE - STUDY



Origin of the project: Submitted by the Government of Zambia

Sub-sector: Roads

Order of priority: Priority class 4: Study

Nature of the project: To study the feasibility of a new bridge across the Zambesi River at Kazungula connecting Botswana and Zambia and replacing the existing ferry service.

Cost of the project: US dollars 18,0 million (1979 value) of which study US dollars 0.9 million

Financing required: Entire amount

Duration: Study: one year

Desirable start: 1981

Project authority: Zambia: Ministry of Works and Supply
Botswana: Ministry of Works and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and Objective

Four countries are connected at one point in the middle of Zambesi River. This point offers the only direct connection between Botswana and Zambia and the connection is in daylight served by a ferry link with one or two pontoons in operation.

The aim is to replace the pontoon service by a bridge which is more reliable and can offer a 24-hour connection.

2.2 Nature of the project

Very little information is available on the condition of the site. The river is about 800 m wide. The shores are partly swampy. There is probably no river traffic which should require a high level bridge. Botswana has discussed the construction of a single-lane pontoon bridge.

Zambia has mentioned in the discussions with the Consultants that the bridge should be designed also for a railway link connecting Zambia with the studied Trans-Kalahari Railway and with Walvis Bay.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The existing ferry service is operated in daylight by two pontoons. Breakdowns and other disturbances have occurred and for shorter or longer periods reduced the capacity to only one pontoon. In 1979 a total of 3,368 vehicles or in average 9.2 vehicles per day have been transported by the pontoons. In 1980 until August the average has been 16,3 crossings/day. The maximum load capacity of the pontoons is 45 tons. A bridge should provide a more reliable 24-hour service with higher capacity in transport volume and load bearing capacity. The running costs of the pontoon operation will disappear.

3.2 Costs

In the Report "United Nations Transport and Communications Decade, 1978-1988", volume II, the Kazungula Bridge is presented as Project No. RCP-77. The cost has been estimated to US dollars 18 million (1979 value) of which 0.9 million for studies. The basis for these estimates are not known.

3.3 Comments by the Consultants

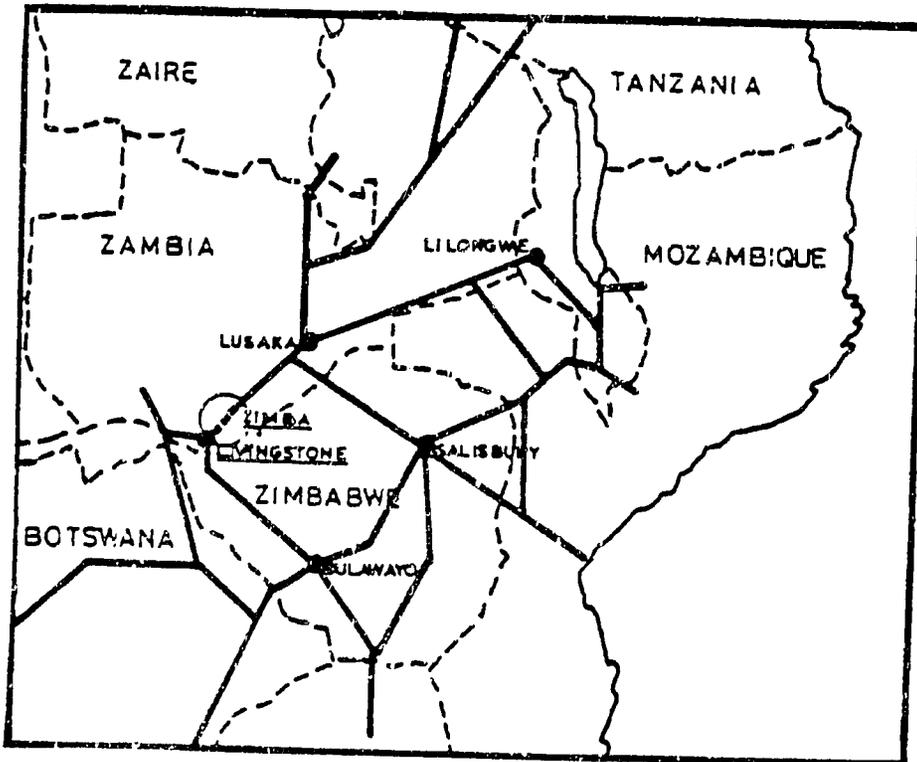
A feasibility study should include:

- a) General study of the transport and traffic demand including forecasts. The study should include Zambia and Botswana and the nearby parts of Zimbabwe and Namibia. It should also consider other existing road and railway connections upstream and downstream the Zambesi River.

- b) General study of the road network and the possibility of a railway link
- c) Preliminary field investigations and investigations of legal aspects, possible river traffic and so on
- d) Preliminary study of bridge design to various standards
- e) Cost-benefit analysis
- f) Recommendations.

PROJECT NO. 1.9.3

ZAMBIA: UPGRADING OF THE LUSAKA - LIVINGSTONE ROAD, SECTION ZIMBA - LIVINGSTONE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Widening the existing single-lane road to two lanes. Rehabilitation and bitumenization.

Cost of the project: US dollars 13,0 million (1980 value)

Foreign currency part: Approx. 60%

Financing required: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Works and Supply

2. DESCRIPTION OF THE PROJECT

2.1 Aims and objectives

Zimba - Livingstone is part of the road Lusaka - Livingstone with further connections to the west in Zimbabwe and to Botswana. It is carrying a considerable amount of international heavy vehicle traffic. The aim is to provide a road with a standard suitable for the traffic demand.

2.2 Nature of the project

The existing road has on this section a 3.5 m wide tar surfacing with 2.5 m wide shoulders. The road section is in a poor condition and need strengthening. It should be widened to 6.1 m bitumen surface with 2.0 m shoulders.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The road section had in 1979 an average daily traffic of 263 vehicles of which 60% heavy vehicles. This traffic will benefit from the road improvement in time savings and reduced vehicle operating costs. The road maintenance costs will also be reduced. No quantification of benefits has been carried out.

3.2 Costs

The costs for the improvements have been estimated to US dollars 13.0 million in 1980 value. As the improvements needed have not been studied in detail the cost estimate is rough.

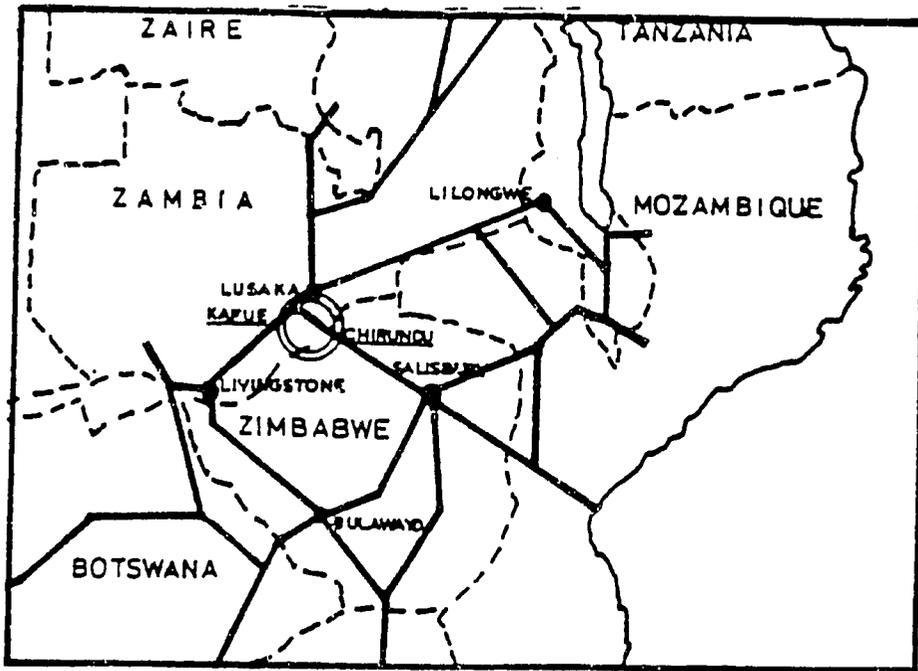
3.3 Comments by the Consultants

The project is likely to give positive net value. Of the traffic on the road section a probable amount of 15-20% is traffic crossing the borders to Botswana and Zimbabwe, thus the regional importance is significant.

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PROJECT NO. 1.9.4

ZAMBIA: REHABILITATION OF THE ROAD KAFUE - CHIRUNDU



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-section: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Of the Kafue - Chirundu road, totally 92 km, about 40 km in portions need strengthening and partly reconstruction.

Cost of the project: US dollars 8,3 million (1980 value)

Foreign currency part: Approx. 60%

Financing required: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Works and Supply

2. DESCRIPTION OF THE PROJECT

2.1 Aims and objectives

The Kafue - Chirundu road is the main road connection between central Zambia and central Zimbabwe. The aims of the project is to rehabilitate the road to a standard responding to the increasing traffic demand, especially the considerable heavy vehicle traffic. Zimbabwe has forwarded a similar project, No. 1.9.1, including 40 km of the same road on the Zimbabwe side of the border.

2.2 Nature of the project

Portions of the road are in a bad condition with failures in the pavement and settlements due to bad underground. The road needs strengthening and partly reconstruction.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The border post at Chirundu was during the period April - August 1980 passed by an average daily traffic of 95 vehicles of which 60 heavy vehicles. No figure of the total traffic on the road is available. It is not possible to calculate the benefits on available information.

3.2 Costs

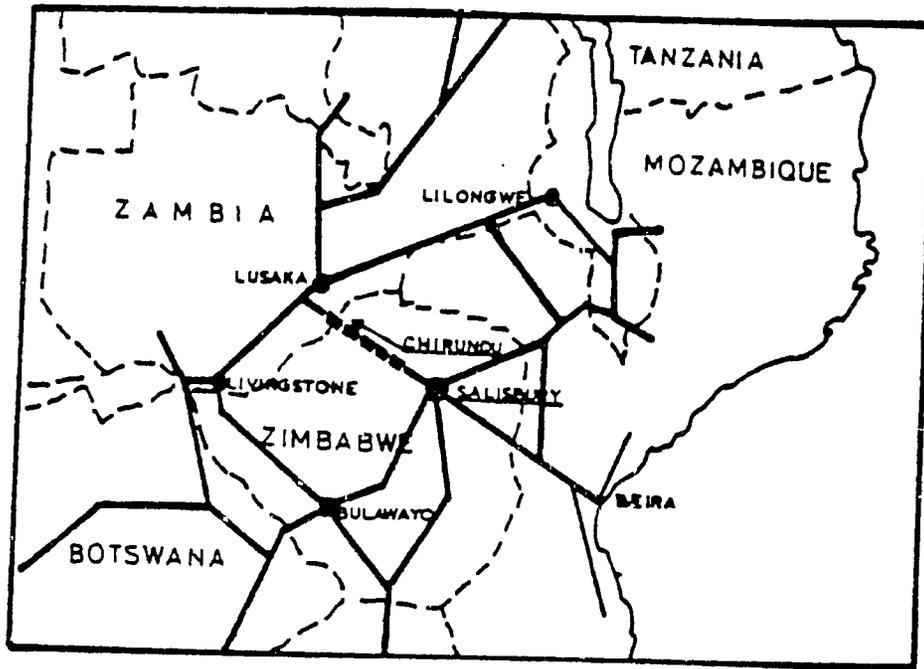
The costs have been estimated to US dollars 8.3 million in 1980 value. No detailed study of the necessary works has been carried out, thus the cost estimate is rough.

3.3 Comments by the Consultants

The road section is important for the traffic between Zambia and Zimbabwe, especially with regard to the considerable amount of heavy vehicle traffic. No economic analysis is available.

PROJECT NO. 1.9.1

ZIMBABWE: REHABILITATION OF THE SALISBURY - CHIRUNDU ROAD ON THREE SECTIONS



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and partly reconstruct the Salisbury - Chirundu road on three sections where it has been damaged or worn down.

Cost of the project: US dollars ^z 16.5 million (1980 value)

Foreign currency part: 36% FX

Financing required: Entire amount

Duration: Five years

Desirable start: 1981

Project authority: Ministry of Roads and Road Traffic, Post and Telecommunications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to restore the road to a suitable standard for especially the heavy traffic which has increased rapidly after the opening of the border with Zambia.

2.2 Nature of the project

The project includes three sections of the road Salisbury - Chirundu, the km peg figures below in distances from Salisbury.

Section A: 312-352 km peg. The use of sodic soils as fill material has resulted in break-down of the road by heavy vehicle traffic. Removing of fill material and reconstruction of the road is partly needed together with rehabilitation of the whole section.

40

Section B: 144-187 km peg, and

Section C: 230-256 km peg. The mentioned two sections have been worn down and damaged by heavy vehicle traffic. The economic lifetime of the road has been exceeded.

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The three sections need rehabilitation in priority order as listed.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No quantification of benefits has been made. The average daily traffic figures below are according to 1979 censuses. In order to get the actual traffic volumes the figures should be multiplied with a factor based on general observations of the traffic increase. The factor is about 1.3 for total traffic and 1.2 for heavy vehicle traffic. The estimated 1980 figures below include the general increase with addition of the traffic recorded at the Chirundu border post. Within brackets is noted the Chirundu traffic in per cent of the 1980 traffic.

	Total traffic		Heavy vehicle traffic	
	<u>1979</u>	Estimate <u>1980</u>	<u>1979</u>	Estimate <u>1980</u>
Section A	0-100	100-250 (40%)	0-25	60-90 (67%)
Section B	365	570 (17%)	125	235 (25%)
Section C	200	360 (26%)	60	130 (46%)
Chirundu border post (April-August 1980)	-	95	-	60

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3.2 Costs

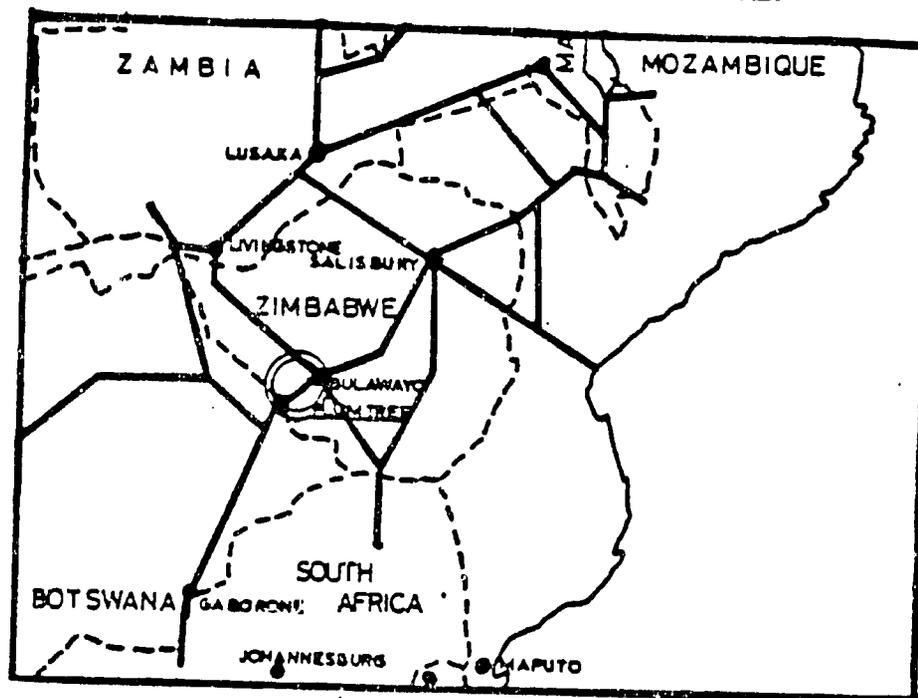
The works have been estimated to cost in 1980 value for the three sections as follows:

Section A	US dollars	7.7	million
Section B	- " -	5.5	- " -
Section C	- " -	<u>3.3</u>	- " -
Total: 16.5 million			

3.3 Comments by the Consultants

The statistics of traffic passing the border posts shows that during the period April-August 1980 the Chirundu border post has had high volumes of commercial vehicles in traffic between Zimbabwe and Zambia. The regional importance of the Chirundu road can be judged from the figures above. It is obvious that the international traffic is important as regards all the three sections of the project.

ZIMBABWE: UPGRADING THE ROAD PLUMTREE - BOTSWANA BORDER



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To upgrade to bituminized standard and partly realign the 10 km road section between Plumtree and the Botswana border.

Cost of the project: US dollars 1,8 million

Foreign currency part: 36%

Financing required: Entire amount

Duration: One year

Desirable start: 1981

Project authority: Ministry of Roads and Road Transports, Posts and Telecommunications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim is to connect the Zimbabwe major road network with that of Botswana. The corresponding road section in Botswana between Francistown and the border will be constructed during the next years, financed by IHRD.

2.2 Nature of the project

The existing road consists of 3 km of old tar road, 5.5 m wide, and 7 km of gravel road with very poor horizontal and vertical alignment. The road will be upgraded and realigned to a two-lane bitumen road designed to the main road standards of Zimbabwe.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The border post was during April - August 1980 passed by an average daily traffic of 50 vehicles of which 6 were commercial vehicles. The condition and alignment of the existing road is not adequate for this traffic. The traffic will benefit in time savings, reduced vehicle operating costs and traffic safety by the reconstruction. No economic estimate of the benefits is available.

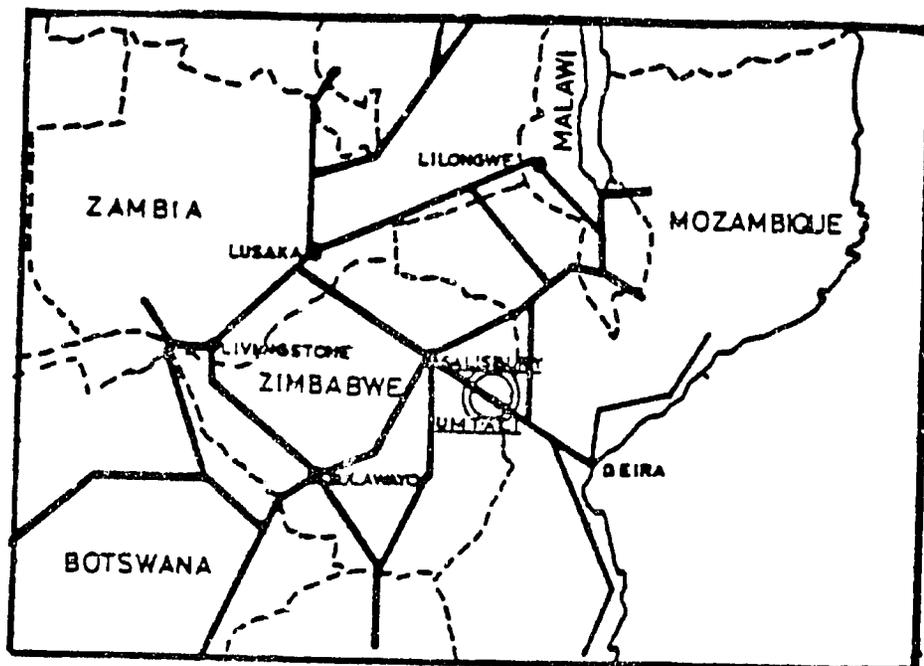
3.2 Costs

The cost based upon detailed design has been estimated to US dollars 1.8 million in 1980 value.

3.3 Comments by the Consultants

The road will be the main connection between Zimbabwe and Botswana and is of regional importance also for traffic in transit from Botswana to Mozambique.

ZIMBABWE: REHABILITATION OF THE SALISBURY - UMTALI ROAD



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Roads

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and partly upgrade the Salisbury - Umtali road on a 26 km section near to Umtali.

Cost of the project: US dollars 5.0 million

Foreign currency part: 36%

Financing required: Entire amount

Duration: 5 years

Desirable start: 1981

Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to restore the road to a suitable standard for especially the heavy traffic which is expected to increase with growing export and import over the port of Beira.

2.2 Nature of the project

The project includes a 26 km section of the Salisbury - Umtali road west of Umtali on a distance of 230-256 km from Salisbury. The mentioned section has been worn down and damaged by heavy vehicle traffic. The economic lifetime of the road section has been exceeded and it needs rehabilitation. In the project has been included minor improvement of the alignment which is below the general geometric standard of the road.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No quantification of benefits has been made.

The average daily traffic is as follows:

	<u>1979</u>	<u>Estimate 1980</u>
Total traffic	600	800
Heavy vehicle traffic	140	170

The 1980 estimate is based on general observations of the traffic increase during the period April - August 1980 compared to 1979. The increase was about 30% for the total traffic and about 20% for the heavy vehicle traffic. The Forbes border post between Umtali and Mozambique recorded an average of 10.5 vehicles per day of which 6.2 heavy vehicles during the period April-August 1980.

3.2 Costs

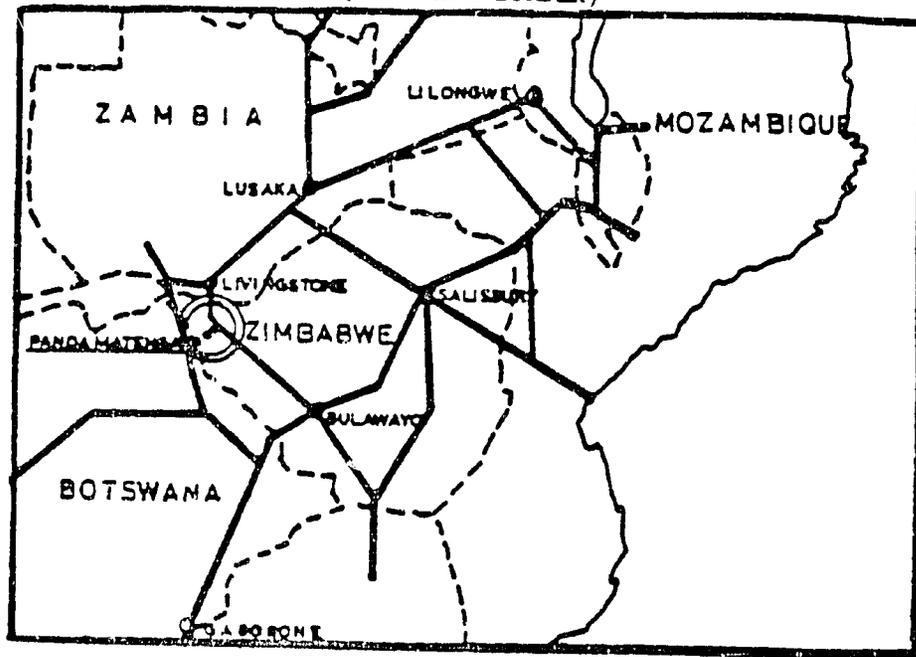
The works have been estimated to cost in 1980 value US dollars 5,0 million.

3.3 Comments by the Consultants

The statistic of traffic passing the Forbes border post show very small volumes, negligible compared to the traffic volumes of the road section to be rehabilitated. However, a considerable increase is expected, especially of the heavy traffic volumes directed to the port of Beira.

PROJECT NO. 1.9.4

ZIMBABWE: CONSTRUCTION OF A ROAD LINK MATETSI (BULAWAYO - VICTORIA FALLS ROAD) - PANDAMATENGA (BOTSWANA BORDER)



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Roads

Order of priority: Priority class 4: Study

Nature of the project: To study the feasibility of the 65 km road link Matetsi - Pandamatenga which would provide a transit route through Zimbabwe for traffic between Botswana and Zambia

Cost of the project: US dollars 14.4 million for implementation
US dollars 100,000 for study

Financing required: Entire amount

Duration: Four months

Desirable start: 1981

Project authority: Ministry of Roads and Road Traffic, Post and Telecommunications

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ZIMBABWE:
Project No. 1.9.4

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim is to provide a road link for transports in transit through Zimbabwe between Botswana and Zambia.

2.2 Nature of the project

There is a road connection between Pandamatenga and the Bulawayo - Victoria Falls road. After reconstruction of this road it might offer an alternative road connection between Botswana and Zambia which is shorter than the route via Kazungula.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The road connection should decrease the distance between the Nata - Kazungula road in Botswana and Livingstone in Zambia by about 40 km compared to the route via Kazungula. The existing traffic at the border is negligible.

Inside Zimbabwe there should be benefits to the tourist traffic attracted to the vast Wankie National Park and other recreational areas in the vicinity of the road.

3.2 Costs

The costs for construction of the road section in 1980 value have been estimated to US dollars 14.4 million.

Costs for a study will be in the size of US dollars 100,000.

3.3 Comments by the Consultants

The shorter route for traffic Botswana-Zambia provided by the proposed road link should reduce considerably the transport costs, especially until the planned Kazungula Bridge has been constructed. However, Botswana and Zambia might prefer a direct connection. Thus the regional importance and the feasibility of the project should be studied in connection with the Kazungula Bridge, project No: 1.8.2.

PROJECT NO. 2.0.1

REGIONAL: STUDY ON RAILWAY ROLLING STOCK

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Southern Africa Transport and Communications Commission

Sub-sector: Railways

Order of priority: Priority class 4: Studies

Nature of the project: To study the requirement for rolling stock in the individual countries of the region, to identify constraints to the movements of wagons and to propose ways and means for improvements.

Cost of the project: US dollars 1.0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: The Southern Africa Transport and Communications Commission.

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The railway administrations of the region own a total fleet of approximately 25,000 wagons. However, many of the wagons are old and due for renewal. Another large part is out of service due to lack of maintenance facilities and spare parts. In addition to this the turn-around times are generally long due to certain constraints such as inefficiency in operation of railways and ports, use of wagons for storage, lack of motive power etc.

The aim of the project is to study the problems related to the use of rolling stock and to propose improvements in order to reduce operation costs and to avoid unnecessary investments.

2.2 Nature of the project

Tentatively it is suggested that the study should include the following:

1. Establishment of an inventory by owner, type, age and quality of all usable wagons in the region.
2. Analysis of the wagon movements for identification of possible constraints.
3. Preparation of proposals for actions which could improve operation such as:
 - system for registration of wagon movements
 - possible changes in regulations and hire rates for use of foreign wagons and for delay in off-loading of wagons upon arrival to destination

REGIONAL:
PROJECT No. 2.0.1

- regulations for maintenance and repair of foreign wagons
 - standardization of wagons, spare parts and maintenance procedures.
4. Preparation of proposal for supply of wagons to the individual railway administrations.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

By implementation of the proposals resulting from the study it should be possible to obtain a substantial improvement in the turn-around times. This would result in the double benefit of reducing the operational costs by better utilization of motive power and rolling stock and reducing the number of wagons required. Already a reduction of the requirement for new wagons by 500 nos or 2% of the total fleet, which is not an unrealistic target, would give a direct saving of US dollars 25 millions.

3.2 Cost

The total cost of the project is estimated at US dollars 1.0 million, all in foreign currency. The duration of the project is estimated at 1/2-1 year.

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PROJECT NO. 2.0.2

REGIONAL: STUDY ON RAILWAY TRAINING PROGRAMMES

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Southern Africa Transport and Communications Commission

Sub-sector: Railways

Order of priority: Priority class 4: Studies

Nature of the project: To study the requirements for training of railway staff at different levels at local, regional and overseas training institutions.

Cost of the project: US dollars 1,0 million (1980 value)

Foreign currency part: 90%

Financing required: Entire amount

Duration: 1/2 - 1 year

Desirable start: 1981

Project authority: Southern Africa Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

A major part of the problems in operating and maintaining the railways of the region is created by lack of educated and skilled personnel and the need for training of staff on various levels can hardly be overstressed.

The aim of the project is to analyse existing training facilities, to identify the training requirements and to propose possible new facilities.

2.2 Nature of the project

Tentatively it is suggested that the study should include the following:

- 1) Analysis and inventory of existing training facilities within the region
- 2) Identification of requirements for training of the various categories of staff, divided in local, regional and overseas training. Due attention should be paid to language problems.
- 3) Preparation of proposals, preliminary layouts and estimates for possible new training centres including equipment.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits of the study are not directly quantifiable.

The benefits of efficient training can hardly be exaggerated. For instance, if the availability of locomotives and wagons can be improved by only a few per cent by training of maintenance staff, savings of the order of magnitude US dollars 50-100 million are obtained.

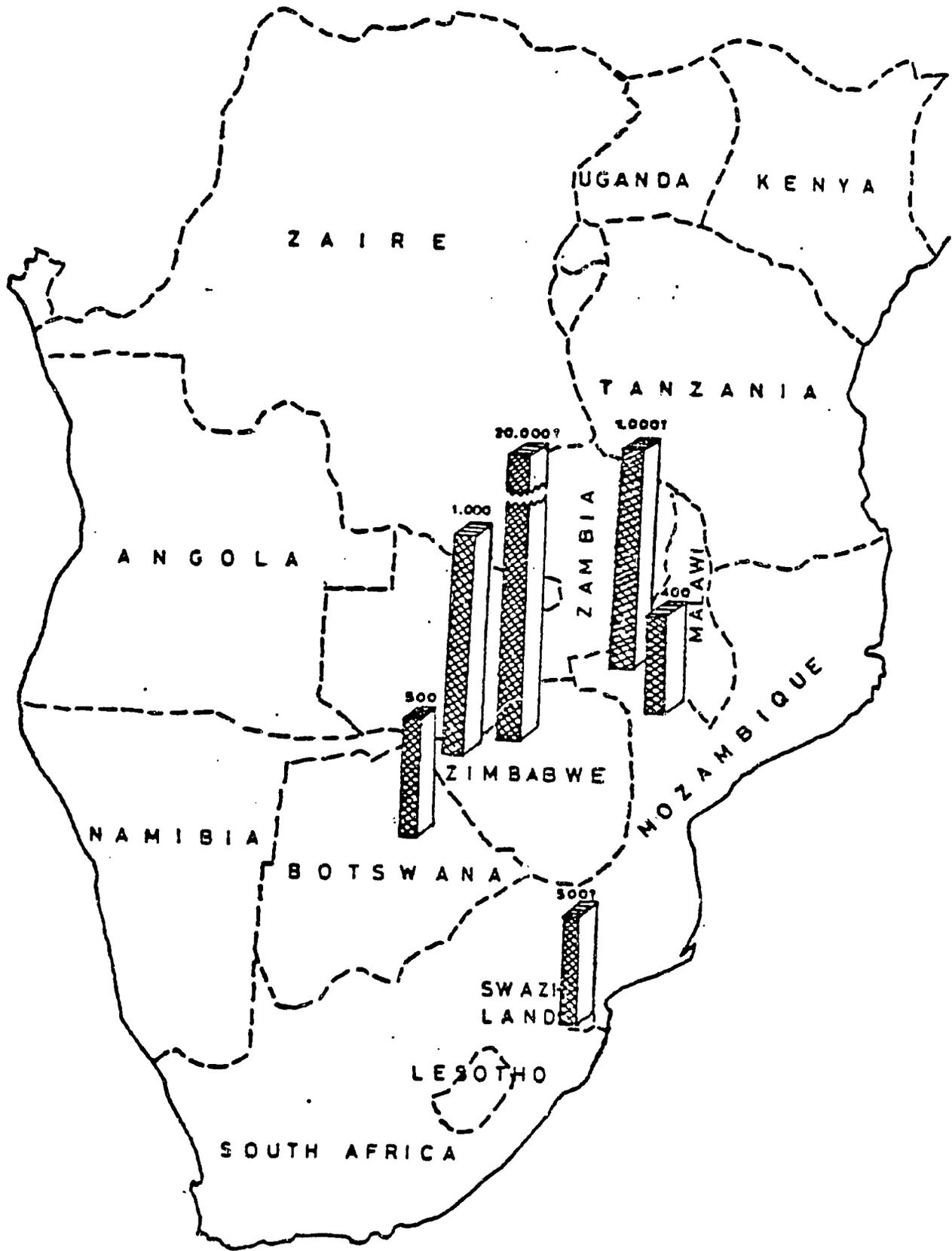
3.2 Costs

The cost of the study is estimated at US dollars 1,0 million with approximately 90% in foreign currency.

The duration of the study is estimated at 1/2 - 1 year.

PROJECT NO. 2.0.3

REGIONAL: STUDY ON SURVEY, EXPLOITATION AND TRANSPORTATION OF MINERALS



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1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Southern African Transport and Communications Commission

Sub-sector: Railways and Ports

Order of priority: Priority class 4: Studies

Nature of the project: To study location and possibilities for exploitation of mineral deposits in the region and to propose transport facilities, terminals etc.

Cost of the project: US dollars 3.0 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 1 year

Desirable start: As soon as possible

Project authority: Southern Africa Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

Southern Africa has some of the most important mineral resources in the world with coal as the dominating quantity and with considerable deposits of petroleum, diamonds, copper, iron, chrome, zinc, lead, bauxite, nickel, cobalt and uranium.

Studies on increased utilization of the minerals have been or are being made in some of the countries, but the possibility of co-ordinating the exploitation and particularly the transport facilities has so far not been studied.

By development of suitable transport and transshipment facilities, common for more deposits, the costs for transportation can be considerably reduced, i. e. the products can be offered to the world market at more competitive prices.

The aim of the project is to carry out a co-ordinated study on survey, exploitation and transportation of minerals for the entire region.

2.2 Nature of the project

Tentatively the study should include the following:

- 1) to study location and potential production of known deposits
- 2) to identify modes of transport between the mines and the consumers and to carry out preliminary engineering studies and cost estimates for selected alternative transport facilities
- 3) to propose possible feasible and recommendable solutions, including time schedules, based on benefit/cost analyses. Due consideration should be given to the possibility of direct conversion of coal into oil products
- 4) to propose a development plan assuming the use of existing facilities in the initial phase, where possible, and a phased construction of new facilities as required.

2.3 Comments by the Consultants

As the mineral transports will affect several other development projects, such as railway and ports projects, it is of utmost importance that the study is carried out as soon as possible.

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3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

There seems to be a potential for a total export of up to 40 - 50 million tons of coal per year plus several other minerals. This could radically improve the region's economic strength.

Large scale exploitation of minerals requires very large investment in mining equipment and transport facilities. The transportation costs are to a large extent determining for the products competitive position on the world market.

The benefits by optimizing the capital investments and the transportation costs can hardly be exaggerated.

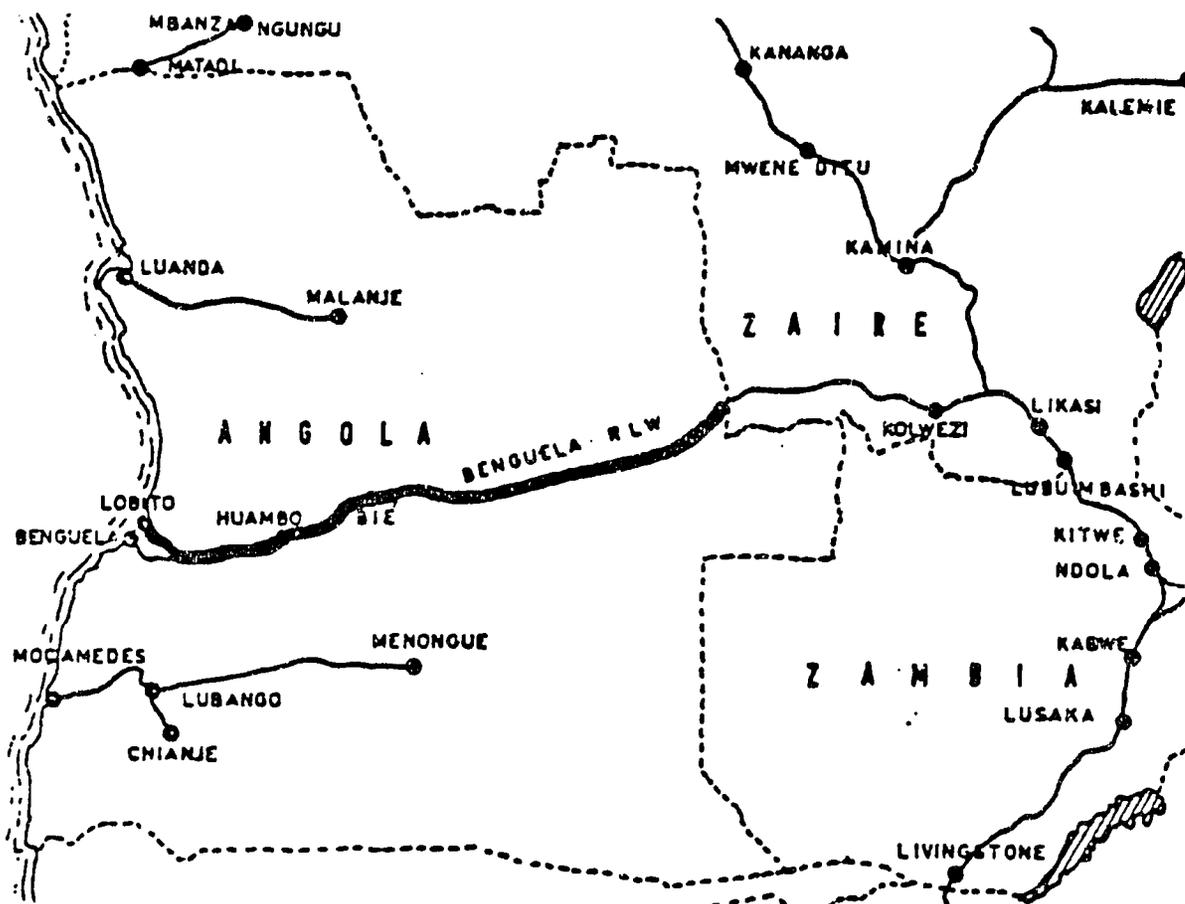
3.2 Cost

The total cost of the project is estimated at US dollars 3.0 million with approximately 90% in foreign currency.

The duration of the study is estimated at 1 year.

PROJECT NO. 2.1.1

ANGOLA: REHABILITATION OF THE BENGUELA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and upgrade the 1.340 km railway from Lobito port to the Zaire border near Dilolo.

Cost of the project: US dollars 60,0 million (1980 value)

Foreign currency part: Approx. 80%

Financing requirements: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Transports and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The operation of the Benguela railway (CFB) has been disrupted since 1975 by loss of a major part of the skilled staff and the continuing hostilities in parts of Angola. However, the CFB has continued to run local train services.

There is a strong desire on the parts of the Governments of Angola, Zaire and Zambia to re-open the railway and the three countries have agreed on a 3-phase rehabilitation of the railway:

Phase 1: Target capacity 48.000 t/month

Phase 2: Target capacity 72.000 t/month

Phase 3: Target capacity 96.000 t/month

Phase 1 can be financed by CFB's own funds. For Phase 2 external financing is secured. The present project is Phase 3 of the rehabilitation.

2.2 Nature of the project

The consultants Henderson, Hughes and Busby of London have carried out a study to identify the requirements necessary to restore the railway. According to their final report "Study of the Benguela Railway, March 1979", phase 3 comprises:

- spare parts, general stores etc	US dollars :	1.6	million
- track materials	- " -	5.1	"
- 450 wagons	- " -	36.0	"
- 12 main line loco, diesel electr.	- " -	14.5	"
- 6 shunt loco, diesel hydr.	- " -	<u>2.8</u>	"
		60.0	"

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits of the project are difficult to quantify in economic terms. The only alternative to a rehabilitation is to close and abandon the line, which is the only outlet to the Atlantic ocean for the region. The loss of this route for international traffic has imposed great hardship on Angola, Zaire and Zambia.

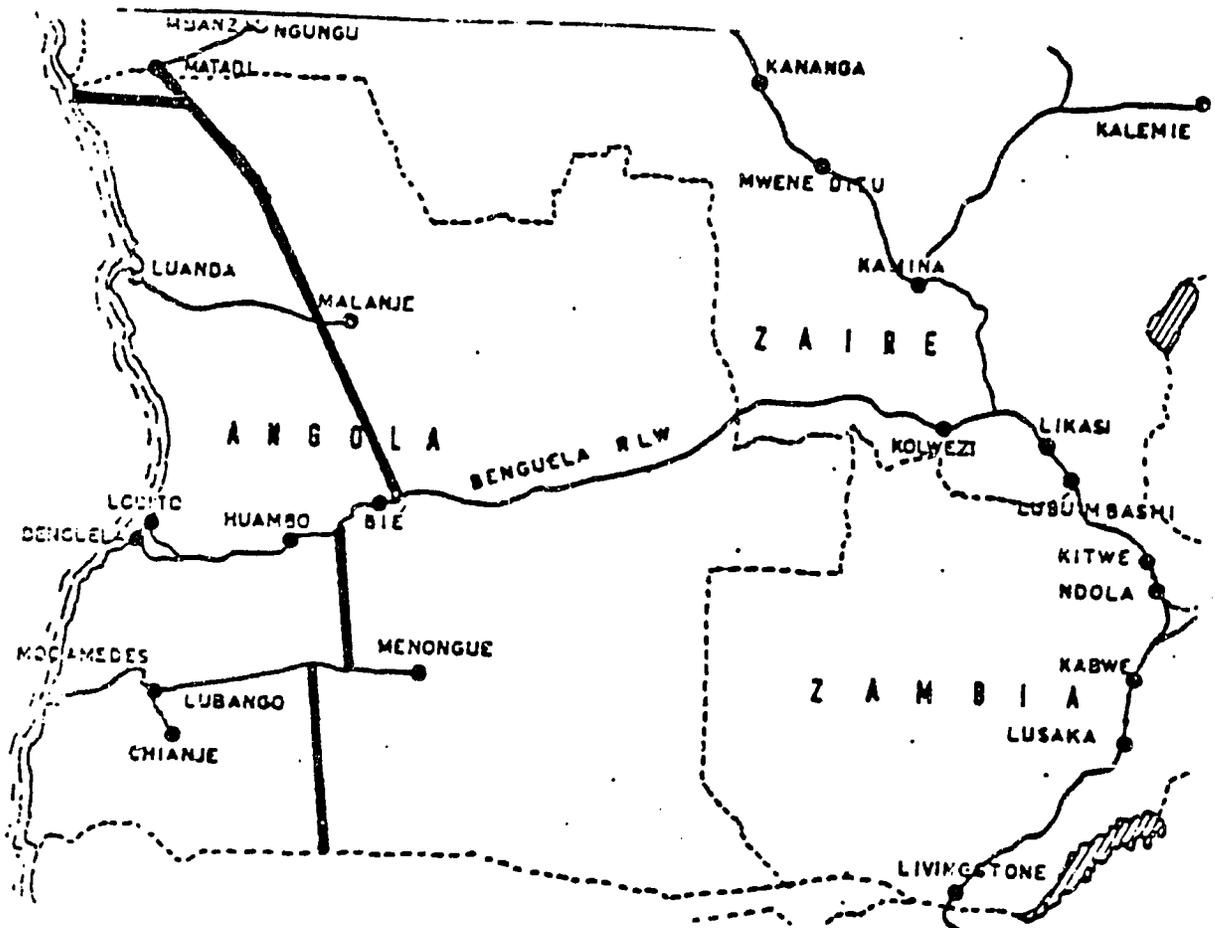
3.2 Cost

The total cost of the project is estimated at US dollars 60,0 million as specified above. Approx. 80% will be in foreign currency. The duration of the project is estimated at 2 years.

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PROJECT NO. 2.1.2

ANGOLA: PRE-FEASIBILITY STUDY FOR NEW NORTH-SOUTH RAILWAY LINKS



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Railways

Order of priority: Priority class 4: Studies

Nature of the project: To study the feasibility of construction of connections between the existing three east-west going lines and from this expanded network to Zaire and Namibia.

Cost of the project: US dollars 1.0 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 1/2-1 year

Desirable start: 1981

Project authority: Ministry of Transport and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The railways in Angola consist of 3 separate east-west going lines: Luanda-Malange, Benguela-Lwau-(Zaire-Zambia) and Mocamedes-Menongue.

The aim of the project is to study the feasibility of constructing a north-south railway axis to connect the three systems and then to connect the expanded network with the railways in Zaire and Namibia.

2.2 Nature of the project

The project is a pre-feasibility study of the following new rail links:

1. Connection between Benguela railway and Luanda-Malange railway, approx. 640 km.
2. Connection between Benguela railway and Mocamedes-Menongue railway, approx. 240 km.
3. Continuation of the link no.1 to join Zaire railways, approx. 500 km.
4. Continuation of the link no. 2 to join Namibia railways, approx. 270 km.
5. Branch line from Mbanza Congo at the Angola-Zaire link to a new port at Soyo at river Zaire, approx. 250 km.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The proposed new rail links will make the ports in Luanda and Mocamedes accessible for inland traffic. In addition the north-south axis will connect agricultural production centres and give access to mineral deposits.

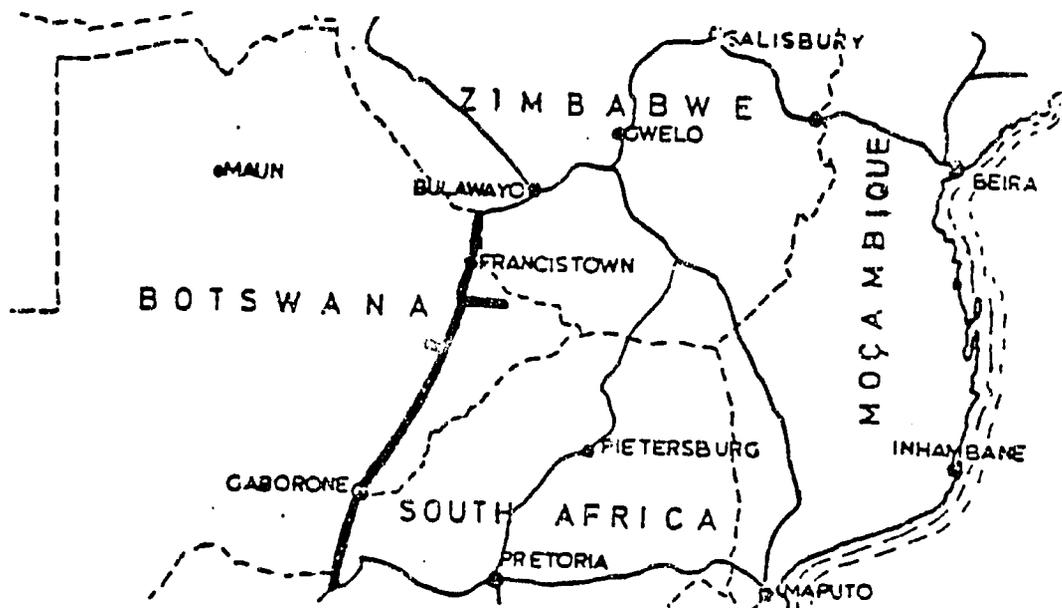
3.2 Cost

The total cost of the study is estimated at US dollars 1.0 million with 90% in foreign currency.

The duration of the study is estimated at 1/2-1 year.

PROJECT NO. 2.2.1

BOTSWANA: TRACK RENEWAL, 715 KM



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Botswana

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To renew the track with 45 kg/m longwelded rails on concrete sleepers on 642 km main line and 57+16 km branch lines at a rate of 40 km/year.

Cost of the project: US dollars 100.0 million (1980 value) or US dollars 5,6 million per year.

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 18 years

Desirable start: 1981

Project authority: Ministry of Works and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The railway of Botswana consists of a 642 km main line and two branch lines Scrule - Selebi Pikwe 57 km and Palapye - Morupule 16 km in total 715 km. The railway system is owned and operated by Zimbabwe National Railway, but Botswana is in the process of taking over the system.

The present track has 40 kg/m rails mainly on steel sleepers. The rails were laid as second hand rails 10-20 years ago. The permissible axle load is 17 t.

The aim of the project is to overcome arrears in track renewal and to increase the axle load to 18,6 t.

2.2 Nature of the project

The project includes replacement of the present track by new 45 kg/m rails and concrete sleepers at a rate of 40 km/year.

2.3 Comments by the consultants

It is recommended to study the following:

- the feasibility of repairing and reusing the steel sleepers in the present track. By using reclaimed sleepers about 20-30,000 US dollars per km could be saved.
- the feasibility of limited realignments in connection with the track renewals in order to improve gradients and curvature.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The main line has a present traffic of about 3,6 mio t/year out of which 2,6 mio t is transit Zimbabwe-South Africa. Due to expected diversion of Zimbabwe's traffic to Mozambique ports a decrease to 2,2 mio t/year during the coming decade is foreseen. The two branch lines carry mainly coal from Morupule to Selebi-Pikwe steel plant, about 0,3 mio t/year.

In addition to secure safe and uninterrupted traffic the project will increase the transport capacity and lower the operation costs by increasing the permissible axle load.

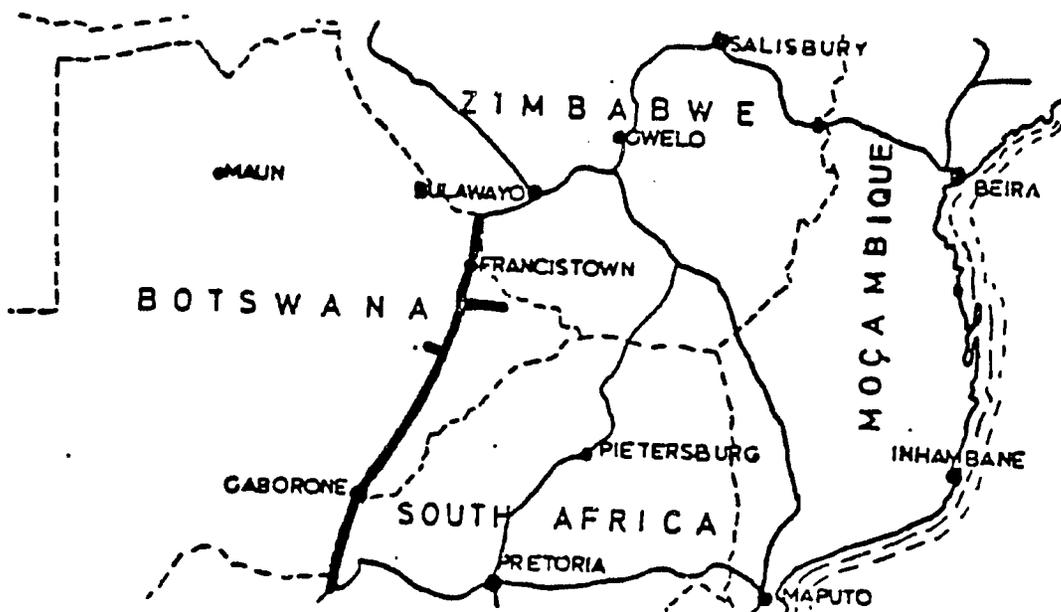
3.2 Cost

The total cost of the project is estimated at US dollars 100,0 million or 5,6 million per year with approx. 90% in foreign currency.

The duration of the project is estimated at 18 years.

PROJECT NO. 2.2.2

BOTSWANA: REHABILITATION OF RAILWAY TELECOMMUNICATIONS FACILITIES



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Botswana

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the Project: To re-equip the present 3-pair overhead telephone line in order to replace the present centre at Bulawayo by a new operational centre in Francistown, Botswana in connection with Botswana's taking over of the railway. In addition one more pair of wires shall be installed to allow for signalling communications.

Cost of the project: US dollars 3,8 million (1980 value)

Foreign currency part: Approx. 95%

Financing required: Entire amount

Duration: 2-3 years

Desirable start: 1981

Project authority: Ministry of Works and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The present railway telecommunications system has Bulawayo, Zimbabwe as the centre, as the railway is operated as a part of Zimbabwe National Railways.

The line equipment is a 3-pair overhead wire line used for telephone connections and transmission of facsimile train orders. The railway has no signalling and no channels are available for signalling communications.

The project aims at re-equipping the line to have centre at Botswana Railways HQ at Francistown. In addition one more pair of wires shall be added to allow for signalling communications. Alternatively a complete new cable or radio system should be established.

2.2 Nature of the project

The project includes the following:

- review of a system study carried out by Transmark, UK 1978-80
- system design
- implementation of the selected system including supply and installation of all equipment.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The project is an integral part of Botswana's taking over of the railway system. A proper communication system is a necessary prerequisite for any railway operation.

Establishment of a signalling system, which will be made possible by the project, will increase the safety and capacity of the railway.

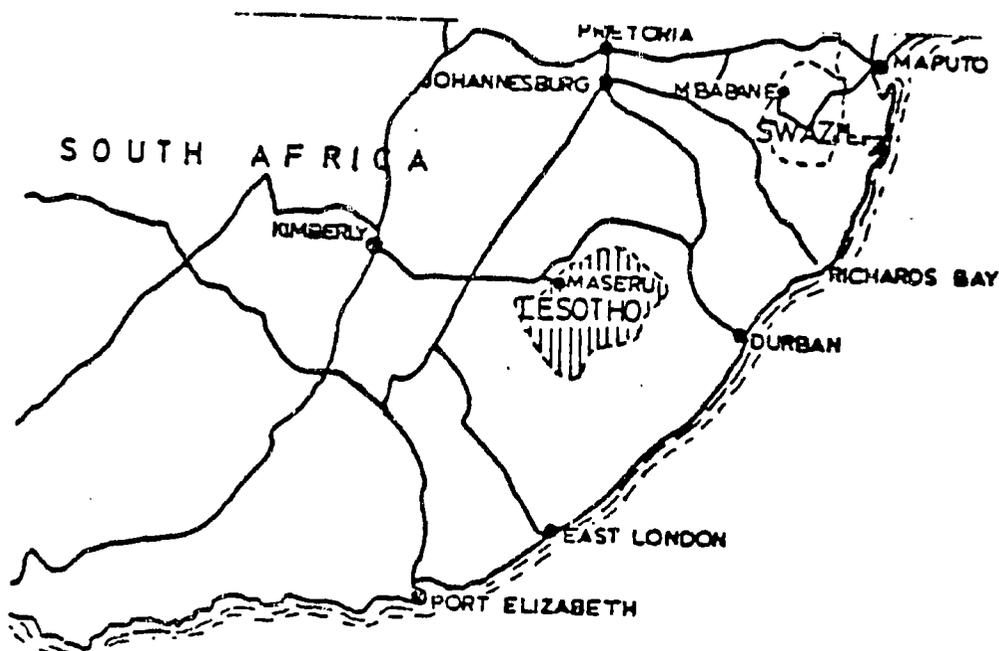
3.2 Cost

The total cost of the project is estimated at US dollars 3,8 million with approx. 95% in foreign currency.

The duration of the project is estimated at 2-3 years.

PROJECT NO. 2.3.1

LESOTHO: CUSTOMS TERMINAL WITH CONTAINER FACILITIES



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Railways

Order of priority: Priority class 3: New Transport projects

Nature of the project: To establish a customs terminal with container facilities

Cost of the project: US dollars 1,1 million (1980 value)

Foreign currency part: Approx. 70%

Financing required: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Transport, Telecommunications and Postal Services

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

As there is no customs terminal at Maseru, goods to be cleared must be held on the South African Railway station, whose facilities are the property of South Africa and are grossly inadequate.

The aim of the project is to establish a bonded customs area with necessary facilities, in particular for containers, at Maseru railway station.

2.2 Nature of the project

The project is construction of a customs terminal consisting of a bonded area with customs warehouse, two railway tracks, roads and surfaced storage areas. Containers are handled by fork lifts. Engineering design is completed.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The cost for transport of goods by road from Durban to Maseru is equal to the sea-freight from Europe to Durban. Transport by rail is about half the cost by road, but transport by rail/container only 25%. Consequently a considerable benefit can be obtained by establishing possibility for a direct and uninterrupted container traffic to a terminal at Maseru.

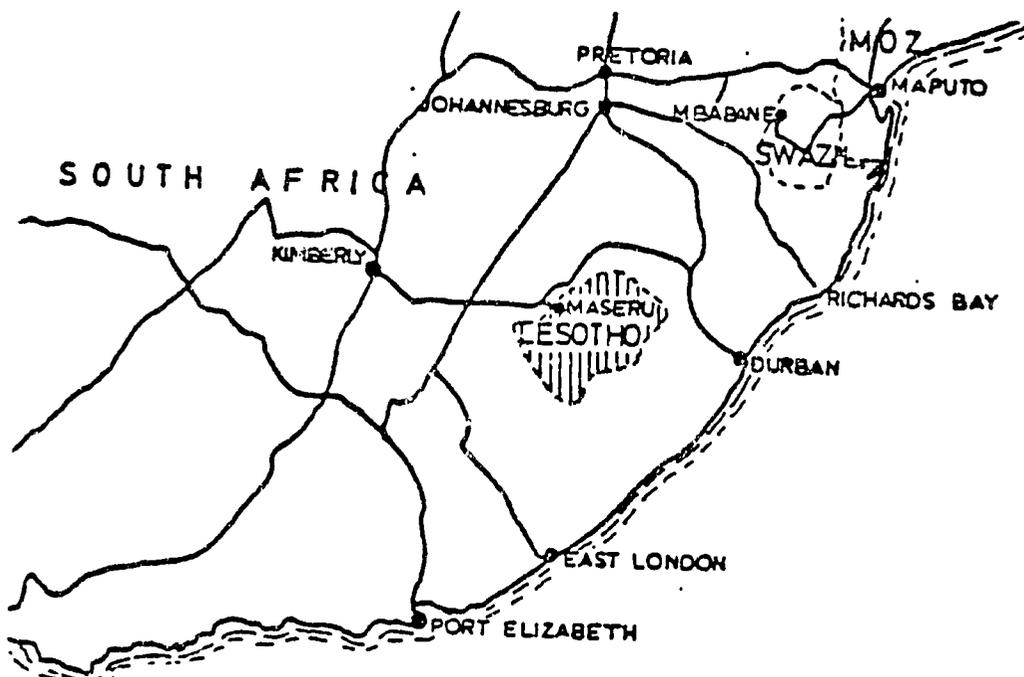
3.2 Cost

The cost of the project is estimated at US dollars 1,1 million with approx. 70% in foreign currency.

The duration of the project is estimated at two years.

PROJECT NO. 2.3.2

LESOTHO: SUPPLY OF RAILWAY ROLLING STOCK



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To supply 84 tank wagons for transportation of oil products from Maputo port to Lesotho, see also project NO. 2.0.1.

Cost of the project: US dollars 5.0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 2 years

Desirable start: 1981

Project authority: Ministry of Transport, Telecommunications and Postal Services

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

Due to limited storage capacity in Lesotho 4-5 tank wagons with oil products should arrive every week-day in order to keep up with the demand. However, South African Railways have problems in keeping the rate, mainly due to the long turn-around time for wagons (3 weeks).

If Lesotho had its own fleet of tank wagons, a more reliable transport schedule could be established.

2.2 Nature of the project

The project comprises the supply of 84 nos railway tank wagons.

2.3 Comments by the Consultants

Reference is made to project NO. 2.0.1 "Study on Railway Rolling Stock".

For the present project it is recommended to study the feasibility of increasing the storage capacity and operate block trains with the shortest possible turn-around time.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

Establishment of a reliable and effective transportation of oil products will reduce the costs of the products and ensure sufficient supplies.

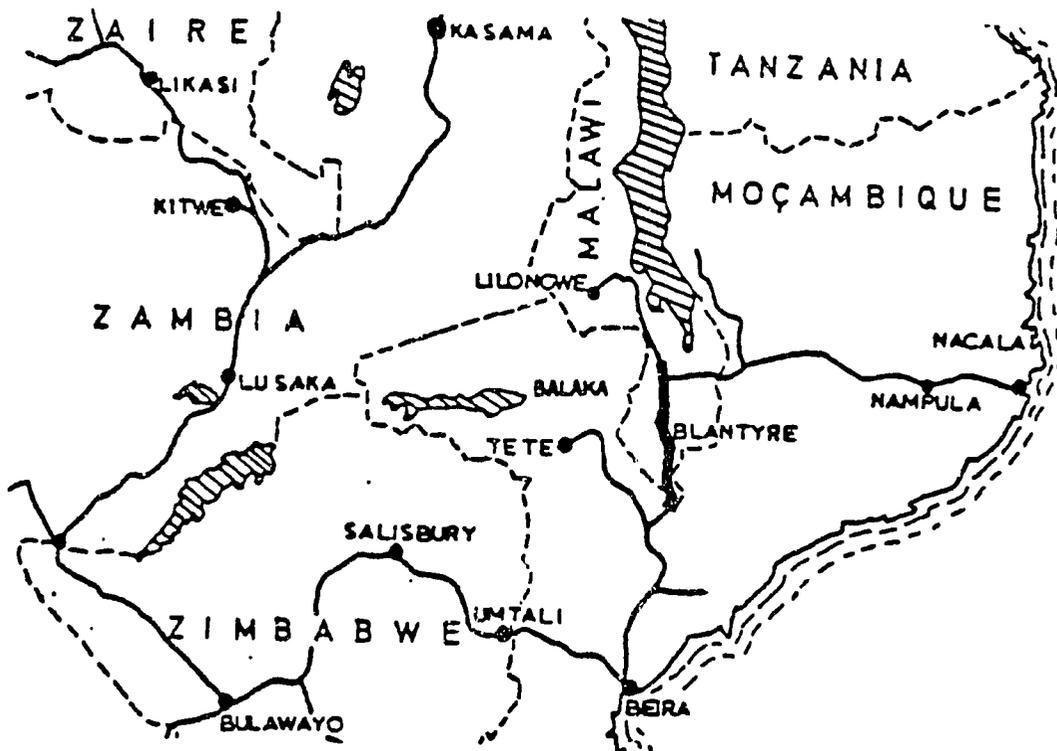
3.2 Cost

The total cost of the project is estimated at US dollars 5.0 million, all in foreign currency.

The duration of the project is estimated at 2 years.

PROJECT NO. 2.4.1

MALAWI: REHABILITATION OF THE BALAKA - SOUTHERN BORDER RAILWAY



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Malawi
- Sub-sector: Railways
- Order of priority: Priority class 1: Rehabilitation/Upgrading
- Nature of the project: To rehabilitate and upgrade the 311 km section of line between Balaka and the Mozambique border to bring it up to a standard which can ensure safe and uninterrupted train operation.
- Cost of the project: US dollars 20,0 million (1980 value)
- Foreign currency part: Approx. 70%
- Financing required: Entire amount
- Duration: 6 years
- Desirable start: 1981
- Project authority: Ministry of Transport and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

Malawi Railways have a total length of 687 km and a new 116 km line from Lilongwe to the Zambian border is under construction. The lines Nkaya - Nayuci, 101 km, and Salima - Lilongwe, 120 km, are constructed 1969-75 with 80 lbs rails and concrete sleepers. The section Balaka - Salima, 154 km, is being rehabilitated to have 80 lbs rails on steel sleepers.

The 312 km section Balaka - Southern Border was originally built to a very low standard. The track consists mainly of 60 lbs (30 kg/m) rails on steel and timber sleepers and partly earth ballast.

The project aims at upgrading the line to a standard similar to that of the other lines in order to improve train speeds and loads and to secure safe and uninterrupted traffic.

2.2 Nature of the project

The project includes the following:

- renewal of rails on 178 km, re-sleepering of 142 km and stone ballasting of 163 km
- stabilisation of an embankment stretch exposed to flooding and erosion.

Some improvements have been carried out with British aid in the period from 1973 to now, but funds have been insufficient and the aid will cease in 1981/82.

2.3 Comments by the consultants

It is recommended that the rehabilitation works be based on a preliminary engineering project with the purpose of investigating possibilities and feasibility of improving gradients and curvature, and of increasing the permissible axle-load and train length.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The reliability of the Balaka - Southern Border section is vital in maintaining the flow of both income earning exports and essential imports. In 1979 two-thirds of railed import/export traffic was carried on this line. The section Blantyre - Sankhulani carried in 1979 approximately 1 million tonnes.

In addition to secure safe traffic the project will increase the transport capacity and lower the operation costs through increase in travelling speed and improved train performance. The maximum speed on the 110 km mountain section south of Limbe is now as low as 25 km/h.

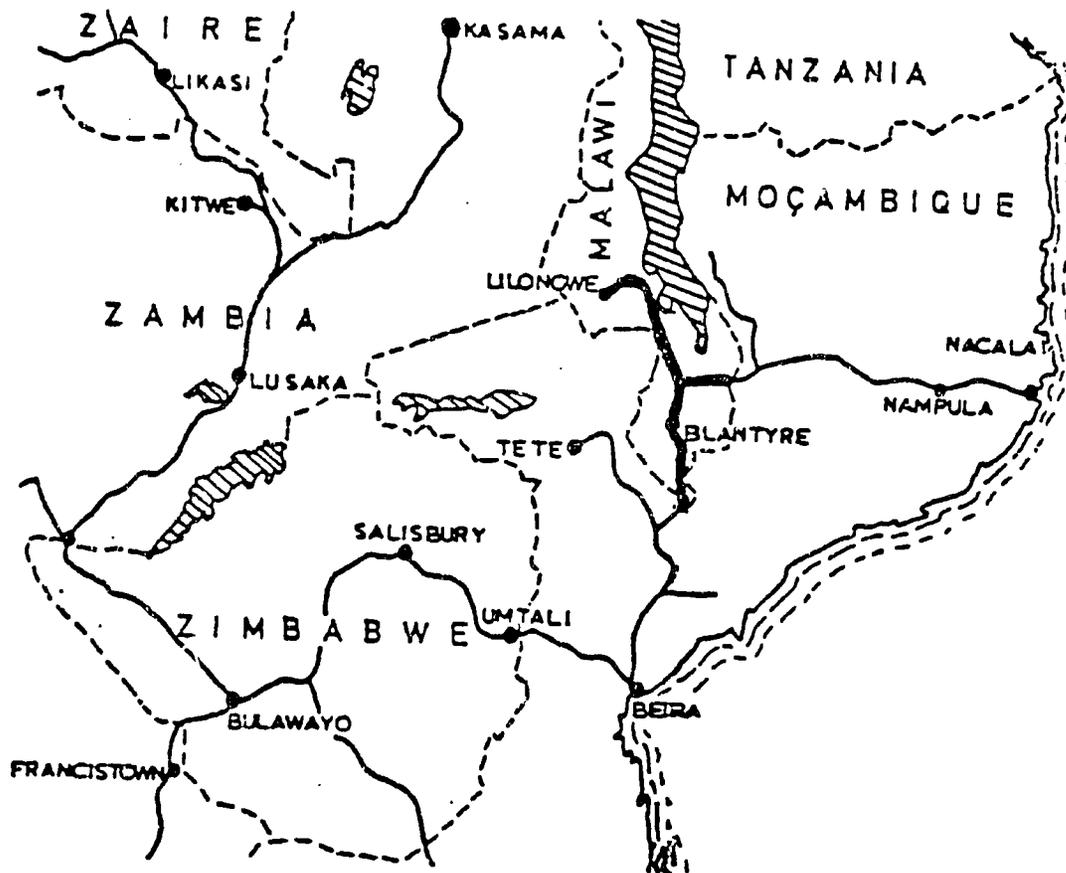
3.2 Cost

The total cost of the project is estimated at US dollars 20,0 million with approx. 70% in foreign currency. The duration of the project is estimated at 6 years.

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PROJECT NO. 2.4.2

MALAWI: SUPPLY OF RAILWAY ROLLING STOCK



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Malawi

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To supply 450 freight wagons and 20 brake vans (see also project NO. 2.0.1).

Cost of the project: US dollars 26.0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Transport and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to provide sufficient wagons for the efficient movement of agricultural and other exports to the Mozambique ports as well as the bulk of Malawi's import. Additionally, the project will provide bulk transport capacity for local freight traffic within Malawi.

2.2 Nature of the project

The project includes:

- supply of 450 freight wagons
- supply of 20 brake vans.

2.3 Comments by the Consultants

Reference is made to project NO. 2.0.1 "Study on Railway Rolling Stock".

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

As the demand for transport cannot be met due to lack of wagons, the additional wagons can immediately be utilized and will give revenue to the railway.

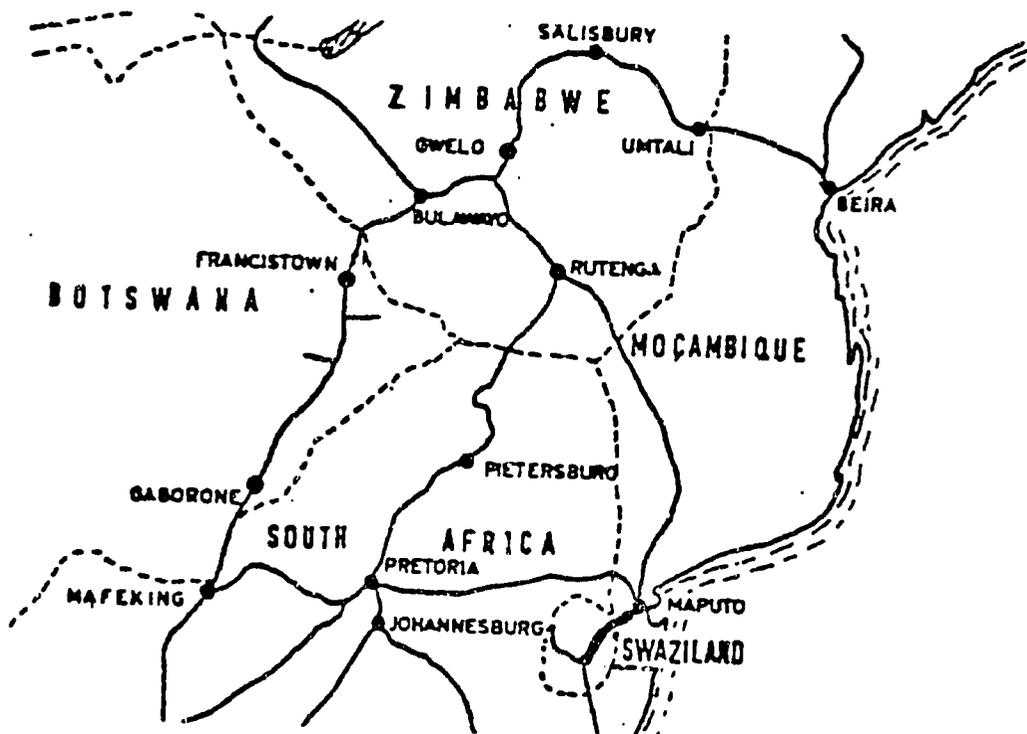
3.2 Cost

The total cost of the project is estimated at US dollars 26.0 million, all in foreign currency.

The duration of the project is estimated at 3 years.

PROJECT NO. 2.5.1

MOZAMBIQUE/SWAZILAND: REHABILITATION OF THE MACHAVA-SWAZILAND RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique. Joint project with Swaziland.

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the Project: To rehabilitate the 145 km long railway Machava - Phuzumoya by replacing all sleepers by new concrete sleepers and part of the rails with new or reclaimed 45 kg/m rails. In connection with the rehabilitation some realignments will be made for improvements of gradients and curvature.

Cost of the project: US dollars 30,0 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The present track has 45 kg/m and 30 kg/m rails on timber sleepers in Mozambique and Swaziland respectively. The western part of the line is mountainous with sharp curves and gradients up to 25 o/oo. Speed restrictions are frequent on the entire line.

The project aims at upgrading the line to a standard of 45 kg/m new or repaired, longwelded rails on concrete sleepers and with sufficient stone ballast thus allowing 20 t axle load right through. The stretch to be rehabilitated is 62 km in Mozambique and 83 km in Swaziland from the border to Phuzomoya, the junction station for the new Swaziland - South Africa rail link.

2.2 Nature of the project

The project includes the following:

- renewal of all sleepers and supply of additional ballast on 145 km and renewal of a part of the rails in Mozambique and all rails in Swaziland. Rails to be welded in 100 m lengths.
- realignments where feasible for improving gradients and curvature.

2.3 Comments by the Consultants

As the major part of the heavy traffic is downhill traffic from Swaziland special attention should be paid to improve gradients against downhill trains - see also project No. 2.5.2.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The Maputo - Machava - Swaziland railway is vital for exports from Swaziland and also important for domestic transport in Mozambique. Estimated total yearly traffic (mio t) in 1980: 0.8, 1990: 2.8 and 2000: 2.9.

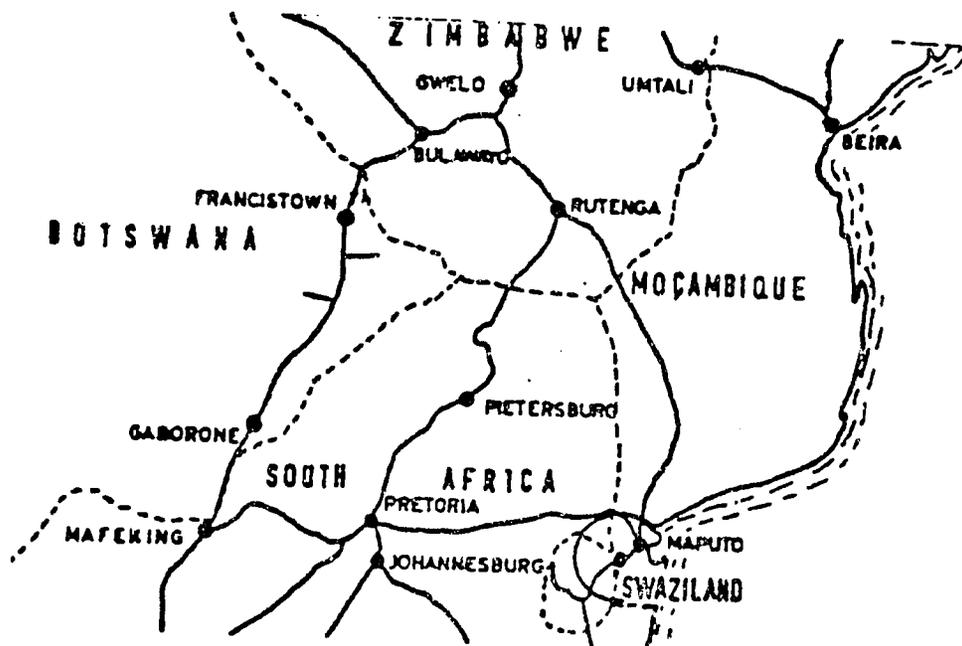
By increase of the axle load and improvement of the alignment the capacity and safety of the line will be considerably increased. The operation and maintenance costs will be reduced.

3.2 Costs

The total cost of the project is estimated at US dollars 30.0 million with approx. 80% in foreign currency.

The duration of the project is estimated at 3 years.

MOZAMBIQUE/SWAZILAND: REHABILITATION OF THE BORDER STATION BY ESTABLISHMENT OF AN EXCHANGE YARD



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique
Joint project with Swaziland

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To construct a small yard, where locomotives
can be changed in order to meet the steep
gradients in the mountain section

Cost of the project: US dollars 3,3 million (1980 value)

Foreign currency part: Approx. 50%

Financing required: Entire amount

Duration: 2 years

Desirable start: 1982

Project authority: Ministry of Ports and Surface Transports

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The objective of the project is to construct a small exchange yard near the border, where locomotives can be changed, partly because each administration wants to move its own locomotives, partly because the difference in gradients on the Mozambique side and the Swaziland side results in different train loads.

2.2 Nature of the project

The project includes construction of a yard near Goba station with tracks and other facilities for change of locomotives and exchange of wagons.

It is the aim to make such realignments that the steep gradients, up to 25 o/oo, all are located on the uphill side of the station.

2.3 Comments by the consultants

A border line between two countries should not physically affect train operations. Formalities should be arranged at the terminals or at other points where the trains have to stop for other reasons. This is particularly true for a short railway as the present one.

Consequently it is recommended that a study is made with the objectives:

- to reduce exchange works and delay of the trains to a minimum
- to determine to what extent it will be possible to work the same train size right through utilizing the fact that the major part of the Swaziland traffic is downhill traffic and bulk traffic (coal, sugar) which should be operated by unit trains
- to find the most suitable location of the exchange station with due regard to the vertical alignment.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

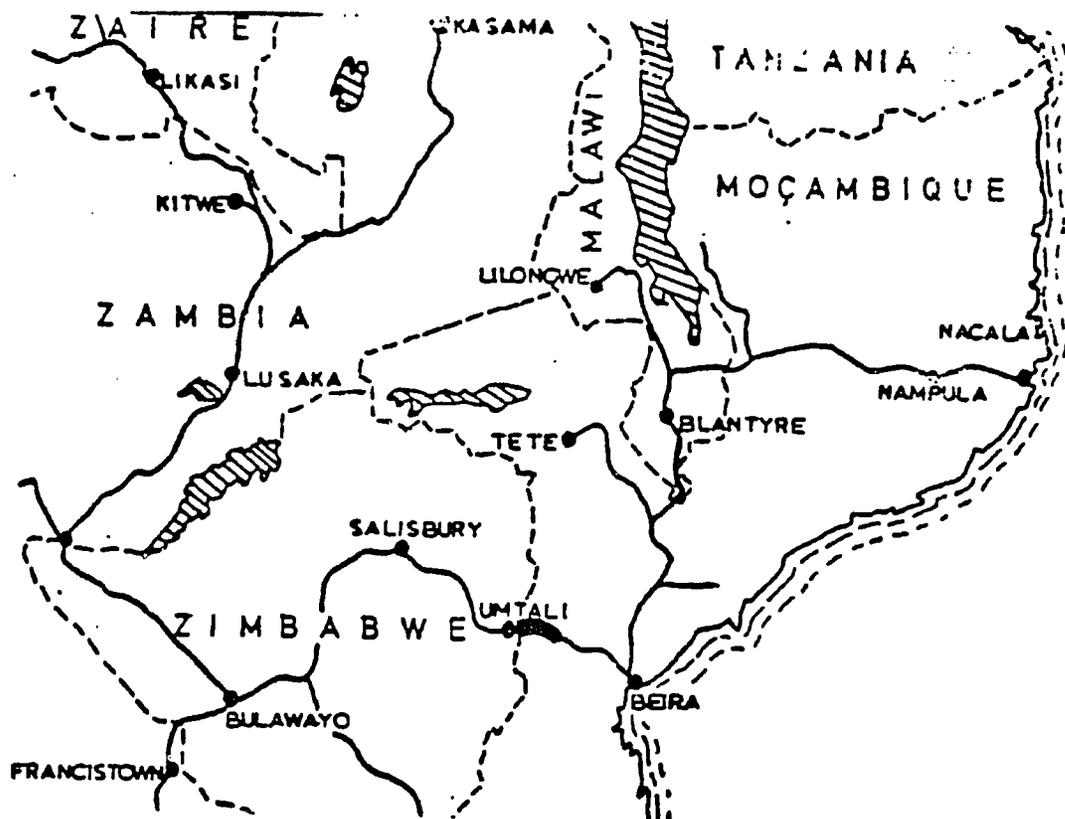
The construction of a well located exchange yard of a suitable design will increase the efficiency of the train operation provided combined with the necessary actions to ease operational and administrative formalities.

3.2 Cost

The total cost of the project is estimated at US dollars 3,3 million with approx. 50% in foreign currency.

PROJECT NO. 2.5.3

MOZAMBIQUE: REHABILITATION ALMADA - MACHIPANDA ON THE BEIRA - ZIMBABWE RAILWAY, 100 KM



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate a 100 km long section of the Beira - Machipanda - Salisbury railway

Cost of the project: US dollars 27,2 million (1980 value)

Foreign currency part: Approx. 70%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The 315 km long Beira - Machipanda (Zimbabwe border) railway has generally UIC 40 rails on timber sleepers and stone ballast. However, the 100 km section Almada - Machipanda has 30 kg/m rails and in addition the steepest gradients (24 o/oo) and sharpest curves on the line (100 m radius).

The project aims at upgrading the section to same standard as the rest of the line.

2.2 Nature of the project

The project comprises construction of a new alignment with max gradient 12 o/oo and min radius 500 m and a new track with 40 kg/m rails on timber sleepers in stone ballast.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The Beira - Zimbabwe railway and the Gwelo - Maputo railway are Zimbabwe's shortest outlets to the sea and as such are of vital importance for Zimbabwe's foreign trade as well as for Mozambique's economy by revenue for transit traffic.

By elimination of the weak section with poor operational conditions the project will largely improve the safety and capacity and thus reduce operation costs for the entire railway line.

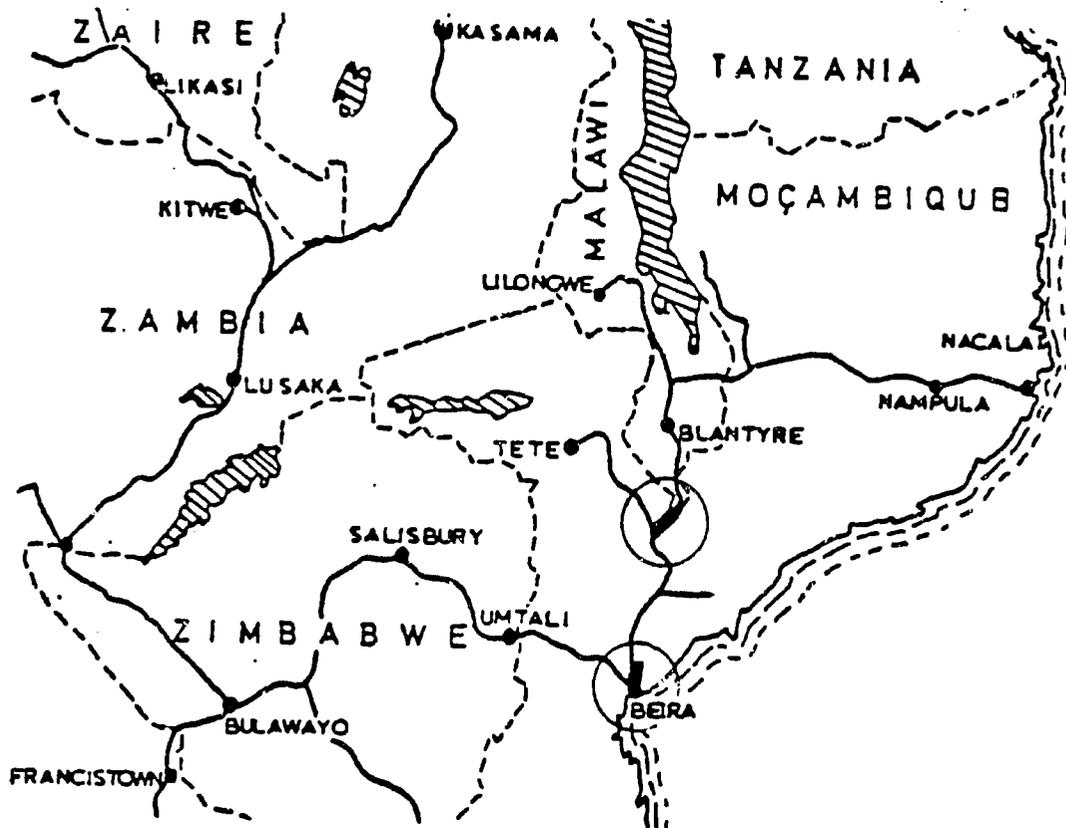
3.2 Cost

The total cost of the project is estimated at US dollars 27,2 million with approx. 70% in foreign currency.

The duration of the project is estimated at 3 years.

PROJECT NO. 2.5.4

MOZAMBIQUE: REHABILITATION OF 67 KM OF THE BEIRA - MALAWI RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and double track the 27 km Beira - Dondo section and to rehabilitate the 40 km Dona Ana - Malawi border section

Cost of the project: US dollars 22,4 million (1980 value)

Foreign currency part: Approx. 70%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The 331 km long Beira - Malawi railway has a mixture of 30 and 40 kg/m rails mostly on timber sleepers. The 27 km Beira - Dondo section is common for the Beira - Zimbabwe and Beira - Malawi/Moatize railway and is thus heavily trafficked.

The project aims at double tracking the Beira - Dondo section and rehabilitation of the 40 km section next to the Malawi border.

2.2 Nature of the project

The project includes:

- renewal and double tracking of 27 km Beira - Dondo with UIC 54 rails on timber sleepers and sufficient stone ballast
- renewal of 40 km track next to Malawi border with 45 kg/m rails, timber sleepers and sufficient stone ballast.

2.3 Comments by the consultants

It is recommended that an inventory and a study is carried out for the section Dondo - Dona Ana in order to establish a long-term programme for this important line carrying both Malawi traffic and heavy coal traffic from Moatize.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The Beira - Dondo section is common for the Zimbabwe and Malawi line. The Dondo - Malawi line is an important outlet to the sea for Malawi and in addition a vital line for Mozambique carrying coal from the large Moatize deposits.

The upgrading and double tracking of the Beira - Dondo section will give a strongly required increase of the capacity to the benefit of both Zimbabwe, Malawi and Mozambique traffic. The upgrading of the Dona Ana - Border section is a continuation of Malawi's project no. 2.4.1.

3.2 Cost

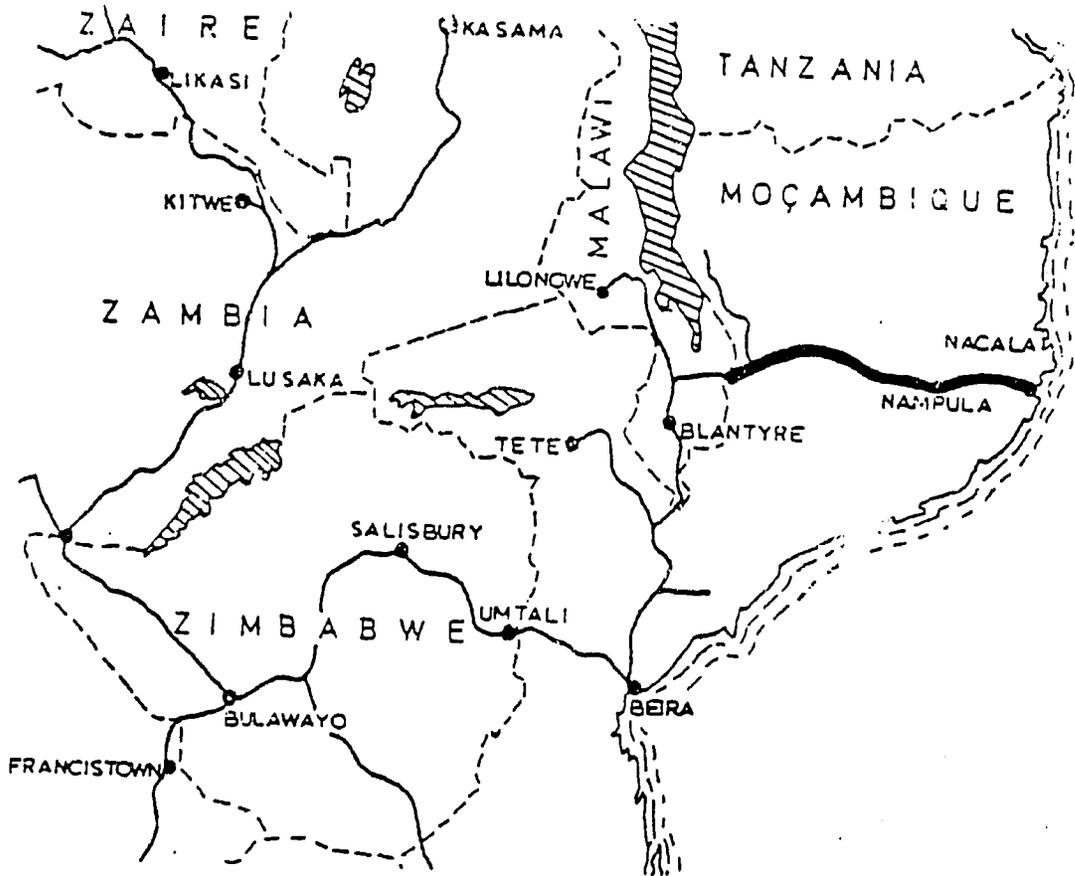
The total cost of the project is estimated at US dollars 22,4 million with approx. 70% in foreign currency.

The duration of the project is estimated at 3 years.

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PROJECT NO. 2.5.5

MOZAMBIQUE: REHABILITATION OF THE NACALA - MALAWI BORDER RAILWAY, 615 KM



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate and upgrade the entire line to have 45 kg/m rails on concrete sleepers and to carry out certain realignments for improvement of gradients and curvature

Cost of the project: US dollars 200 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: 6 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective:

The 615 km Nacala - Malawi line has 30 kg/m rails on timber sleepers. The condition of the track is extremely poor with rails up to 30 years old, 65 % of the sleepers completely worn out and poor ballast. Only about 77 km of track near the border is in good condition. Speed restrictions down to 15 km/h have been introduced at numerous locations, but in spite of this, derailments are frequent, up to once a week.

The project aims at total replacement of the track by 45 kg/m rails on concrete sleepers with sufficient stone ballast and including certain realignments for improvement of gradients and curvature.

2.2 Nature of the project

The project includes:

- renewal of 650 km of track (including sidings)
- establishment of ballast quarries, sleeper factory and rail welding plant
- realignments on about 100 km for improvement of gradients and curvature

2.3 Comments by the consultants

Due to the large order of magnitude of the investment it is recommended that a comprehensive study and preliminary engineering is carried out to determine a feasible sequence of the works and to identify feasible realignments, locations of quarries, aggregate deposits, sleeper factory etc.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The railway line forms Malawi's outlet to Nacala port, Malawi's only alternative to Beira port and one of the best natural ports on the African east coast. Consequently the railway is vital for Malawi's foreign trade. In addition the line is the main means of transport for northern Mozambique. The traffic forecasts estimate the total traffic in mio t/year: 1980: 0.4, 1990: 1.6 and 2000: 2.3.

Considering the conditions of the line the only alternative to a rehabilitation is closure and abandonment of the line, whereas rehabilitation can ensure safe and uninterrupted traffic between the port and the hinterland.

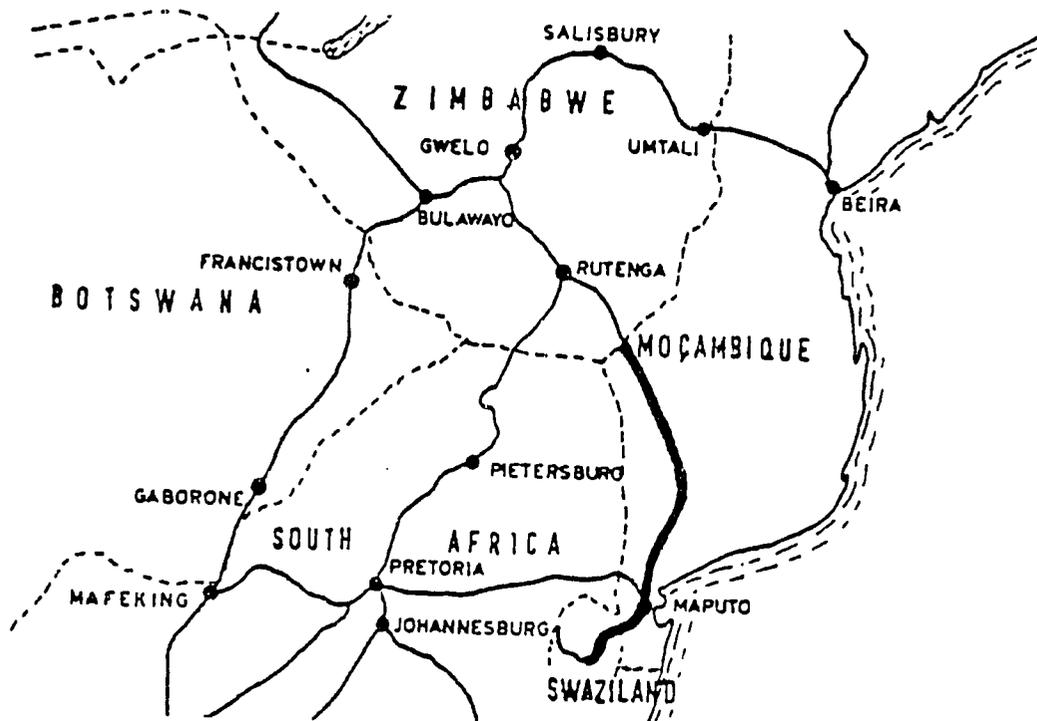
3.2 Cost

The total cost of the project is estimated at US dollars 200 million with approx. 80% in foreign currency.

The duration of the project is estimated at 6 years.

PROJECT NO. 2.5.6

MOÇAMBIQUE/ZIMBABWE: FEASIBILITY STUDY FOR ELECTRIFICATION OF THE SALISBURY-MAPUTO AND MAPUTO-SWAZILAND RAILWAYS



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Moçambique

Sub-sector: Railways

Order of priority: Priority class 4: Studies

Nature of the project: To study the feasibility of electrification of the Moçambique sections of the Salisbury-Maputo and Maputo-Swaziland railways.

Cost of the project: US dollars 0.7 million (1980 value)

Foreign currency part: 90%

Financing required: Entire amount

Duration: 1/2-1 year

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

1/10

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The two railway lines from Maputo to South Africa and Swaziland respectively carry the heaviest traffic of all Mozambican railways.

With the re-opening of the border to Zimbabwe and the new political conditions it can be expected that also the Maputo-Salisbury line will be heavily loaded with transit traffic.

Electrification (25 kV, 50Hz) is underway in Zimbabwe with the first phase covering the stretch Salisbury-Gwelo.

A feasibility study for electrification of the Maputo-Ressano Garcia - (South Africa) has been made by Sofrerail, France.

The aim of the present project is to study feasibility and propose a time schedule for electrification of the main lines of CFM-Sul.

2.2 Nature of the project

The project includes:

- traffic analysis and traffic forecasts
- preliminary technical lay-out and cost estimates, including proposals for feasible realignments, if any, in order to be able to utilize the higher train speeds
- benefit/cost analysis
- recommendations together with proposed construction schedule.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefit of the study is not directly quantifiable.

With increasing oil prices and at a time where track rehabilitation and renewal of motive power is under way it is obvious that an electrification scheme should be studied for a railway system carrying a traffic of several millions t/year.

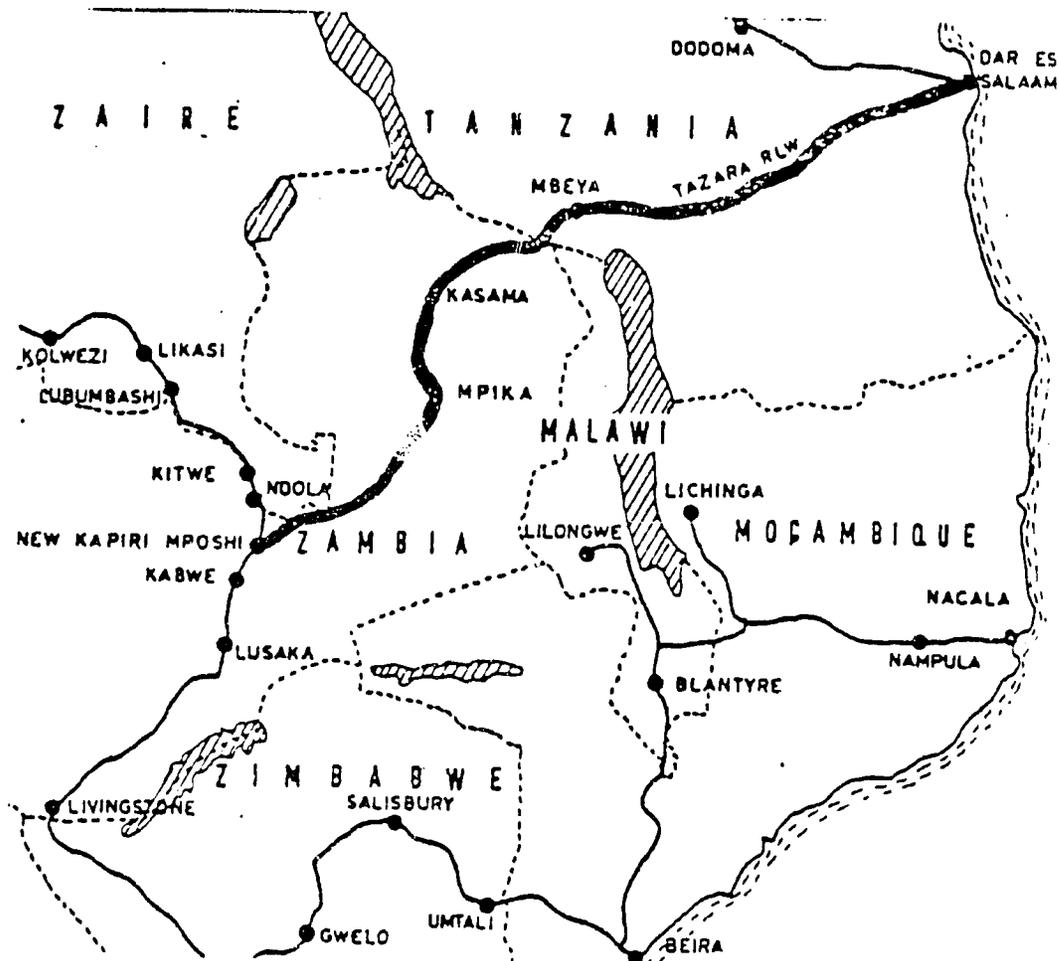
3.2 Cost

The total cost of the study is estimated at US dollars 0.7 million with 90% in foreign currency.

The duration of the study is estimated at 1/2-1 year.

PROJECT NO. 2.7.1

TANZANIA/ZAMBIA: REHABILITATION WORKS AT TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: The project consists of two separate parts:
 1. To repair land-slides.
 2. To weld rail-joints and to introduce mechanized maintenance.

Cost of the project: US dollars 25.0 million (1980 value)

Foreign currency part: Approx. 70%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

TAZARA railway is a new 1860 km long line, constructed to a high standard in the period 1969-75 and it does not need an overall rehabilitation. However, some works and supplies are required in order to ensure full capacity of this important line, which is the most economic outlet to the sea for Zambia's foreign trade.

2.2 Nature of the project

The project consists of two separate parts:

1. Repair of some 30 landslides, which have occurred over a 80 km stretch with difficult soils conditions. Total costs for survey, design and construction US dollars 5.0 million.
2. Welding of rail joints and introduction of mechanized track maintenance in order to increase the lifetime for the rails, improve running conditions and reduce maintenance costs. Total cost US dollars 20.0 million, out of which dollars 3 million in any case will be required for welding equipment, when replacing of the first generation of rails starts in a few years time.

2.3 Comments by the Consultants

The above works are recommended in a report issued May 1980 under the UNDP/UNCTAD project: "Special Emergency Project to assist in Alleviating Congestion on the Zambia to Dar-es-Salaam Corridor".

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The repair of the land slides is an emergency work necessary for the safety of the railway.

The welding of rails and introduction of mechanised maintenance is justified by postponement of renewal of rails and by savings in maintenance costs.

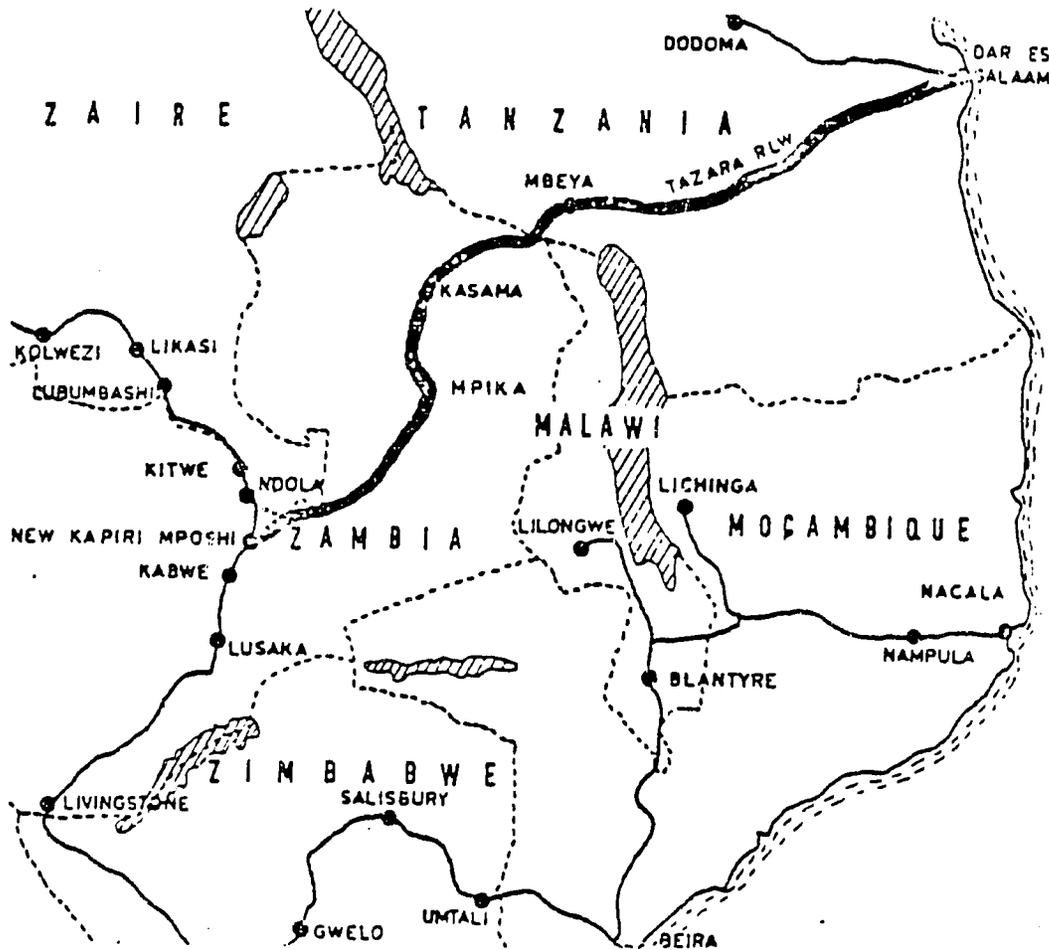
3.2 Cost

The total costs of the project are estimated at US dollars 25.0 million as specified above. Approx. 70% will be in foreign currency.

The duration of the project is estimated at 4 years.

PROJECT NO. 2.7.2

TANZANIA/ZAMBIA: SUPPLY OF 25 NOS OF MAIN LINE LOCOMOTIVES FOR TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Supply of 25 nos of 6-axle diesel-electric locomotives to replace present 4-axle diesel hydraulic locomotives being unable to operate satisfactorily.

Cost of the project: US dollars 25.0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 2-3 years

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

One of the major present restrictions on the capacity of the Tazara Railway is the poor performance of the 80-t, 4-axle locomotives. These locomotives can only haul a 1.000 t train through the mountain section by overstressing of the engines resulting in an availability as low as about 40% causing a constant lack of motive power for the trains.

Improvement cannot be expected, until heavier and more powerful locomotives (diesel-electric 6 axles - 120 t weight) are acquired in a number sufficient to cover the mountain section. Then 1.500-2.000 t trains can be operated double headed by 6-axle locomotives on the mountain stretch and 4-axle locomotives on the remaining part of the line. Eventually, all 4-axle main-line locomotives should be replaced by 6-axle locomotives.

2.2 Nature of the project

The project is supply of 25 nos 6-axle diesel-electric 2600/3000 H.P. locomotives to replace an equivalent number of the present 4-axle locomotives.

2.3 Comments by the Consultants

The project of replacing the present locomotives with a more powerful type is supported by a team of experts working on the UNDP/UNCTAD project. "Special Emergency Project to Assist in Alleviating Congestion on the Zambia to Dar-es-Salaam Corridor".

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

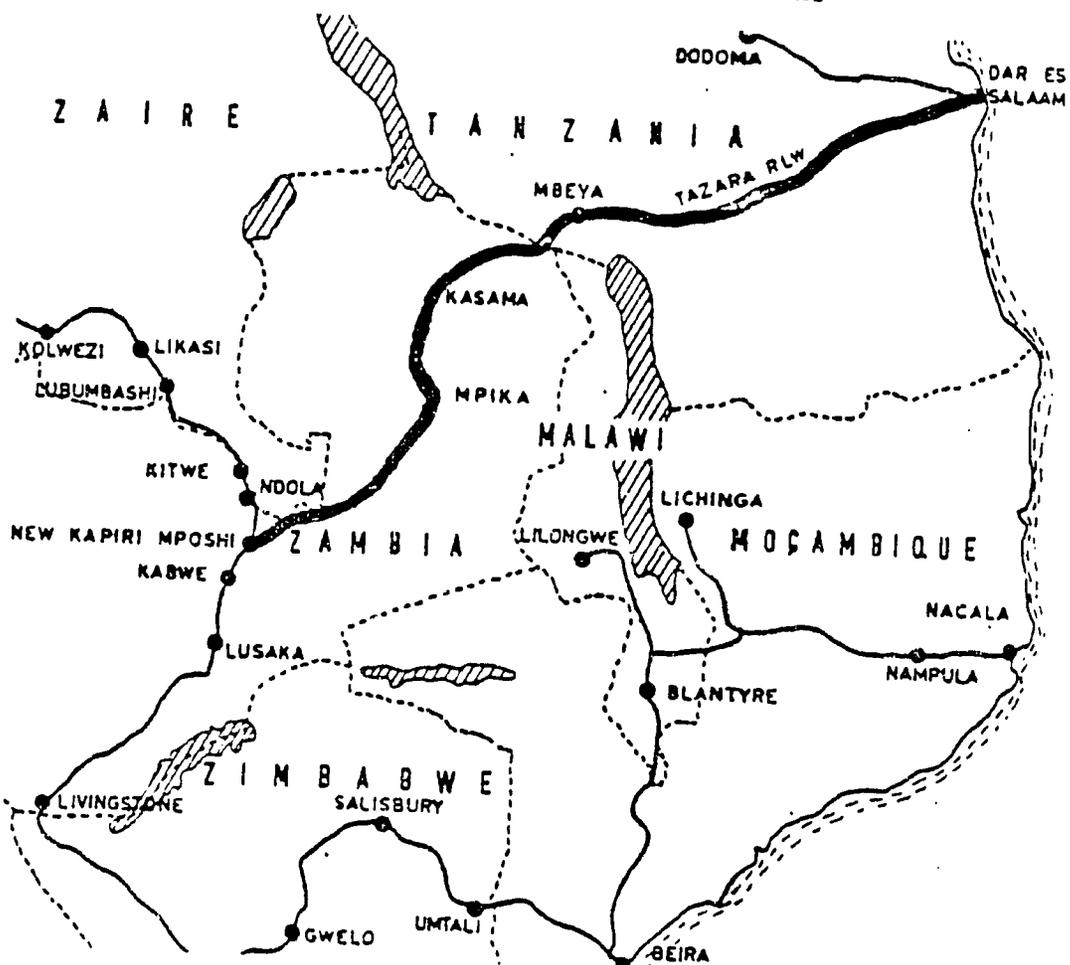
The supply of new locomotives is necessary for restoring the railway's capacity, which is seriously hampered by poor performance of the original locomotives having an availability as low as 40%.

3.2 Cost

The total cost of the project is estimated at US dollars 25.0 million, all in foreign currency.

The duration of the project is estimated at 2-3 years.

TANZANIA/ZAMBIA: SUPPLY OF WAGONS FOR TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: Supply of 400 railway wagons

Cost of the project: US dollars 20.0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

TAZARA railway has planned to purchase 318 nos high sided, 160 nos drop sided, 118 nos covered and 104 nos flat container wagons, totally 700 wagons. However, it will probably not be necessary to get all these wagons if the turn-around time is improved by the other projects, in particular by supply of more reliable locomotives. It is estimated that a total of 400 wagons is required.

2.2 Nature of the project

The project comprises supply of 400 wagons of various types.

2.3 Comments by the Consultants

Reference is made to project NO. 2.0.1 "Study on Railway Rolling Stock".

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The supply of additional wagons is considered necessary in order to meet the traffic demand and will increase the revenues from the traffic.

3.2 Cost

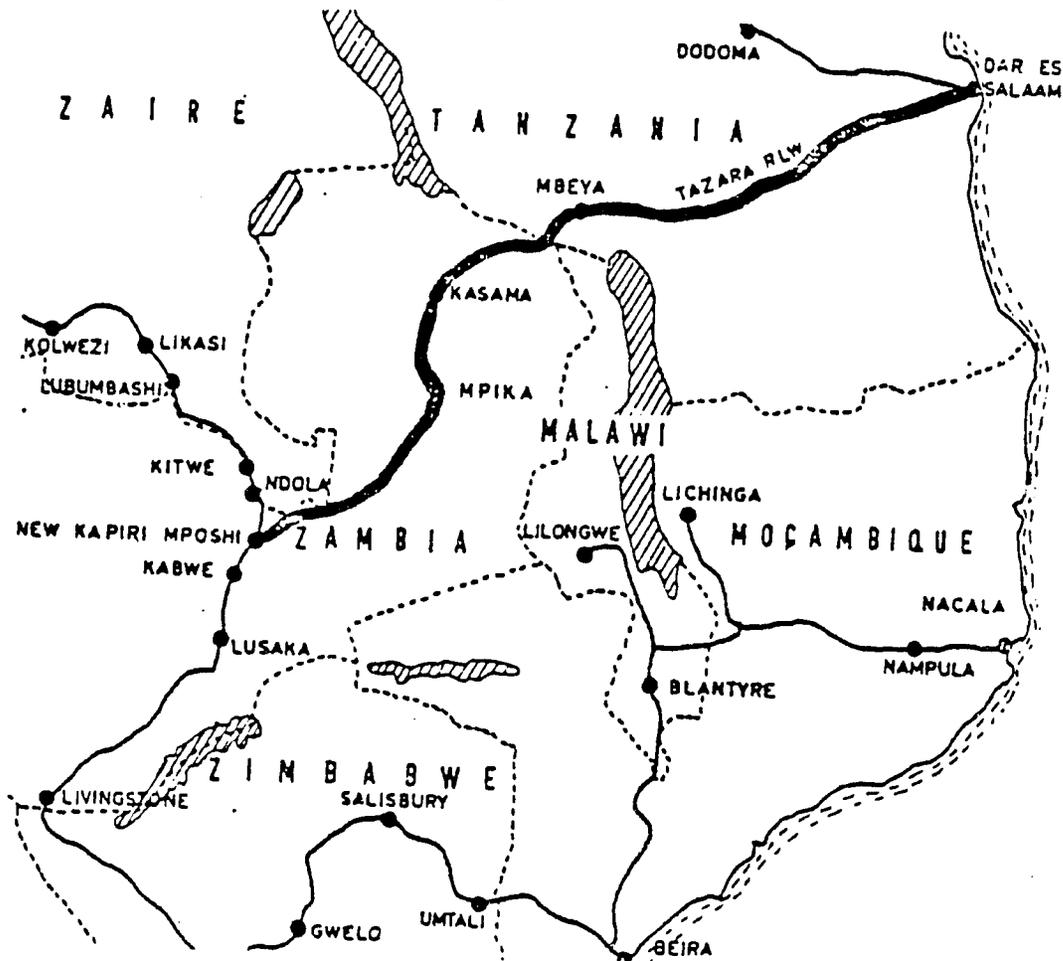
The total cost of the project is estimated at US dollars 20.0 million, all in foreign currency.

The duration of the project is estimated at 3 years.

1/5/

PROJECT NO. 2.7.4

TANZANIA/ZAMBIA: TERMINAL FACILITIES AT NEW KAPIRI MPOSHI STATION,
TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Tanzania
- Sub-sector: Railways
- Order of priority: Priority class 3: New Transport Projects
- Nature of the project: To establish storage and handling facilities at New Kapiri Mposhi Station, the junction between TAZARA and Zambia Railways.
- Cost of the project: US dollars 10.0 million (1980 value)
- Foreign currency part: Approx. 70%
- Financing required: Entire amount
- Duration: 2 years
- Desirable start: 1981
- Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

At New Kapiri Mposhi station imports are split with parts going northwards to Copper Belt and parts going southwards to the Lusaka area. Transshipment to road transport takes place to a certain extent.

The aim of the project is to establish the necessary facilities for loading/off-loading and storing of goods at the junction station.

2.2 Nature of the project

The project includes construction of warehouses, roads and cranes, mainly for handling of containers.

2.3 Comments by the Consultants

It is recommended to study whether or not it is feasible to tranship containers and other goods to be hauled by road over several hundred km parallel to the existing Zambia Railway. It seems more logic to continue by rail as far as possible and, if there are problems in the cooperation between the two railway administrations, to solve such problems directly.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

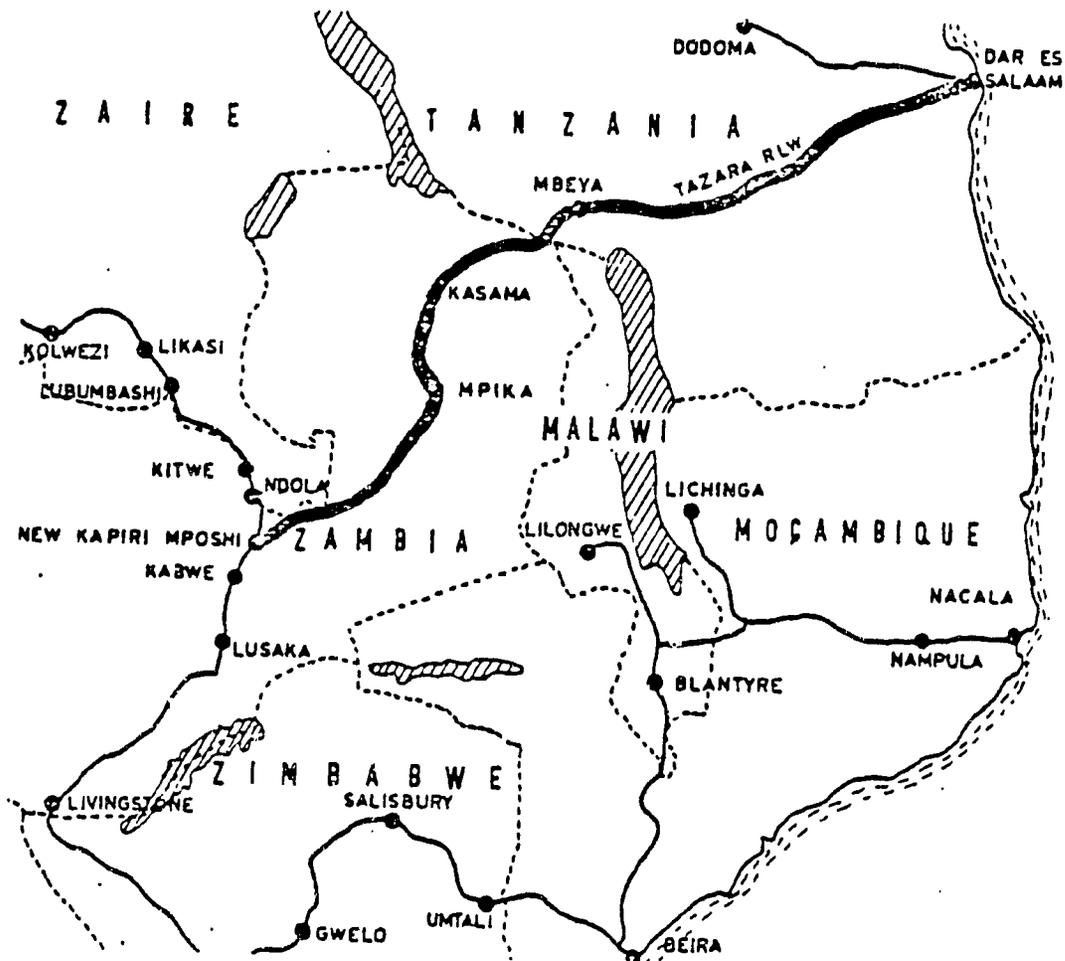
The benefits are not quantifiable.

3.2 Cost

The total cost of the project is estimated at US dollars 10.0 million with approx. 70% in foreign currency.

PROJECT NO. 2.7.5

TANZANIA/ZAMBIA: SUPPLY OF MECHANICAL EQUIPMENT TO TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To supply various items of mechanical equipment such as

- two railway emergency cranes
- two under-floor wheel lathes
- mechanized handling equipment and weigh bridges for warehouses

Cost of the project: US dollars 7,0 million (1980 value)

Foreign currency part: 100%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to speed up the different works in the railway by supply of various mechanical equipment.

2.2 Nature of the project

The project includes supply of the following equipment:

- 1) Supply of two railway emergency cranes to serve as supplement to the existing 3 cranes which are not reliable. Cost: US dollars 4,0 million
- 2) Supply of two under-floor wheel lathes to speed up re-profiling of wheels. Cost: US dollars 2,0 million
- 3) Supply of mechanical handling equipment and two weighbridges for warehouses. Cost: US dollars 1,0 million.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits are not directly quantifiable, but the following could be mentioned:

Reliable emergency cranes must be available to clear the line in case of accidents. At a recent accident the line was blocked for two days due to break-down of the existing cranes.

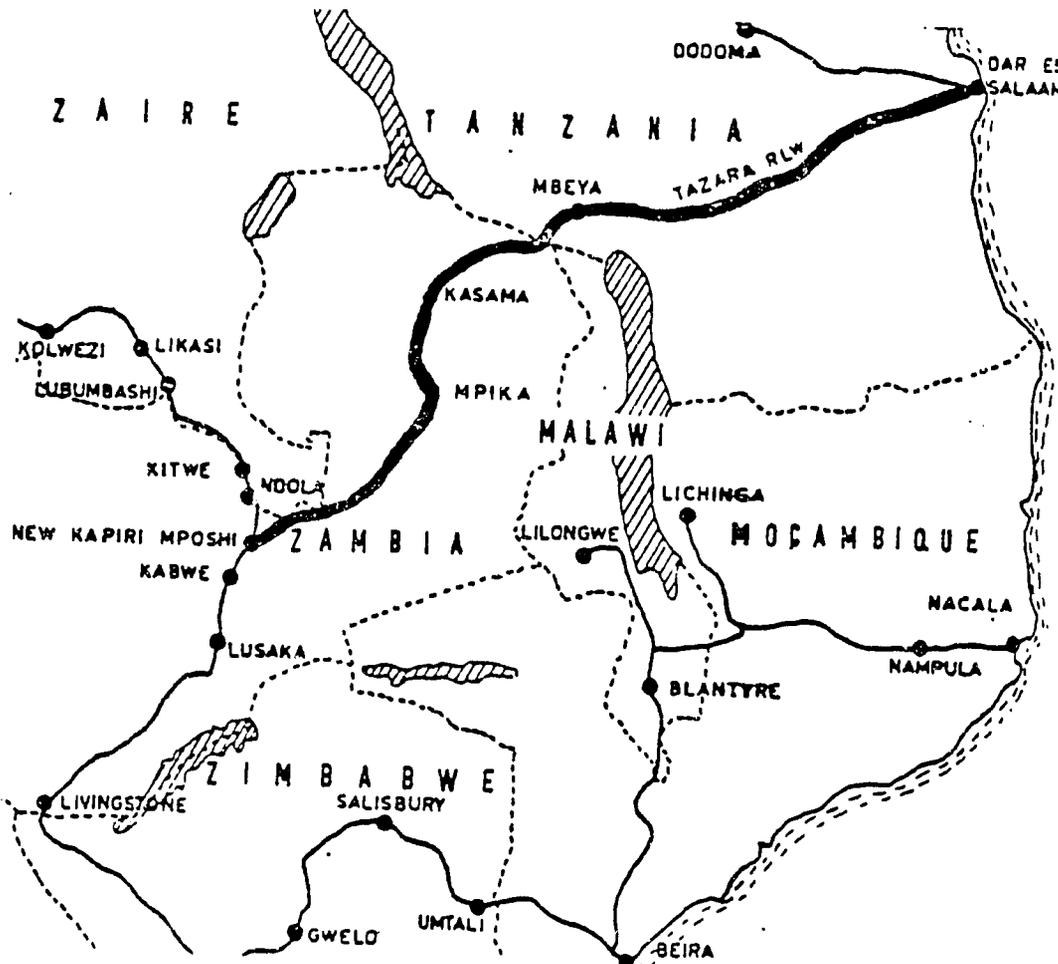
Good wheel-lathes of the under-floor type, which can profile wheels without dismantling them, can considerably decrease the time for re-profiling and thus improve the availability of wagons and locomotives.

Mechanical equipment in warehouses will speed up the operations and reduce loss from damaged goods.

3.2 Costs

The total cost of the project is estimated at US dollars 7,0 million, all in foreign currency. The duration of the project is estimated at 1 year.

TANZANIA/ZAMBIA: SUPPLY OF SIGNALLING AND COMMUNICATIONS EQUIPMENT TO TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To supply various items of equipment such as:

- automatic train stop at stations
- radio equipment for shunting
- track circuits at stations

Cost of the project: US dollars 5.0 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of the project is to increase safety and improve operation on the railway by supply and installation of certain items of signalling and communications equipment.

2.2 Nature of the project

The project includes the following:

1. Supply and installation of equipment for automatic train stop at station signals. Cost US dollars 2.2 million.
2. Supply of 35 portable radio sets for communications in shunting yards. Cost US dollars 0.3 million.
3. Supply and installation of track circuits in station tracks. Cost US dollars 2.5 million.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits are not directly quantifiable, but the following could be mentioned:

Automatic train stop is a device which activate the brakes on the locomotive if it passes a signal on "stop". One accident saved could justify the entire project costs.

Portable radios to be used for communications in shunting areas can increase the safety and speed up the operations.

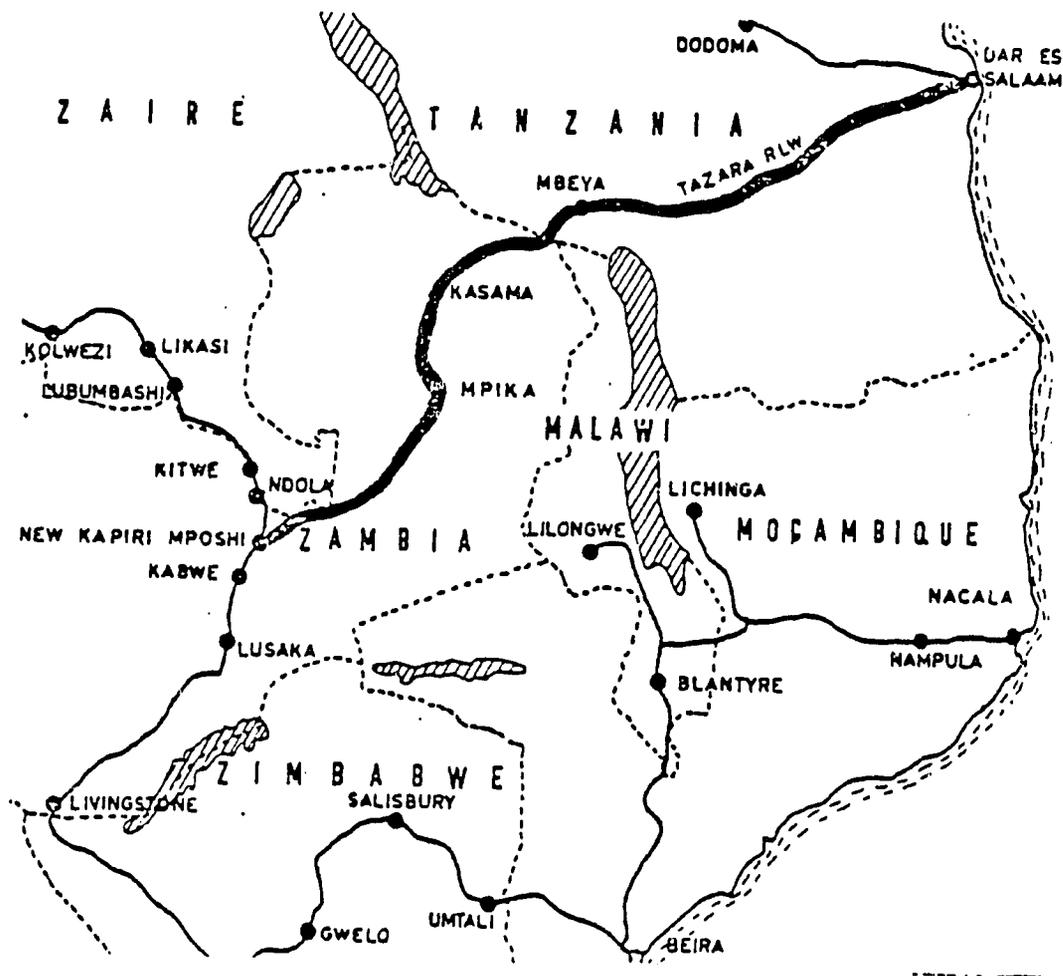
Track circuits in station tracks, which can indicate track occupation, will prevent that the station master by mistake allows a train to enter a track which is already occupied and will thus prevent accidents.

3.2 Cost

The total cost of the project is estimated at US dollars 5.0 million with approx. 90% in foreign currency.

The duration of the project is estimated at 1 year.

PROJECT NO. 2.7.7
 TANZANIA/ZAMBIA: TRAINING FACILITIES FOR TAZARA RAILWAY



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Railways

Order of priority: Priority class 3: New Transport Projects

Nature of the project: To supply and install an operations model room at the Tazara Railway School at Mpika, Zambia. To obtain scholarships for key staff to study new technology and management practice abroad.

Cost of the project: US dollars 1,0 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: Tazara

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The Railway School at Mpika, Zambia is a basic school for technicians in all departments of Tazara Railway.

The project aims at improving training facilities at the school and to make it possible to send key staff abroad for more advanced training.

2.2 Nature of the project

To set up an operations model room at the school and to obtain scholarships for training abroad of key staff.

2.3 Comments by the consultant

See also project No. 2.0.2 "Study on railway training programmes".

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits are not directly quantifiable, but training is essential for any railway administration.

3.2 Cost

The cost for the equipment for the school is estimated at US dollars 1,0 million with 90% in foreign currency. (The costs for scholarships are not quantified. The duration of the project is estimated at 1 year.

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ZAMBIA: FEASIBILITY STUDY FOR NEW RAIL LINKS CONNECTING ZAMBIA WITH NEIGHBOURING COUNTRIES AND WITH PORTS



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Railways

Order of priority: Priority class 4, Studies

Nature of the project: To study the feasibility of construction of new railway lines to connect Zambia Railways with the railways in Malawi, Mozambique, Zimbabwe and Namibia in order to establish new outlets to the sea for Zambia's foreign trade.

Cost of the project: US dollars 0,5 million

Foreign currency part: 90%

Financing required: Entire amount

Duration: 1/2 year

Desirable start: 1981

Project authority: Ministry of Power, Transport and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

Zambia Railways (ZR) network consists of 848 km main line and 426 km branch lines. In addition the Government of Zambia owns jointly with the Government of Tanzania the 1.860 km long Tazara railway to Dar es Salaam.

Zambia's existing routes to the sea are:

- the Tazara railway to Dar es Salaam port
- the southern railway routes to Mozambican and South African ports
- the Benguela railway to Lobito port.

From time to time these routes have been exposed to operational difficulties caused by physical problems, civil disturbances and political restrictions.

The aim of the project is to establish a basis for planning and construction of new railway links which would provide alternative outlets to the sea.

2.2 Nature of the project

The project is a pre-feasibility study covering the new railway links listed below and any other possible alternatives and/or combinations found during the study:

1. New railway link from Lusaka to Mchinji, joining Malawi Railways' system to give improved access to Beira and Nacala ports.

The railway link could be divided into two phases, namely

Phase 1: Mchinji - Chipata (36 km)

Phase 2: Chipata - Lusaka (640 km) or to link Chipata with Tazara railway at Serenje or Mpika.

2. New railway link from the Chipata - Lusaka link at Katete to Moatize, joining the railway system in Mozambique to give improved access to Beira port. Approx. length: 300 km.
3. New branch line from Tazara railway to Mpulungu port at Lake Tanganyika, 160 km.
4. New railway link from Kafue via Chirundu to Zawi, joining the Zimbabwe railway network, approx. 300 km. This link would be the shortest connection between Lusaka and Beira port.
5. New railway link from Chingola to Mucussueje on the Benguela railway in Angola to give improved access to Lobito port, avoiding transit through Zaire. Approx. length 760 km. The link will shorten the route from copper belt to Lobito by about 300 km.
6. New railway link to the Atlantic ocean at Walvis Bay from Livingstone via Kasungula - Caprivi Strip and Grootfontein, 850 km.

2.3 Comments by the Consultants

The following previous study reports have been issued:

"Extension of Malawi Railway to Zambia", a feasibility study by Transconsult, Canada, Sept. 1979.

"Zambia Coastal Links Transport Study", Final Report, June 1980 by Coopers & Lybrand Ass. Ltd., London.

The conclusion of the Coopers & Lybrand study is:

"... it is not possible to justify the construction of any new route for Zambia's trade on economic grounds alone, even after allowing for the possibility of continued closure of some of Zambia's main existing routes and a relatively low standard of efficiency in operating these routes ..."

However, this conclusion has been reached on the basis of rather pessimistic trade and traffic forecasts.

A new study, which will mainly be review and update the previous study, may come to more optimistic forecasts under the region's new political conditions and thus reach a different conclusion.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

Not directly quantifiable.

3.2 Cost

The total cost of the study is estimated at US dollars 0,5 million, with 90% in foreign currency. The duration of the study is estimated at 1/2 year.

PROJECT NO. 3.0.1

REGIONAL: SOUTHERN AFRICAN SHIPPING LINE

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Southern African Transport and Communications Commission

Sub-sector: Ports and Water Transports

Order of priority: Priority class 4: Study

Nature of the project: Study on the advantages of establishing a multinational shipping line for the Southern African region

Cost of the project: US dollars 0.2 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 10 months

Desirable start: 1981

Project authority: The Southern African Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The objective of the study is to decrease the costs for maritime services to the Southern African States.

The purpose of the study is to determine the economic and administrative feasibility of the establishment of a multinational shipping line and to make recommendations as to the most practical and cost-effective method to establish such a line.

2.2 Nature of the project

The study comprises:

- an analysis of various categories of present and future traffic
- recommendations of the choice of type and number of vessels adapted to the condition of the market and port facilities
- a programme of investment for the short-term period based on the economic findings of the study
- a prospective programme of investment for the intermediate-term period
- an analysis of technical and economic benefits of the project
- recommendations for planning, organization, administration and management of the line
- legal aspects of the proposed line.

2.3 Comments by the Consultants

The establishment of a regional operational shipping line by forming a consortium or a pool of existing national shipping fleets is a complex matter involving many juridical and organizational questions e. g. owner responsibility or defining main ports of call and intermediate ports.

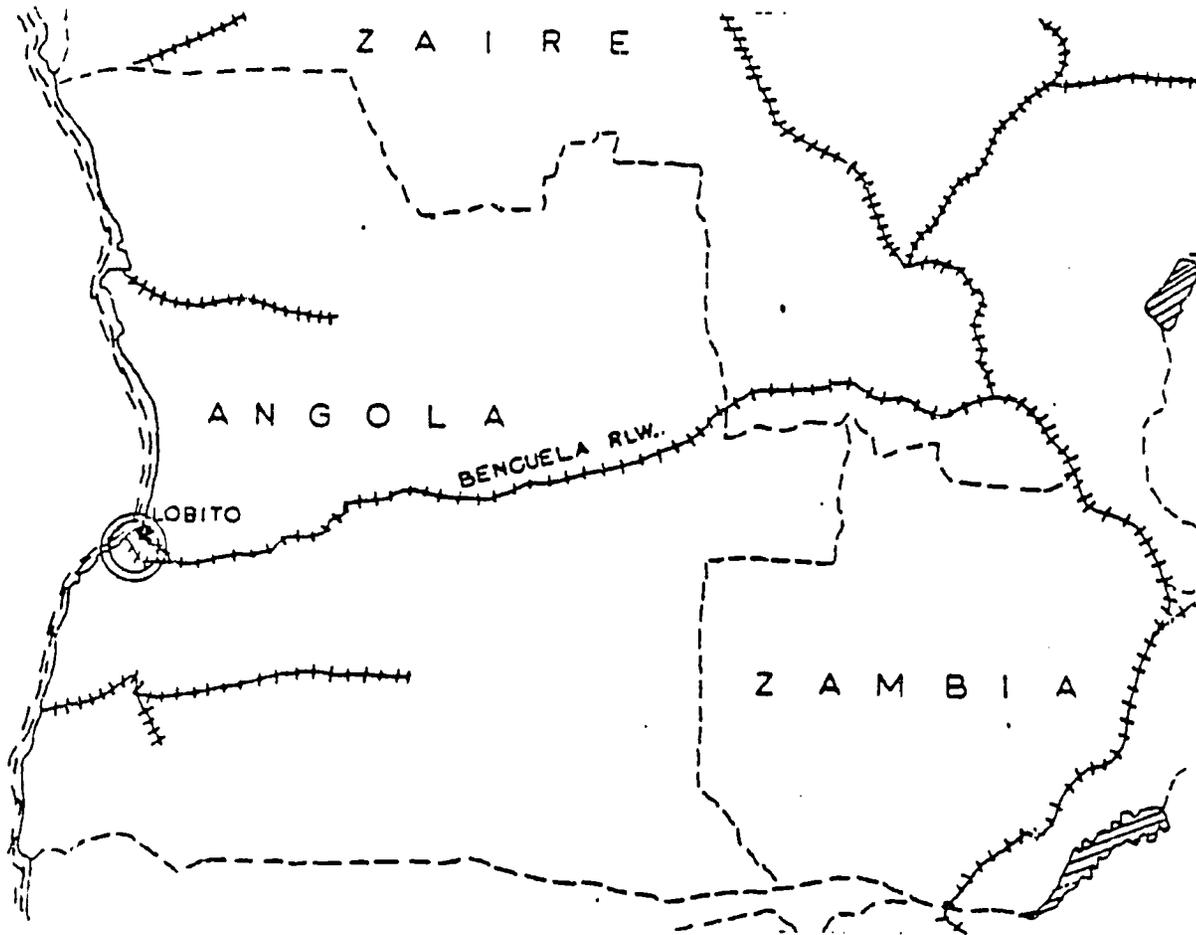
3. JUSTIFICATION OF THE PROJECT

3.1 Costs

The cost of the project is estimated at US dollars 0.20 million of which 90% will be in foreign currency.

PROJECT NO. 3.1.1

ANGOLA: MASTER PLAN FOR THE PORT OF LOBITO



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Ports and Water Transport

Order of priority: Priority class 4: Studies

Nature of the project: To define the prospects for the Port of Lobito in the form of a long-term development of port facilities and related installations as well as the connections with the overland transportation system.

Cost of the project: US dollars 1.4 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: Ministry of Transports and Communications

2. DESCRIPTION OF THE PROJECT

2. Aim and objective

The project conforms with the objective of improving the maritime services of the Southern African countries and in particular the coastal links for the landlocked ones.

Lobito is the ocean terminus of the Benguela railway which under normal circumstances is the main exit route for the copper from the copper belt in Zambia and Zaire. It is also a natural transit corridor for Zambia's trade with the western world.

Mainly due to the civil war the installation and equipment in the port have deteriorated which means rather low productivity, congestion problems etc. When the railway is rehabilitated these problems will multiply if measures to meet them are not taken beforehand.

The aim of the project is to create an instrument for the timely development of the port to enable it to meet the demands of modern maritime traffic.

2.2 Nature of the project

The project includes:

- Analysis of the commodity flows by means of transport and forecast for 1985 and 1990
- Analysis of demands on port capacities emanating from the future goods flows
- Assignment of specific areas for all logical port and port related activities and their intermediate term expansion, and indication of areas for their long-term expansion needs
- Organization of a department for co-ordination of operations, port planning and control, training of staff etc
- Establishment of a crash programme of emergency measures.

2.3 Comments by the Consultants

Extensive terms of references have already been proceeded. A quay of 995 metres is presently under construction. It is recommended that the project is started as soon as possible.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

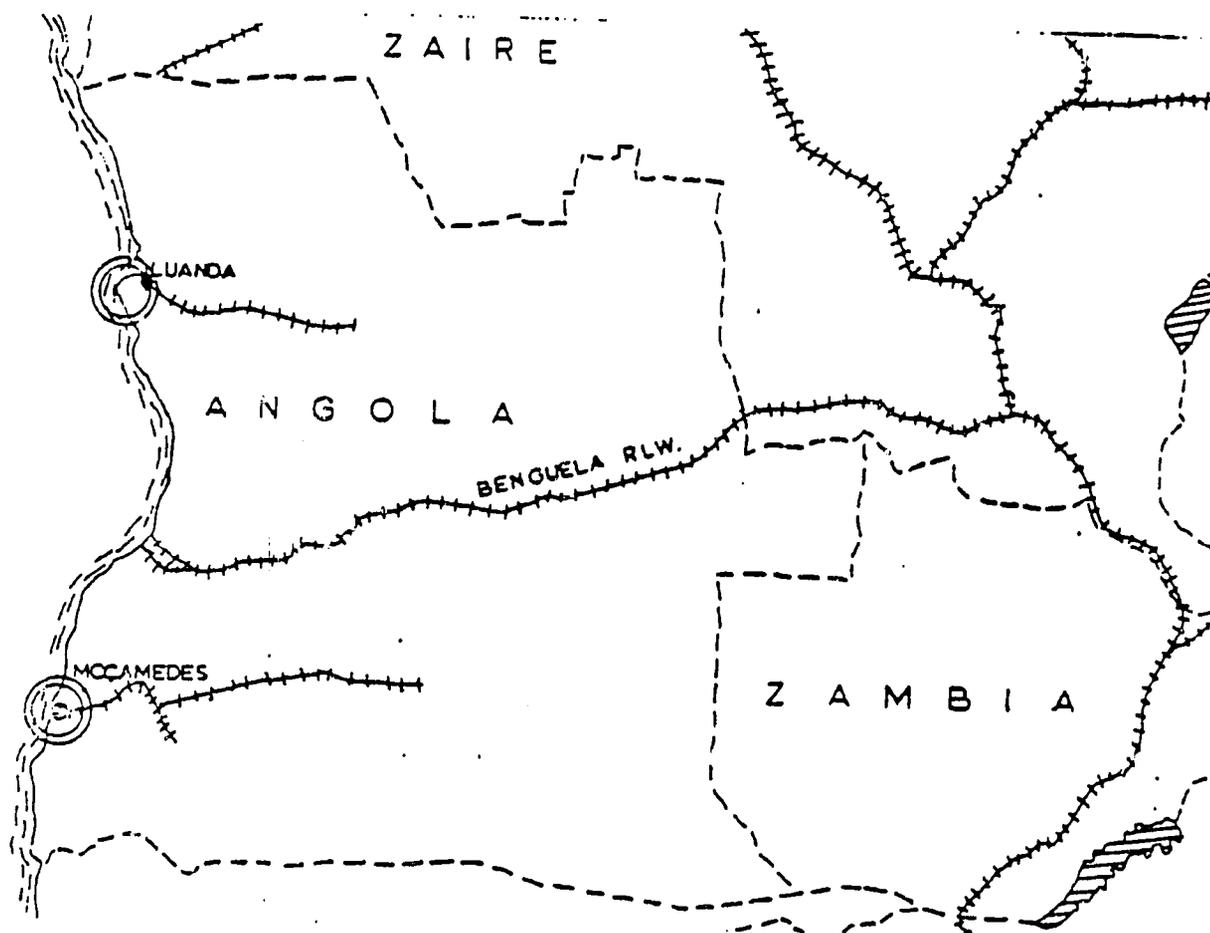
No quantified assessment of the benefits of the project has been calculated at the present time.

3.2 Costs

The cost of the project may be assessed at US dollars 1.4 million of which 30% will be in foreign currency.

PROJECT NO. 3.1.2

ANGOLA: PORTS OF LUANDA AND MOÇAMEDES
REHABILITATION AND MANAGEMENT ASSISTANCE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Ports and Water Transport

Order of priority: Priority class 4: Studies

Nature of the project: Fact finding study to specify the needs for rehabilitation and upgrading of the present cargo-handling equipment, purchase of new equipment and additional storage capacity as well as technical assistance in port management and personnel training.

Cost of the project: US dollars 0.2 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: 5 months

Desirable start: 1981

Project authority: Ministry of Transport

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The Angolan ports and especially that of Luanda has serious congestion problems. During the last years the daily number of ships in the roadstead has been between 15 and 25. By improving the productivity of the ports the turn-round time will be shortened and the congestion relieved, which would benefit Angola as well as its neighbouring land-locked countries.

2.2 Nature of the project

The project includes three items:

- Assistance to the port management authorities to establish and implement a crash programme of emergency measures.
- Visit by a cargo handling expert to specify the needs in terms of equipment, manpower and additional storage facilities.
- Visit by a vocational training expert to establish a programme for staff training including all grades from manual operational staff through technical staff to management level.

2.3 Comments by the Consultants

The staff training programme should be designed to meet the need of all Angolan ports and might be modified for use also in other Portuguese speaking African countries.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

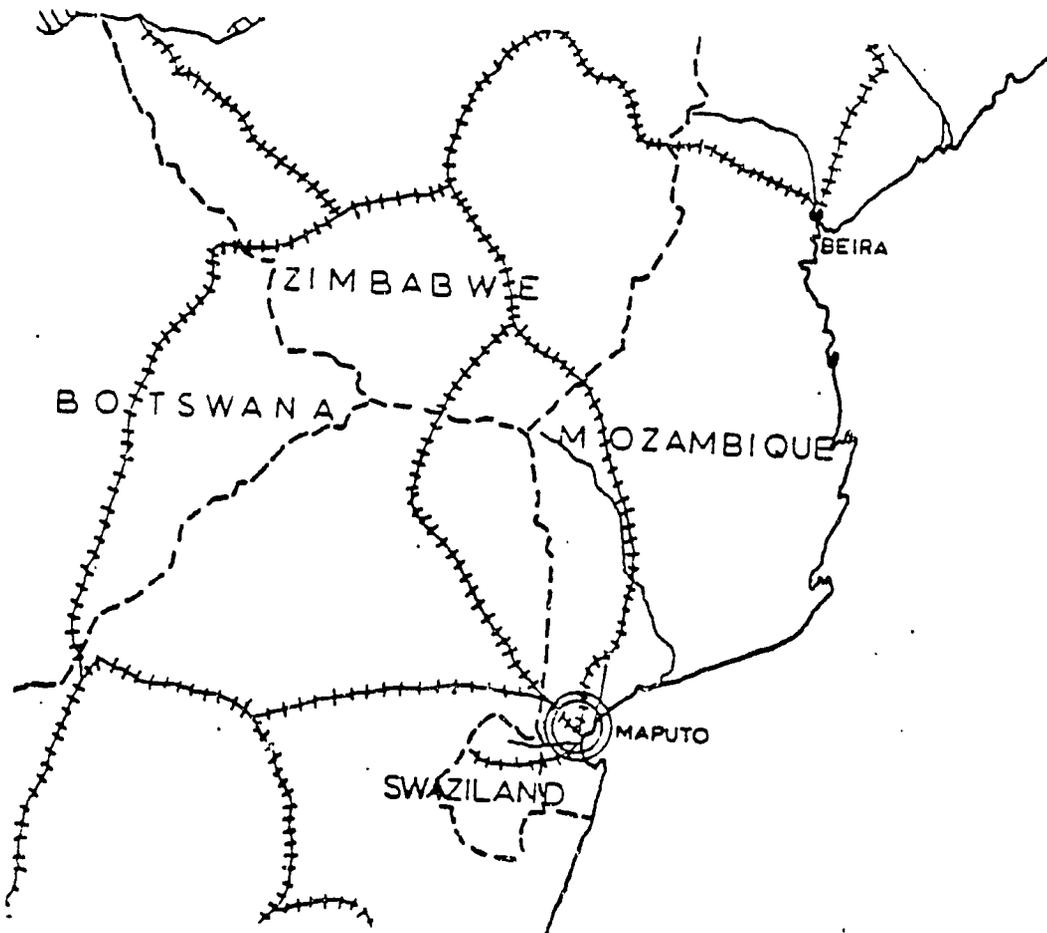
The cost of ship's time in port is very large, and has to be borne by the transported goods. Thus waiting time and inefficient cargo handling will result in higher costs for the consumers of import commodities and less net revenue from the export. A recent study assessed this additional cost at Luanda to US dollars 13.7 per ton of cargo, or a financial loss for the external trade of US dollars 16.6 million in 1978. As the economic revival of the country proceeds the importance of solving these problems are growing.

3.2 Costs

The cost of the project amounts to US dollars 0.2 million, out of which 80% will be in foreign currency.

PROJECT NO. 3.5.1

MOÇAMBIQUE: INCREASE IN CAPACITY OF THE PORT OF MAPUTO



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Moçambique

Sub-sector: Ports and water transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Deepening and widening of the entrance channel to the port of Maputo and the Matola bulk terminal, development of a coal terminal there and purchase of container handling equipment for the Maputo container wharf.

Cost of the project: US dollars 183.3 million (1980 value)

Foreign currency part: Approx. 85%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transport

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project conforms with the objective of improving the maritime services of the Southern African countries and in particular the coastal links for the land-locked ones.

The port of Maputo serves Botswana, Swaziland, Zimbabwe and other countries in the region with large natural resources of coal and ores only waiting for adequate transport means to be exploited. However, navigation in the channel at present is difficult for larger vessels because of restricted depth and silt accumulation.

The aim of the project is:

- to develop a coal terminal at Matola with loading facilities for vessels of 80,000-100,000 DWT
- to deepen the channel to allow these vessels to exit after loading without unreasonable waiting for tidal conditions
- to purchase cargo handling equipment for serving large cellular container vessels which then will be able to call at the Maputo container wharf.

2.2 Nature of the project

The project comprises three parts:

- Dredging of the channel to permit the passage of large vessels to the Matola terminals using normal tides as well as of container vessels to the Maputo container wharf on all tides.
- Construction of a coal terminal at Matola for the coal exports mainly from Zimbabwe, Swaziland and Botswana.
- Purchase of two container cranes for the service of cellular container vessels and two transtainers for stocking and retrieving containers at the container yard.

2.3 Comments by the Consultants

Maputo is the most important of the Mozambican ports. At present it represents about 70% of the total tonnage handled in all the ports of the country. The railway net links the port to Botswana, Swaziland, Zimbabwe and other countries in the region and makes it one of their natural outlets. Thus about 70% of the traffic is transit cargo to and from the neighbouring countries.

According to our forecasts this proportion is expected to grow steadily during the period and reach the 90% mark already in 1990.

Assuming sufficient capacity we estimate that the quantities to be handled at the port will be (in million metric tons):

	<u>1980</u>	<u>1990</u>	<u>2000</u>
Total	5,2	23	26,2
Of which domestic	1,5	2,2	3,0
% transit	71	91	39

At present the largest fully loaded vessel that can freely call at the port is 20,000 DWT. However, with tidal advantage 60,000 DWT vessels have exited after loading at the Matola Ore Wharf. Large container ships are usually sailing on a tight schedule and are not supposed to wait for high tides. The steadily increasing container traffic which now has to be handled either by ship's gear or by tandem cranes is expected to reach 60 000 in 1985 and about 100 000 in 1990. The proportion transit cargo is at least the same as for other traffic. The Maputo container and steel wharf has a combined length of 660 m and an adjacent bitumenized area of 35 hectares with expansion possibilities of another 30 hectares. The proposed cranes should also handle some of the steel cargo.

In 1977 the British firm of consulting engineers, Bertlin and Partners, carried out an offshore geophysical survey of the areas for the alternative channel proposals. It is recommended that this survey is supplemented by a borehole investigation and further siltation studies to check out the best channel alignment on which the dredging work may be based.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The benefits of the dredging project are mainly made up from the possibility to use bigger vessels for the large bulk commodities coal and crude oil. Assuming that the coal terminal will be operating in the end of 1984 and that the average vessel size in the dredged channel will increase from 40 000 DWT to 60 000 DWT the net present value 1981 of the savings on sea transport costs for the projected coal quantities until the year 2000 will by using a discount rate of 10% amount to US dollars 180 million. Even if only half of this is realized in reduced sea freight costs the coal traffic alone will be able to pay for the dredging project.

The net present value from savings on crude oil traffic calculated in the same way is US dollars of million. The benefits from the container traffic cannot be quantified in monetary terms but it must be stressed that a deeper channel is a pre-requisite for the development of regular container services over Maputo. This also applies to the proposed container handling equipment.

The consulting firm Soros Associates has done an engineering study on the proposed coal terminal and also shown that the project is economically viable under a wide range of different circumstances. Thus with a repayment period of 15 years and a very reasonable handling cost of US dollars 2.5 per ton the internal rate of return would be at least 15% for the predicted traffic during this period.

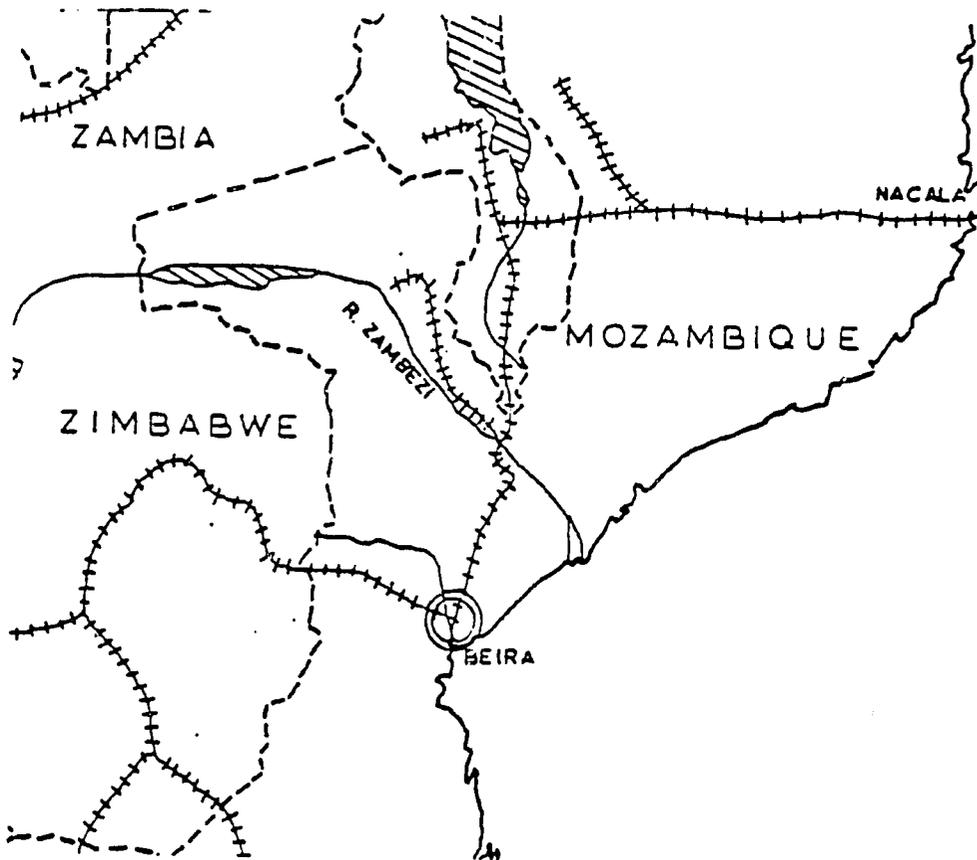
MOZAMBIQUE:
Project No. 3.5.13.2 Costs

The total cost of the project is estimated at US dollars 183.3 million broken down as follows and out of which 85% will be in foreign currency:

	<u>Million US dollars</u>
Bore-hole investigation and siltation studies	2.0
Enlargement of the channel	65.0
Coal terminal	65.6
Equipment for the container terminal	9.5
Total cost	<u>183.3</u>

PROJECT NO. 3.5.2

MOZAMBIQUE: INCREASE IN CAPACITY OF THE PORT OF BEIRA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Ports and water transports

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Deepening and widening of the entrance channels and construction of two deep-water berths

Cost of the project: US dollars 158,3 million (1980 value)

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project conforms with the objective of improving the maritime services of the Southern African countries and in particular the coastal links for the landlocked ones.

Beira, on the left bank of the Pongué River near its estuary, is the natural port of central Mozambique including the province of Tete with its large coal deposits. It also serves Zimbabwe, Malawi, Zambia and other landlocked countries in the region. The port is situated some 20 km from the open sea. Access is gained through a dredged channel with a minimum depth of 5,5 m below chart level. This also defines the all-time allowed draft. However, during high tides vessels with draughts of 9 m, i. e. about 20.000 DWT, are able to enter the port. It is not unusual that these small ships are unduly delayed by adverse tide conditions.

The aim of the project is to remedy these poor conditions by providing the port with infrastructure adapted to modern maritime transport needs.

2.2 Nature of the project

The project consists of:

- Dredging of the entrance channel to permit the passage of larger vessels to the Franquia deep water area
- Design and construction of two deep water berths in this area.

2.3 Comments by the Consultants

The geographical location of the port of Beira with rail connections to Zimbabwe, Zambia, Malawi and beyond makes it the natural port not only for the central zone of Mozambique but also for large parts of the external trade of these landlocked countries. Therefore the development of Beira port will be of vital importance for the whole region.

The British firm Bertlin and Partners, consulting engineers, has made a prefeasibility study on the deepening of the harbour entrance and the construction of two deep water berths, sited at the Franquia. Based on their findings it may be concluded that there is a case for deepening the harbour to enable fully laden vessels of at least 40.000 DWT. By accepting some delays it then would be possible to serve fully laden carriers of up to 60.000 DWT and 80.000 DWT vessels partloaded to 90% capacity.

However, the development of this port would be heavily dependent on the coal traffic as without it there may not be sufficient reason for deepening the entrance except by a small amount.

There are two possible ports for exporting coal from the Moatize fields - Beira and Nacala. On the basis of data available when the prefeasibility study was made the consultants considered Beira the better one although the Nacala route was found competitive in an economic comparison of coal transport costs. The main reasons for this was the broader influence which the development of Beira would have on the Mozambique economy and the strategical advantages of the Beira route as it is wholly within Mozambique whereas the rail route for Nacala passes through Malawi.

Since then new vast coal deposits have been discovered further north of Lake Cahora Bassa. The additional studies which have to be made on the routing of coal must consider these facts but also take into account the consequences not only for Mozambique but also for the landlocked countries, especially Zimbabwe, should Beira be relegated to the role of a secondary port. The studies should also include the possibility of using the Zambezi River or part of it for transporting the vast quantities in question.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The port of Beira has a potential for a very large throughput provided that the facilities are there and arrangements made for handling the traffic. Bertlin and Partners have made economic appraisals of the project for a wide range of different size ships and various assumptions as to commodity flows and dredging costs. Nearly all the analyses presented give a good economic return both on the test that NPV's should be positive and BCR's should exceed unity. The only exception is that if coal is not exported through Beira it would not be worth while to improve the entrance for ships larger than about 40.000 DWT. The best return under standard conditions is obtained for channel enlargement for fully laden 40.000 DWT vessels and berth accommodations for 70.000 DWT ships which give the NPV US dollars 157 million with BCR 3,3.

For channel enlargement for vessels of 70.000 DWT fully laden the investment costs will be about 50% more, NPV US dollars 153 million and BCR 2,5.

3.2 Costs

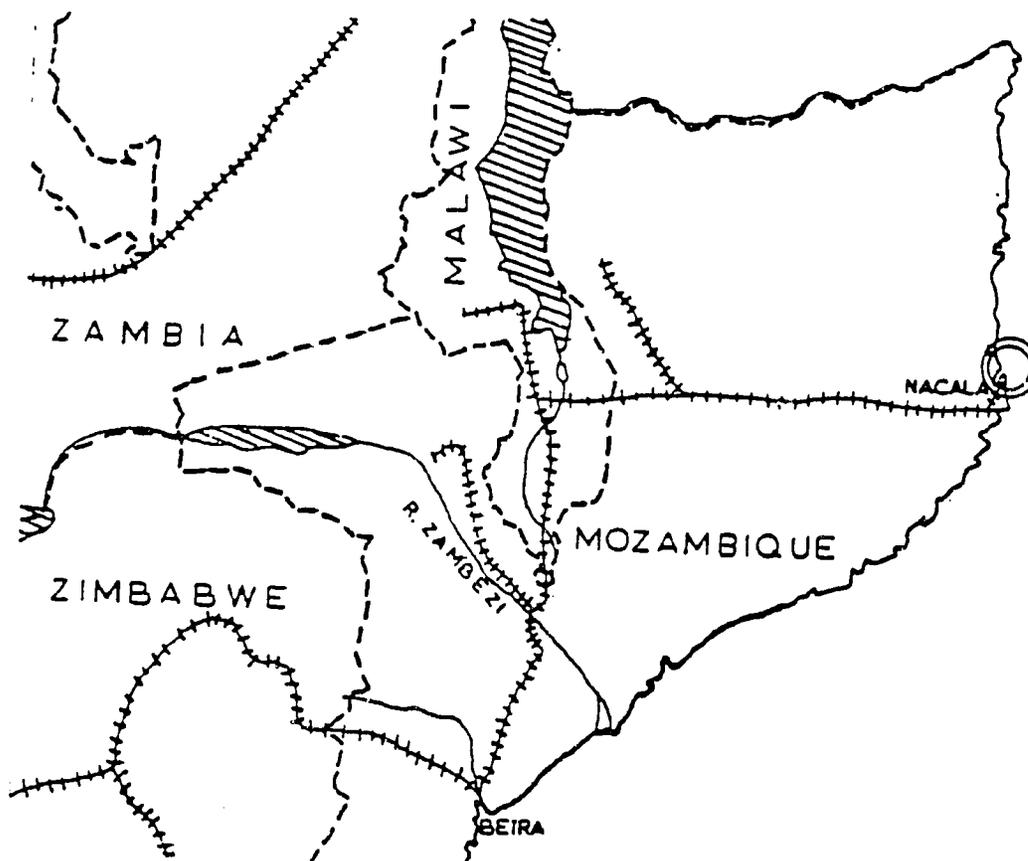
The total cost of the project is estimated at US dollars 158,3 million broken down as follows of which 90% will be in foreign currency:

	<u>Million US dollars</u>
Further engineering investigations	2,0
Channel improvements	86,9
Navigation aids	3,2
Berth design and construction	<u>66,2</u>
Total cost:	158,3

The study on the coal mines development and the routing of coal exports indicated in section 2.3 is not included.

PROJECT NO. 3.5.3

MOZAMBIQUE: DESIGN AND CONSTRUCTION OF CONTAINER TERMINAL AT THE PORT OF NACALA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Ports and water transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Design and construction of container wharf and purchase of container handling equipment

Cost of the project: US dollars 27,1 million (1980 value)

Foreign currency part: Approx. 65%

Financing requirements: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Ministry of Ports and Surface Transports

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project conforms with the objective of improving the maritime services of the Southern African countries and in particular the coastal links for the landlocked ones.

Nacala is the terminal of the 615 km Nacala - Malawi railway which through Malawi railway links it to the central railway net and also through Malawi to the Zambian border. The steadily increasing container flows, mostly to and from Malawi, is now handled at the general cargo berth with inadequate equipment. Thus it is the aim of the project to provide the port with a container terminal with adequate equipment to meet the demands of this kind of traffic.

2.2 Nature of the project

The project includes:

- Design and construction of a 400 m container wharf with adjacent bitumen surfaced area for handling and storing containers
- purchase of one container crane and one transtainer for stocking and retrieving units in the stockyard.

2.3 Comments by the consultant

Nacala is the third largest of the Mozambique ports. It has exceptional advantages as to access navigability, shelter and depth. Situated in the Bay of Bengo which forms the inner part of Nacala Bay, it offers easy possibilities of constructing additional deep-water berths for every kind of vessel, handling and storage areas as well as adjacent industrial development areas with favourable ground conditions.

The container traffic is steadily growing and the rate now is more than 1.000 units a month. This figure is expected to reach the 2.000 mark by the end of next year. The development of the traffic is seriously hampered by two factors - the lack of adequate facilities and the poor condition of the railway track (see project no. 2.5.5).

Assuming these deficiencies will be remedied Nacala has possibilities to become a central container port for the African east coast with feeder services to shallow draft ports in the region.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

No quantified assessment of the benefits of the project has been made. However, it is clear that if the port is to continue to be the transit link for landlocked Malawi and - to a lesser extent - Zambia, it must be provided with infrastructures suited to modern maritime transport characteristics.

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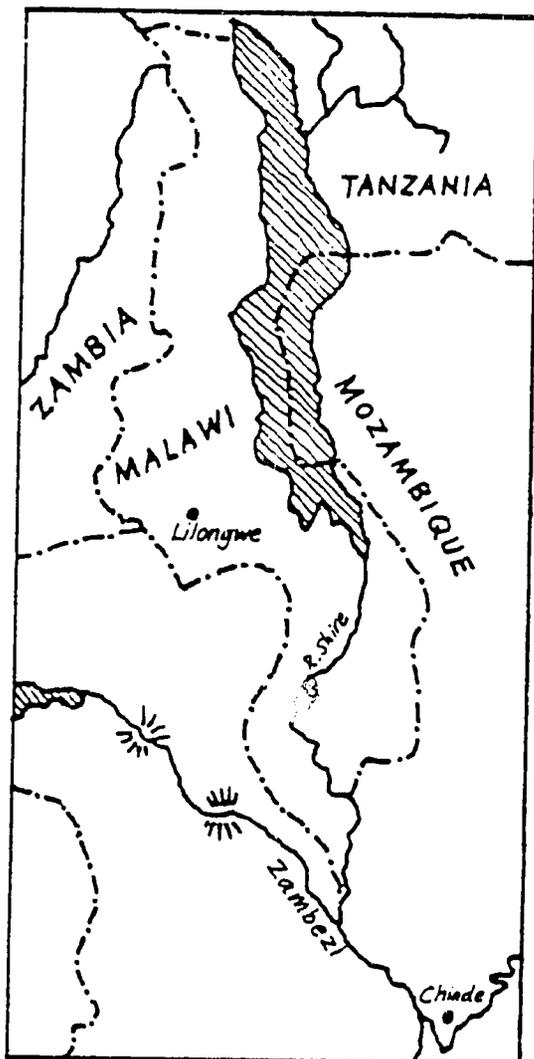
3.2 Costs

Extensive bathymetric surveys, soil investigation and engineering studies are already completed according to which the cost of the project will total US dollars 27,1 million broken down as follows of which 65% will be in foreign currency.

	<u>Million US dollars</u>
Design and construction	20,7
Purchase of equipment	<u>6,4</u>
Total cost:	27,1

PROJECT NO. 3.7.1

TANZANIA: DEVELOPMENT OF NAVIGATION ON LAKE MALAWI/NIASSA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Ports and Water Transport

Order of priority: Priority class 4: Studies

Nature of the project: Feasibility study of the possibility to establish viable integrated services on Lake Malawi/Niassa

Cost of the project: US dollars 0.4 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: One year

Desirable start: 1981

Project authority: Ministry of Transports and Communications

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The objective of this project is to improve the efficiency of inland water transport. It aims at laying down the conditions for establishing shipping services for the entire lake, i. e. for all three countries around it.

2.2 Nature of the project

The study shall consider the following questions:

- The conditions of including Mozambique and Tanzania in the navigation services which now only calls at Malawi ports
- Changes in the water level
- Necessary terminal facilities and their localization
- Terminal connections to the existing rail and road system to foster the development of integrated traffic systems
- Need for navigational aids and co-ordination of communications
- Additional shipyard and equipment for vessel repairs
- Personnel training programmes and necessary facilities.

2.3 Comments by the Consultants

Malawi Railways successfully operates passenger and cargo traffic on the lake. Any judicial questions concerning the use of the lake also by the two other countries should be sorted out.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

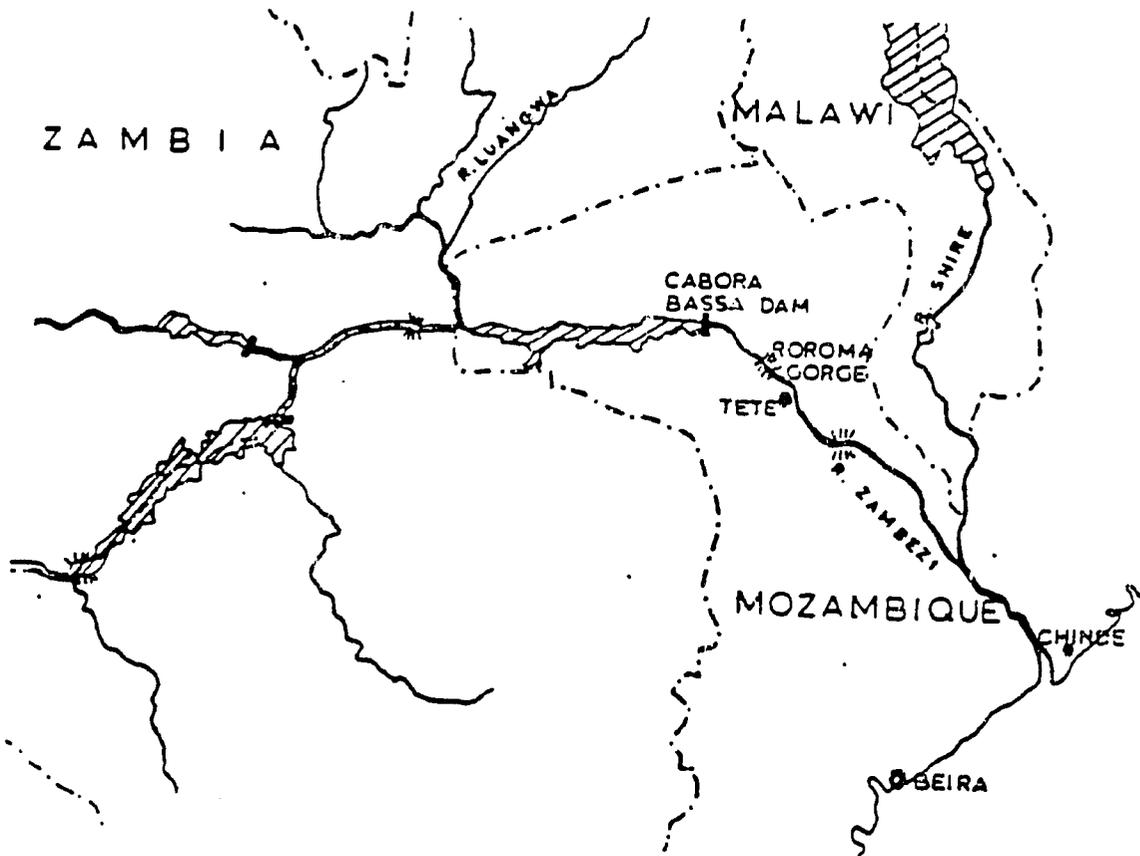
The cost per ton/km of water transport are usually much lower than the ton/km cost of any other transport mode. The necessary transfers between ship and rail/road may however offset the savings.

3.2 Costs

The cost of the study is estimated at US dollars 0.4 million of which 80% will be in foreign currency.

PROJECT NO. 3.8.1

ZAMBIA: NAVIGABILITY OF THE ZAMBEZI RIVER



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Ports and Water Transports

Order of priority: Priority class 4: Studies

Nature of the project: Prefeasibility study to establish the economic feasibility of navigation on the Zambezi and Lake Cabora Bassa taking into account the commodities to be transported as well as the size and type of vessels to be used.

Cost of the project: US dollars 0.3 million (1980 value)

Foreign currency part: Approx. 80%

Financing required: Entire amount

Duration: 6 months

Desirable start: 1981

Project authority: Ministry of Power, Transport and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project has the objective of promoting inland water transport in the region. The aim is to establish the feasibility of using Lake Cabora Bassa and the Zambezi for the transport of mineral cargoes in large quantities from deposits in Zambia, Zimbabwe and Mozambique.

2.2 Nature of the project

Reviewing earlier studies made on the subject and evaluating their findings in the context of the latest knowledge of the natural resources in the influence region.

An independent study of the type and size of ships possible to use for navigation on the whole system or part of it. The study should be made at a prefeasibility level of detail.

A program for more detailed investigations should the appraisals indicate that there is a case for this.

2.3 Comments by the Consultants

The study of the navigability on the Zambezi River system should be made in context with an integrated study on the transport of mineral cargo and other bulk commodities from the Zambezi Basin. Such a study would be of interest to Malawi, Mozambique, Zambia and Zimbabwe.

3. JUSTIFICATION OF THE PROJECT

3.1 Costs

The costs for the proposed study have been estimated to US dollars 0.3 million of which approximately 80% will be in foreign currency.

PROJECT NO. 4.0.1

TANZANIA: FLIGHT TESTING OF NAVIGATION AIDS

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Airports and air transport

Order of priority: Priority class 4: Studies

Nature of the project: Feasibility study of regional co-operation in flight testing of navigation aids

Cost of the project: US dollars 0,04 million

Financing required: Entire amount

Duration: 2 months

Desirable start: 1981

Project authority: Southern Africa Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The project has the objective of establishing, on a co-operative basis, a flight testing unit for calibration of aids to navigation and landing.

International requirements for testing of facilities for navigation and landing are laid down in ICAO Annex 10. ILS, VOR and DME facilities have to be regularly calibrated at least twice per year.

There is a shortage within the region of reliable aircraft to do this calibration; heavy reliance has to be placed on external resources. This often results in failure to get the service when it is wanted and the arrangement is very expensive. No state within the sub-region can establish an efficiently economic flight testing unit only for its own needs, because although the unit is very important to safety, it will not be utilized enough.

2.2 Nature of the project

Study of the feasibility of regional co-operation in flight testing of aids to navigation and landing.

The projected study should at least contain the following parts:

- collecting of information on present procedures for flight testing within the region
- inventory of requirements for flight testing including number and types of facilities to be tested
- recommendation of type of aircraft and flight inspection equipment that should be used
- possible solutions for the co-operation within the region
- economic analysis, financing, management, implementation plan etc.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The safety of air transport is greatly depending on the proper function of radio navigation and landing aids and to achieve this goal regular flight testing is necessary.

3.2 Costs

One expert to undertake a mission during 2 months. Estimated to US dollars 0,04 million.

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PROJECT NO. 4.0.2

REGIONAL: FEASIBILITY STUDY ON CO-OPERATION IN CIVIL AVIATION

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by several Governments
Sub-sector: Airports and air transport
Order of priority: Priority class 4: Studies
Nature of the project: Feasibility study for co-ordination in different fields of civil aviation
Cost of the project: US dollars 0,2 million
Foreign currency part: 100%
Financing required: Entire amount
Duration: 1 year
Desirable start: 1981
Project authority: Southern Africa Transport and Communications Commission

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of this feasibility study would be to ascertain whether and in what areas of civil aviation co-operation within the region would be viable.

The study would cover:

- aircraft fleet utilization/standardization
- airline integration and joint operation
- engineering and maintenance
- spare parts
- networks and scheduling
- air traffic services and navigational aids
- flight testing
- airworthiness
- training
- licencing

2.2 Nature of the project

This project consists of a feasibility study on regional co-operation in civil aviation. Tentatively it is suggested that the study should cover:

- an inventory of the resources available or required within the areas in which co-operation is anticipated
- analysis of ways and means of co-ordination in each area of interest
- the feasibility of establishing an agency for the pooling of aircraft, spare parts, maintenance etc
- economic analysis, financing, management, implementation plan etc.

2.3 Comments by the Consultant

It is recommended that initially a pre-feasibility study be performed by one consultant during a period of one year. The study should be made in close co-operation with the aviation authorities and airline operators within the region and with the objective of identifying areas in which co-operation would be most feasible. Within each area a preliminary concept of co-operation should be presented. The consultant should also recommend terms of reference and manpower required for further feasibility studies of the areas identified. The studies should be grouped in two areas:

- a) of interest to aviation authorities, and
- b) of interest to airline operators.

It is anticipated that studies within group b) above would include co-operation with an airline manufacturer and may result in a proposal on establishing a pooling agency within the region.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

By implementation of the recommendations of this study and further feasibility studies the result is expected to be a better utilization of aviation resources within the region, i. e. training facilities, aviation specialists, aircraft fleet, spare parts, maintenance facilities etc and thereby a reduction of the costs of administrations and airline operators.

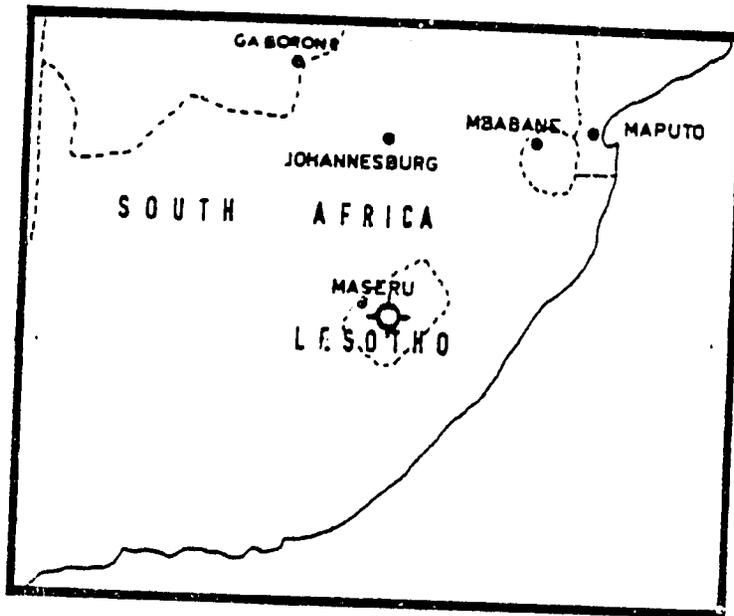
As an example, the costs of spare parts for the first aircraft in a fleet could be estimated to 40-50 per cent of the total cost of the aircraft while the corresponding cost for each succeeding aircraft is only roughly 10 per cent. It is obvious that a pooling of spare parts will reduce the costs considerably for each airline operator co-operating in such a pool.

3.2 Costs

This project is estimated to US dollars 0,2 million.

PROJECT NO. 4.3.1

LESOTHO: NEW AIRPORT



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Airports and air transport

Order of priority: Priority class 3: New transport projects

Nature of the project: Construction of a new airport for Lesotho. The following parts are not yet committed: buildings, navigational aids and communications, and meteorological equipment.

Location: About 15 km south of the capital, Maseru

Cost of the project: US dollars 55-60 million

Financing required: US dollars 14 million, the rest already committed

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Transport, Telecommunications and Postal Services

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

Existing airport at Maseru has severe operational restrictions and accepts only light and commuter-type aircraft. It cannot be upgraded for safe operations with medium-size aircraft. As air transport is of vital importance to Lesotho, a decision is taken to build a new airport for domestic and international air services. The airport will be located 15 km from Maseru, adjacent to the main road from Maseru to the south.

When the new airport is in operation, the regional services are planned to expand thus reducing the dependence on South Africa for external transports. Some form of co-operation with neighbouring countries is also considered to widen the scope of operation.

The main part of the financing of the airport project is committed covering the management and supervision of the project, construction of a 3.200 m runway with taxiway and apron, airfield lighting and electrical power supply and fire and rescue vehicles.

This project aims at adding to the main project the necessary buildings, navigation and communication aids and meteorological equipment.

2.2 Nature of the project

The project includes the following:

- Buildings, comprising a terminal, aerodrome control tower, an administrative block, fire and rescue buildings and service buildings with auxiliary works
- Navigational and communication aids
- Meteorological equipment.

2.3 Comments by the consultant

The building and equipment in this project are required to bring the airport into operation. It is therefore necessary that funds should be made available for the investment to make it possible to commence the implementation of the new airport programme. Funds for acquisition of teletechnical aids should include technical assistance for staff training.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

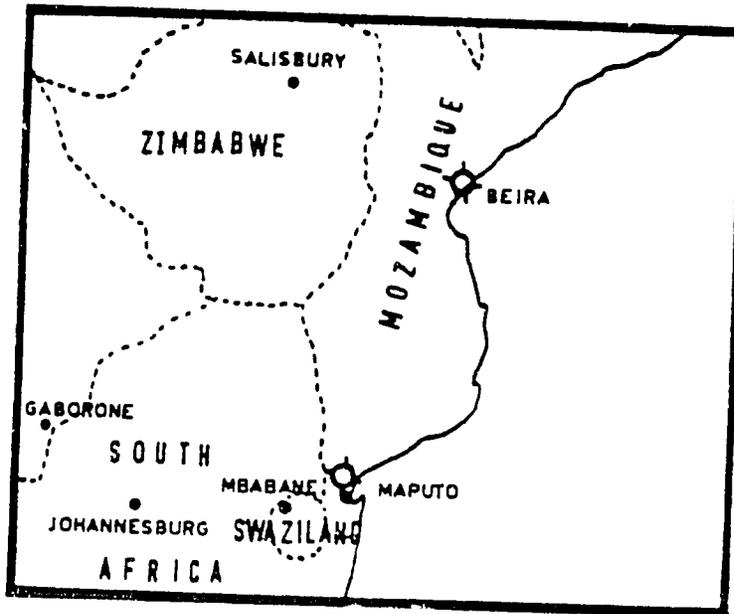
The new airport is vital to Lesotho in increasing the air traffic safety and making possible direct air service to countries outside of South Africa. It also contributes considerably to the development of internal air services.

3.2 Costs

The total cost of the project is estimated at US dollars 55-60 million out of which 11 million are not yet committed.

PROJECT NO. 4.5.1

MOZAMBIQUE: REHABILITATION OF AIRPORT LIGHTING



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To rehabilitate the airport lighting system at the two main airports in Mozambique.

Cost of the project: US dollars 5 million

Foreign currency part: Approx. 95%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Aeroportos de Moçambique E.E.

105

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The main airports of Mozambique at Maputo and Beira airports are both used for international and domestic traffic. Maputo is the base of the Mozambique airline company, LAM. The aerodrome lighting systems, including the power supply, are generally in bad condition.

The aim of this project is to bring the lighting system at Maputo and Beira up to an internationally accepted standard.

2.2 Nature of the Project

The project includes the following:

- crash programme
- procurement and installation of new lighting systems at Maputo and Beira, including rehabilitation of stand-by power supply.

Engineering design is initiated. Funds are committed for the design, management and supervision of the project.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The reliability of the airport lighting system is of vital importance for safe operations not only during nights but also in fog and other poor weather conditions. This project will bring into full operation the lighting systems of Maputo and Beira and thereby, together with the improvements proposed for navigation and landing aids (of Project NO. 4.5.2), secure safe operations for international and domestic traffic.

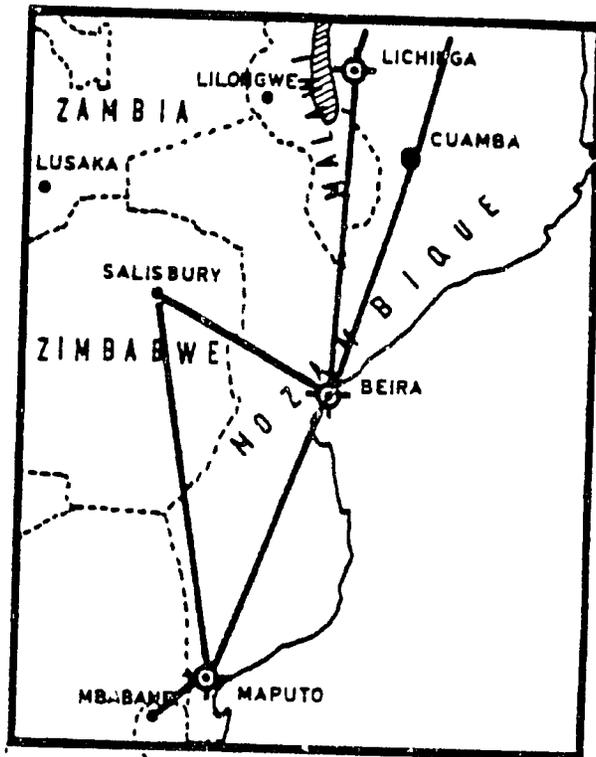
3.2 Costs

Estimated to US dollars 5 million.

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PROJECT NO. 4.5.2

MOZAMBIQUE: NAVIGATION AND LANDING AIDS



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To replace the instrument landing systems (ILS) at the two main airports and to upgrade the navigation aids at airports and en-route.

Cost of the project: US dollars 3 million

Foreign currency part: 100%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Aeronortos de Moçambique E. E.

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The instrument landing systems (ILS) at Maputo and Beira international airports are more than 10 years old and difficult to maintain. A replacement is therefore urgently needed to ensure internationally required safety standards.

A rehabilitation and upgrading of navigation aids for en-route and terminal area purposes is also needed. The aim is to enable navigation along the main routes and terminal areas based on VHF omni-directional radio beacons (VOR), and where needed in combination with the use of distance measuring equipment (DME).

2.2 Nature of the project

This project includes purchase and installation of:

- 2 ILS at Maputo and Beira
- 1 VOR (doppler) at Maputo
- 2 VOR at Cuamba and Lichinga
- 1 DME at Cuamba.

2.3 Comments by the consultants

The project should also include technical assistance for staff training.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

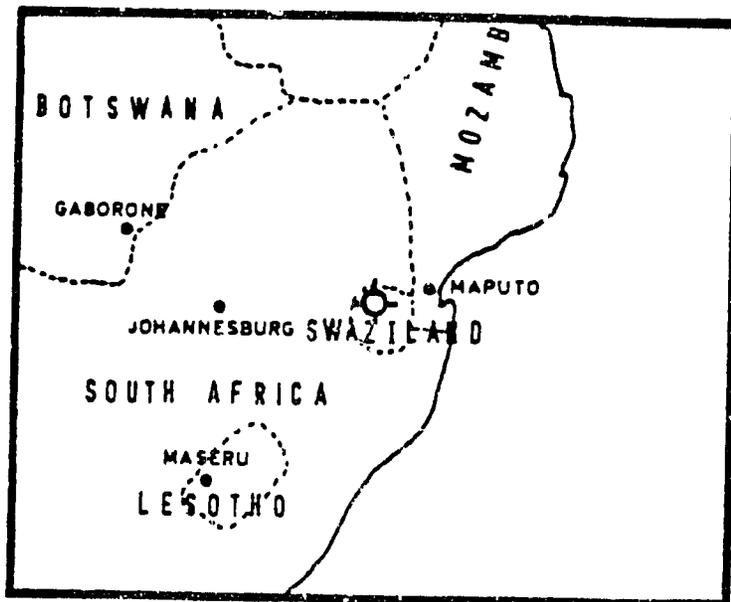
This project will bring the navigation and landing aids for the routes and airports most frequently used on international and domestic flights to an internationally required standard and will, together with the improvement of airport lighting (of Project No. 4.5.1) contribute considerably to regularity and safety in air transports.

3.2 Costs

This project is estimated to US dollars 3 million.

PROJECT NO. 4.6.1

SWAZILAND: IMPROVEMENT OF MATSAPA AIRPORT



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Swaziland

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Improvement and upgrading of the existing airport to be able to handle medium size aircraft for destinations such as Mauritius, Nairobi and Kinshasa

Location: Matsapa, about 30 km south-east of Mbabane

Cost of the project: US dollars 15 million

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Works, Power and Communications

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2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The existing Matsapa airport has a runway of about 1.500 m constructed in 1967 and a terminal building of about 850 m² including a departure hall of 100 m². The largest aircraft in use at the airport is Fokker Friendship -28 with 65 passenger seats. The airport is open daily from 07.00 to 17.30 hours.

The aim of this project is to upgrade the airport to be capable of handling medium size aircraft (e. g. B-737, which is generally used in the region) with a full passenger payload for destinations such as Mauritius, Nairobi and Kinshasa. Also, an extension of the opening hours to 14-16 hours per day is envisaged.

2.2 Nature of the project

The project is based on recommendations made in the report "Master Plan for Development of Matsapa Airport", February 1980. The main components are as follows:

- new runway 2.400 m long and 45 m wide
- new terminal area
- new terminal building for a typical peak hour traffic of 300 passengers
- freight terminal and fire station
- modern communication and landing equipment and fire and rescue vehicles
- staff quarters for about 38 families.

Designs for runway and site are ready, and the design for the terminal building is expected to be completed early 1981, at which time tenders should go out.

2.3 Comments by the Consultants

The improved airport will require additional staff as well as some staff with new skills. In order to be able to make full use of the facility on completion of the investment the necessary steps to train new staff should be initiated in due time. Also, the future maintenance activities should be given serious consideration.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

Swaziland is a landlocked country, its contact with the outside world is mostly through South Africa. Air transportation has not been able to benefit the country very much in this respect. This is due partially to the inadequacy of the Matsapa airport particularly its short runway. The Government initially considered the construction of a new airport in the lowveld but due to financial and other considerations this idea was not pursued.

The airport at present handles about 30.000 passengers per year in 1.000 scheduled operations. The forecast for 1990 is 145.000 passengers in 2.000 scheduled operations. Non-scheduled operations are expected to grow from 7.500 in 1978 to 24.000 in 1990, and freight and mail to grow from 200.000 kg to 800.000 kg.

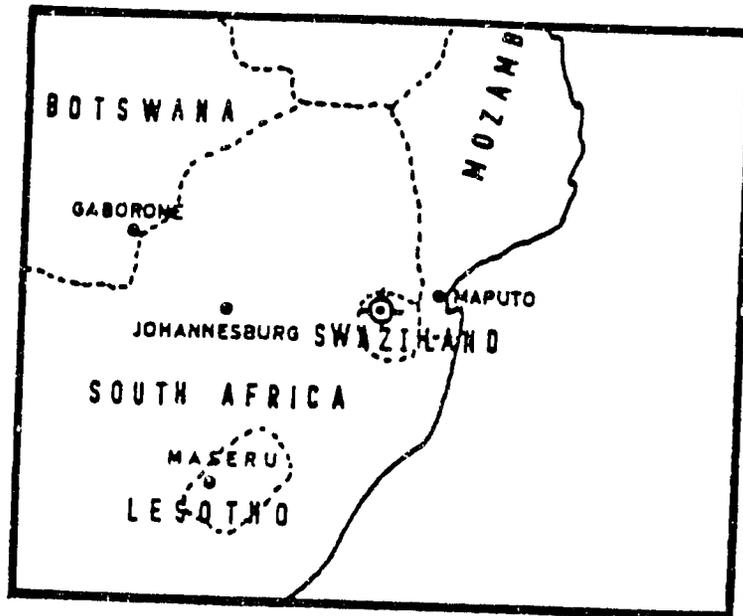
On this basis it has been calculated that the ratio between revenues and depreciation plus operating costs would be 1.5 in 1990, assuming a revenue per passenger of about US dollars 10 as in many airports of the region.

3.2 Costs

The costs of the project are estimated at about US dollars 15 million including site and engineering costs.

PROJECT NO. 4.6.2

SWAZILAND: NAVIGATION AIDS



1. IDENTIFICATION AND SUMMARY

Origin of the project:	Submitted by the Government of Swaziland
Sub-sector:	Airports and air transport
Order of priority:	Priority class 1: Rehabilitation/Upgrading
Nature of the project:	Improvement of navigation aids at Matsapa airport
Cost of the project:	US dollars 0.6 million
Foreign currency part:	100%
Financing required:	Entire amount
Duration:	6 months
Desirable start:	1981
Project authority:	Ministry of Works, Power and Communications

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SWAZILAND:
Project No. 4.6.2

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

The aim of this project is to improve the means of navigation en-route and within the terminal area of Matsapa airport.

2.2 Nature of the project

Purchase and installation of

- VHF omni-directional radio range VOR
 - Distance measuring equipment DME
- at Matsapa airport.

2.3 Comments by the Consultants

The project should also include technical assistance for staff training.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The project will bring the navigation aids for the routes used for regional traffic and for the airport to an internationally recommended level and will contribute to regularity and safety in air travel.

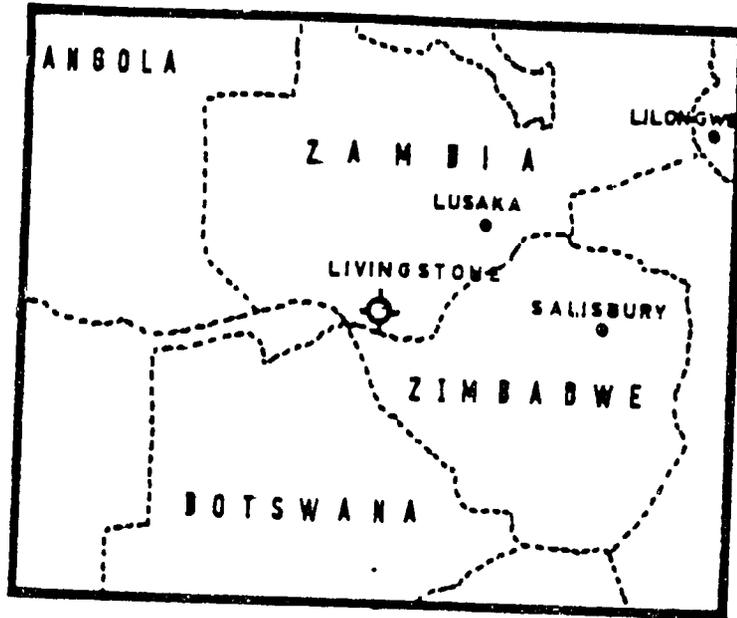
3.2 Costs

This project is estimated at US dollars 0.6 million.

The equipment will be sufficient for the improved Matsapa airport described under Project No. 4.6.1.

PROJECT NO. 4.8.1

ZAMBIA: IMPROVEMENT OF LIVINGSTONE AIRPORT



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia
 Sub-sector: Airports and air transport
 Order of priority: Priority class 1: Rehabilitation/Upgrading
 Nature of the project: Improvement of Livingstone airport
 Cost of the project: US dollars 13 million
 Financing required: Entire amount
 Duration: 6 years
 Desirable start: 1981
 Project authority: Department of Civil Aviation

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

This project meets the objective to upgrade the airport for operation of medium size aircraft.

The renovation of the runway with new overlay is a prerequisite to regularity in operations.

2.2 Nature of the project

This project consists of the following:

First priority: renovation of runway overlay

Second priority:

- improvement of the airport including building for control tower and fire and rescue services, extension and upgrading of terminal building
- instrument landing system (ILS)
- stand-by power supply.

2.3 Comments by the consultant

Funds for the acquisition of ILS should also cover technical assistance for staff training.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

If the runway were to be left in its present condition the operations would be restricted due to limited runway strength, especially during wet season, prohibiting the use of medium size aircraft.

A renovation of the airport would increase the opportunities to develop tourism in Zambia.

3.2 Costs

The total cost US dollars 13 million broken down as follows:

First priority:

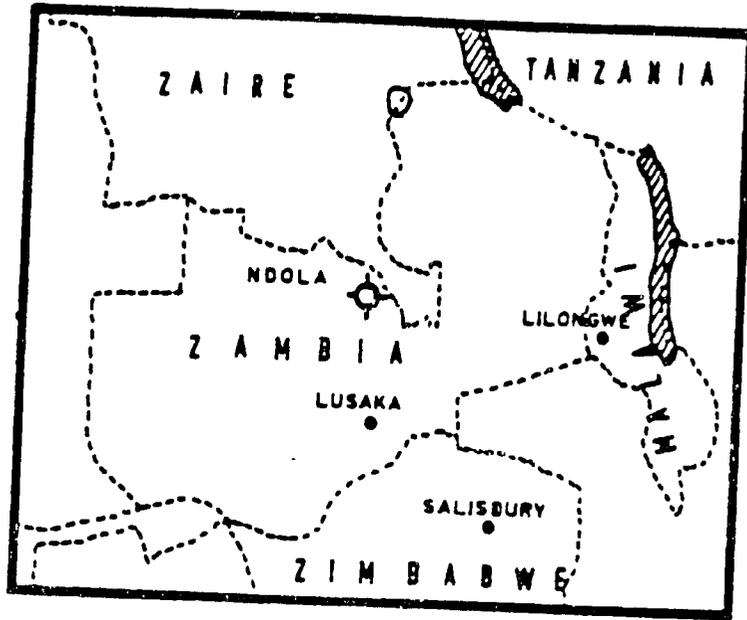
Runway overlay US dollars 4,3 million

Second priority:

Buildings	US dollars 6 million
ILS	US dollars 0,2 million
Stand-by power supply	US dollars 1,5 million

PROJECT NO. 4.8.2

ZAMBIA: IMPROVEMENT OF NDOLA AIRPORT



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Improvement of Ndola airport

Cost of the project: US dollars 13,2 million (Cargo warehouse not included)

Financing required: Entire amount

Duration: 6 years

Desirable start: 1981

Project authority: Department of Civil Aviation

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

This project meets the objective to rehabilitate and upgrade the Ndola airport. The airport is connected to the domestic network and base for domestic services to the Northern Province.

Passengers total: about 120.000 in year 1979

Estimated yearly growth rate: 4%

Existing passenger building needs urgently to be replaced by a new terminal capable of handling large jet aircraft (e. g. B 707).

An instrument landing system (ILS) is required for regularity and safe operations. Air transport is needed for export of cobalt (high security) and agricultural products.

Freight total in 1979: 4,5 million kgs

Existing cargo warehouse is insufficient and needs to be replaced.

2.2 Nature of the project

The project includes the following:

First priority: Instrument landing system (ILS)

Second priority: Construction of a new passenger terminal building

Third priority: Engineering design and construction of a new cargo warehouse.

2.3 Comments by the Consultants

Ndola airport is located only about 65 kms from Southdowns airport at Kitwe (of Project No. 4.8.3). Integration of the two airports is not considered possible at this time due to pressure from local authorities.

Funds for the acquisition of ILS should also cover technical assistance for staff training.

3. JUSTIFICATION OF THE PROJECT

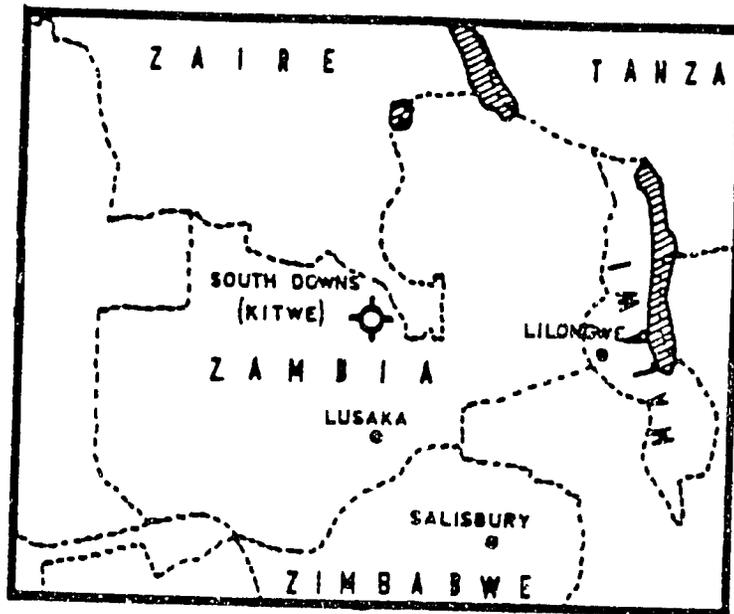
3.1 Benefits

This project will enable the Ndola airport to handle rapidly and efficiently the reception of passengers and freight. The regularity and safety of air traffic will be improved.

3.2 Costs

The cost of the project, excluding the warehouse is estimated at US dollars 13,2 million.

ZAMBIA: IMPROVEMENT OF SOUTHDOWNS AIRPORT (KITWE)



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia
 Sub-sector: Airports and air transport
 Order of priority: Priority class 1: Rehabilitation/Upgrading
 Nature of the project: Improvement of Southdowns airport
 Cost of the project: US dollars 13,6 million
 Financing required: Entire amount
 Duration: 6 years
 Desirable start: 1981
 Project authority: Department of Civil Aviation

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

This project meets the objective to improve and upgrade the airport with the aim of facilitating operations of medium size aircraft (e. g. B 737). Southdowns airport is connected to the domestic network and base for some domestic routes.

Passengers total: about 59.000 in year 1979

The project includes runway reconstruction and extension, runway lighting and buildings for passengers, control tower and fire and rescue services.

2.2 Nature of the project

The project consists of the following:

First priority: runway lighting

Second priority: buildings for passenger terminal, control tower and fire and rescue services including equipment. Reconstruction and extension of runway and taxiways.

2.3 Comments by the Consultants

Southdown airport is located only about 65 kms from Ndola airport (of Project No. 4.8.2). Integration of the two airports is not considered possible at this time due to pressure from local authorities.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

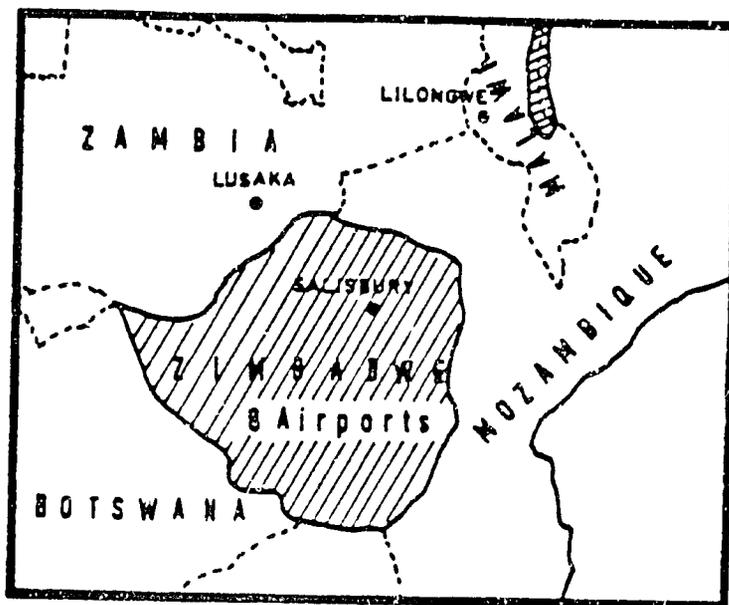
The project will enable Southdowns airport to accept larger aircraft than is possible at present and to satisfy regularity and safety requirements.

3.2 Costs

The costs will total US dollars 13,6 million out of which US dollars 0,4 million are for the runway lighting.

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ZIMBABWE: AIRPORT RESCUE AND FIRE SERVICE: RE-EQUIPMENT



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Re-equipment of rescue and fire service at Zimbabwe airports

Cost of the project: US dollars 11 million

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Transport and Power

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

This project meets the objective of bringing the airport rescue and fire services at the main Zimbabwe airports to conform to ICAO specifications. Many of the present vehicles are old and unreliable and have deficiencies in capacity and general performance. In the project emphasis is placed on rescue as the prime function and on distributed capacity over several vehicles for the sake of availability.

2.2 Nature of the project

Purchase of rescue and fire-fighting equipment and auxiliary equipment, protective clothings, tools etc so as to reequip the services according to the specification below.

Station requirements:

Interpretations: Rapid Intervention Vehicle	-	RIV
Major Tender	-	MT
Rescue Tender	-	RT
Ambulance	-	AM

Salisbury Airport:

Category required: 9
 Vehicles required: 2 RIV
 3 MT of 10.000 litre water capacity
 2 RT
 4 AM

Bulawayo Airport/Victoria Falls Airport:

Category required: 7
 Vehicles required 1 RIV
 at each: 3 MT of 6.000 litre water capacity
 1 RT
 3 AM

Fort Victoria/Buffalo Range/and Kariba Aerodromes:

Category required: 6
 Vehicles required 1 RIV
 at each: 2 MT of 6.000 litre water capacity
 1 RT
 2 AM

Wankie National Park Aerodrome:

Category required: 6
 Vehicles required: as Fort Victoria etc except -
 2 RIV

Charles Prince Airport:

Category required: 3
 Vehicles required: 2 RIV
 1 RT
 1 AM

ZIMBABWE:
Project No. 4.9.1

Total vehicle requirements are -

MTs (10.000 litre capacity)	3
MTs (6.000 litre capacity)	14
RIVs	11
RTs	9
AMs	19
<hr/> Total:	<hr/> 56

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The implementation of this project is necessary to comply with recommendations by ICAO to meet the international safety requirements.

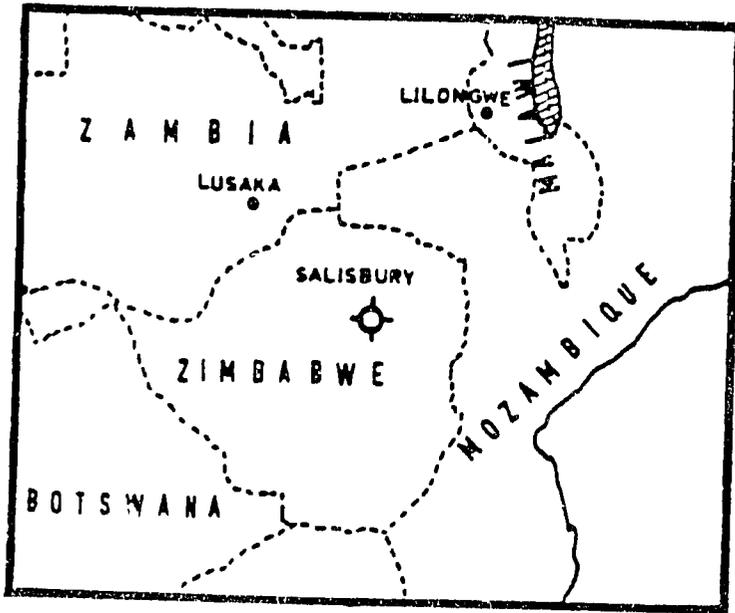
3.2 Costs

The cost of the project will total US dollars 11 million.

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PROJECT NO. 4.9.2

ZIMBABWE: NEW SALISBURY AIRPORT TERMINAL



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Airports and air transport

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: New airport terminal, access road systems, taxi ways and aircraft aprons

Cost of the project: US dollars 100 million

Foreign currency part: US dollars 15 million

Financing required: Entire amount

Duration: 5-7 years

Desirable start: 1981

Project authorities: Ministry of Transport and Power

2. DESCRIPTION OF THE PROJECT

2.1 Aim and objective

This project meets the objective of adapting Salisbury international airport to the capacity required for the handling of all regional and international traffic without inconvenience and delay to passengers.

The airport passenger terminal was completed in 1956 and it has become completely inadequate for the number of passengers now passing through the airport.

Number of passengers 1979: 430.000

Expected year 1990: 2.300.000

Reports :

- "Salisbury Airport Development, Masterplan" by Airport Planning Partnership, 1974 and

- "Phase II - Functional and Requirement Planning, Summary Report", 1975 (based on several working reports).

The project includes, in addition to a new terminal, access roads, and additional taxiways and aircraft aprons.

2.2 Nature of the project

This project consists of:

- planning and engineering design,
- tender documentations
- construction of a new passenger terminal building
- access road systems
- additional taxiways and aircraft aprons.

3. JUSTIFICATION OF THE PROJECT

3.1 Benefits

The implementation of this project is a vital condition for the handling of present traffic and passenger flow and for the future development of the airport for regional and international traffic.

3.2 Costs

The total cost of the project is estimated at approximately US dollars 100 million, out of which US dollars 4.8 million is for engineering designs and tender documentations. Earthwork, drainage etc is estimated at US dollars 12.3 million and access roads etc (including guiding system and landscaping) US dollars 9.2 million.

PROJECT NO. 5.0.1

(BOTSWANA): AFRICAN DOMESTIC SATELLITE SYSTEM (AFROSAT)

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Botswana

Sub-sector: Telecommunications

Order of priority: Priority class 4: Studies

Nature of the project: Study of a high quality 24 hour telephone service to isolated rural communities in African countries

Cost of the project: US dollars, 1 million

Foreign currency part: 100%

Financing required: Entire amount

Duration: 1 year

Desirable start: 1981

Project authority: Pan African Telecommunication Union
(Consultant's proposal)

2. DESCRIPTION OF THE PROJECT

Recent advances in technology have made it possible, given the right choice of satellite, to think in terms of using small unattended Earth Stations to provide high quality 24 hour Telephone service to isolated rural communities. Current estimates put the probable cost of such terminals at around 20 to 40 thousand US dollars inclusive of their own Solar Power source.

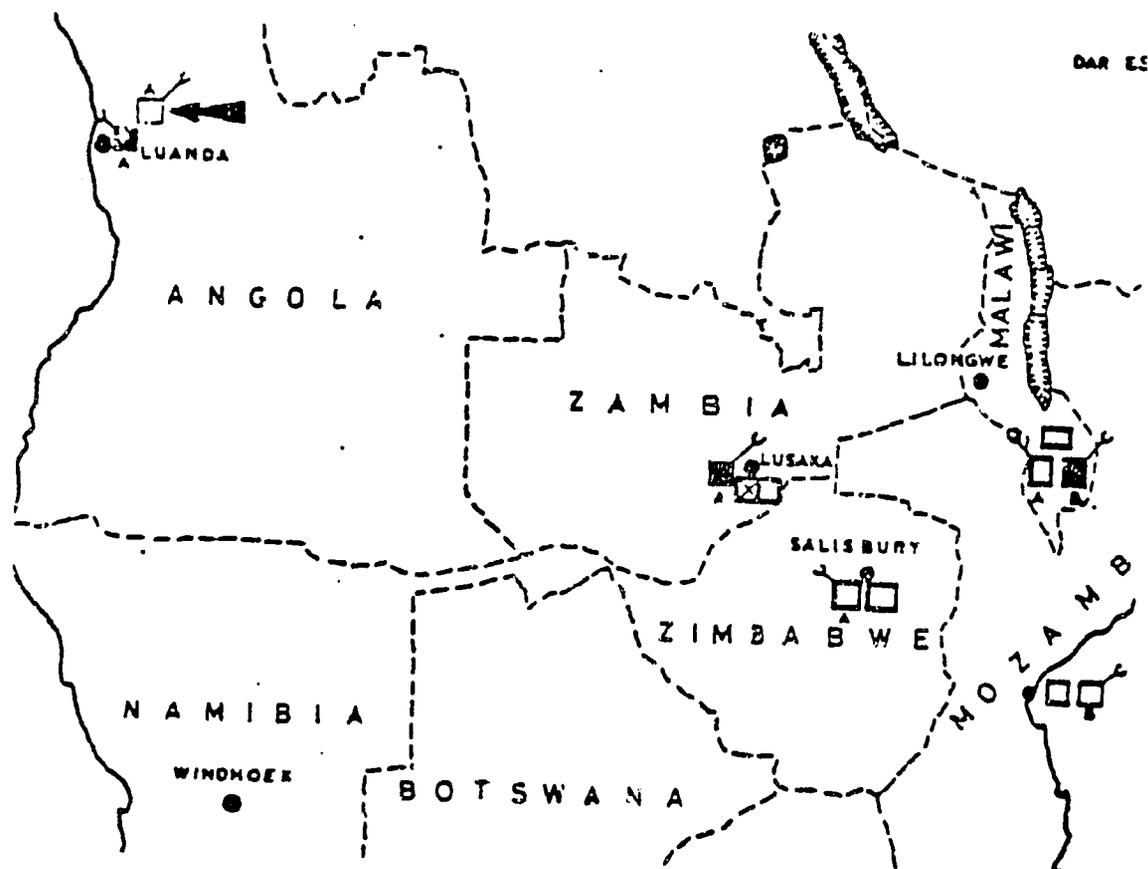
The relevance of this to a country such as Botswana with a small population widely spread over a large area is obvious. It is also obvious that Botswana could not afford, nor would it need, a satellite for its use alone.

An AFRICAN domestic satellite system might well fill this need and also provide improved telecommunications to other African countries.

3. COMMENTS BY THE CONSULTANTS

This project requires comprehensive feasibility studies and negotiations between countries having a potential interest in using an African domestic satellite system. The Pan African Telecommunication Union (PATU) may be interested in carrying out the feasibility studies.

ANGOLA: EARTH STATION, STANDARD A, FACING THE INDIAN OCEAN SATELLITE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Angola

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To make the satellite telecommunication system more versatile by installing an earth station facing the Indian Ocean satellite as a complement to the existing station facing the Atlantic Ocean satellite.

Cost of the project: US dollars 12 million

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 3 1/2 years

Desirable start: 1981

Project authority: Ministry of Transport and Communications

ANGOLA:
Project No. 5.1.1

2. DESCRIPTION OF THE PROJECT

The existing earth station in Angola (facing the Atlantic Ocean) can communicate with Europe and USA but, owing to the fact that most of the earth stations in Southern Africa face the Indian Ocean satellite, traffic to many countries in the region has to be routed via Europe. The installation of an earth station facing the Indian Ocean satellite will enable Angola to establish direct communications with countries having earth stations facing the Indian Ocean satellite.

3. COMMENTS BY THE CONSULTANTS

When the Panafstel terrestrial system from Nairobi via Tanzania to Zambia will be completed by August 1981, Angola can establish direct communications with some countries in the region by using the recently installed Kenyan earth station facing the Atlantic Ocean satellite.

2. DESCRIPTION OF THE PROJECT

The present PANAFTEL plans call for a 450 km Microwave link connecting Francistown to Kasane where it would be connected into Zambia. Such a system would cost around US dollars 4 million for the section within Botswana alone. Although it would provide good communications to Zambia it would be of little benefit to the Botswana internal telecommunications.

With the changed political situation in Zimbabwe, it would be to a considerable advantage if a radio link could be constructed between Francistown and Bulawayo. This would both increase the capacity and reliability of cross-border communications and provide access to the PANAFTEL network over the microwave link Bulawayo-Livingstone proposed by Zimbabwe, project no. 5.9.3.

3. COMMENTS BY THE CONSULTANTS

The actual teletraffic flow through the existing carrier system on the open wire line between Francistown and Bulawayo may not seem to justify a high-capacity link, but by the time (1984) when the proposed link is to be put into service the traffic flow will, no doubt, exceed the maximum capacity of the (upgraded) carrier system.

PROJECT NO. 5.3.1

LESOTHO/ZIMBABWE: FOUR SATELLITE CIRCUITS BETWEEN MASERU AND SALISBURY

1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Lesotho

Sub-sector: Telecommunications

Order of priority: Priority class 2: New telecommunication Projects

Nature of the project: To establish a reliable direct link between Lesotho and Zimbabwe.

Cost of the project: Unknown

Foreign currency part: Unknown

Financing required: Unknown

Duration: Unknown

Desirable start: Unknown

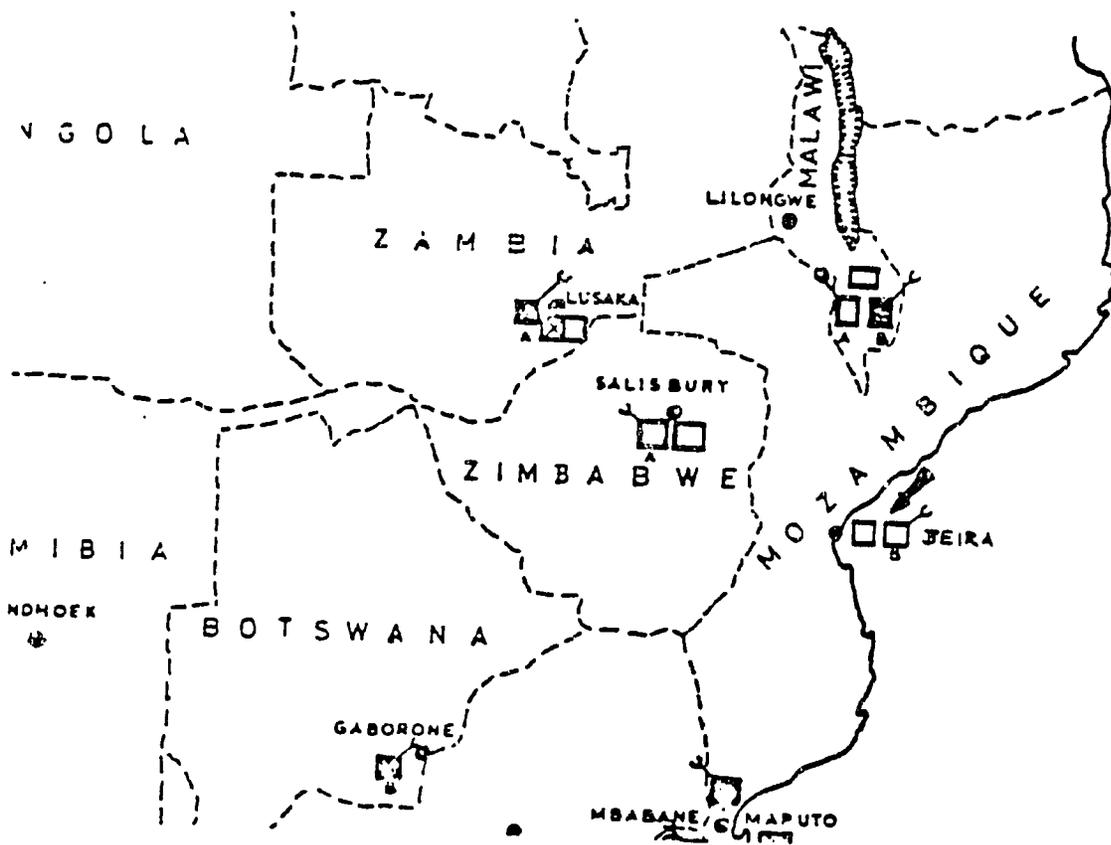
Project authority: Ministry of Transport, Telecommunications and Postal Services

2. COMMENTS BY THE CONSULTANTS

This project is based on the assumption that there will be earth stations in both countries. Lesotho may have taken a decision on their earth station, but Zimbabwe will carry out a feasibility study before a firm decision is made (see Project no. 5.9.2). As it may take 3 years before an earth station, standard A, as proposed by Zimbabwe, can be put into service it is too early to give any particulars on the actual project. It is however very important that Lesotho gets a direct link with good transmission quality to another country in the region. The existing HF link Maseru-Nairobi should be considered as a temporary solution. As Nairobi now (also) has an earth station facing the Atlantic Ocean satellite it might be possible to replace the HF link with satellite circuits Maseru-Nairobi when the earth station in Lesotho is put into service.

PROJECT NO. 5.5.1

MOZAMBIQUE: EARTH STATION STANDARD B AT BEIRA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Telecommunications

Order of priority: Priority class 2: New telecommunication projects

Nature of the project: To improve in the short run the telecommunication services between Mozambique and neighbouring countries.

Cost of the project: US dollars 3.00 million

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 18 months

Desirable start: 1981

Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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2. DESCRIPTION OF THE PROJECT

This project should be seen in connection with the proposed International Telephone Switching Centre at Beira, project no. 5.5.2 which will take at least 3 years to carry out.

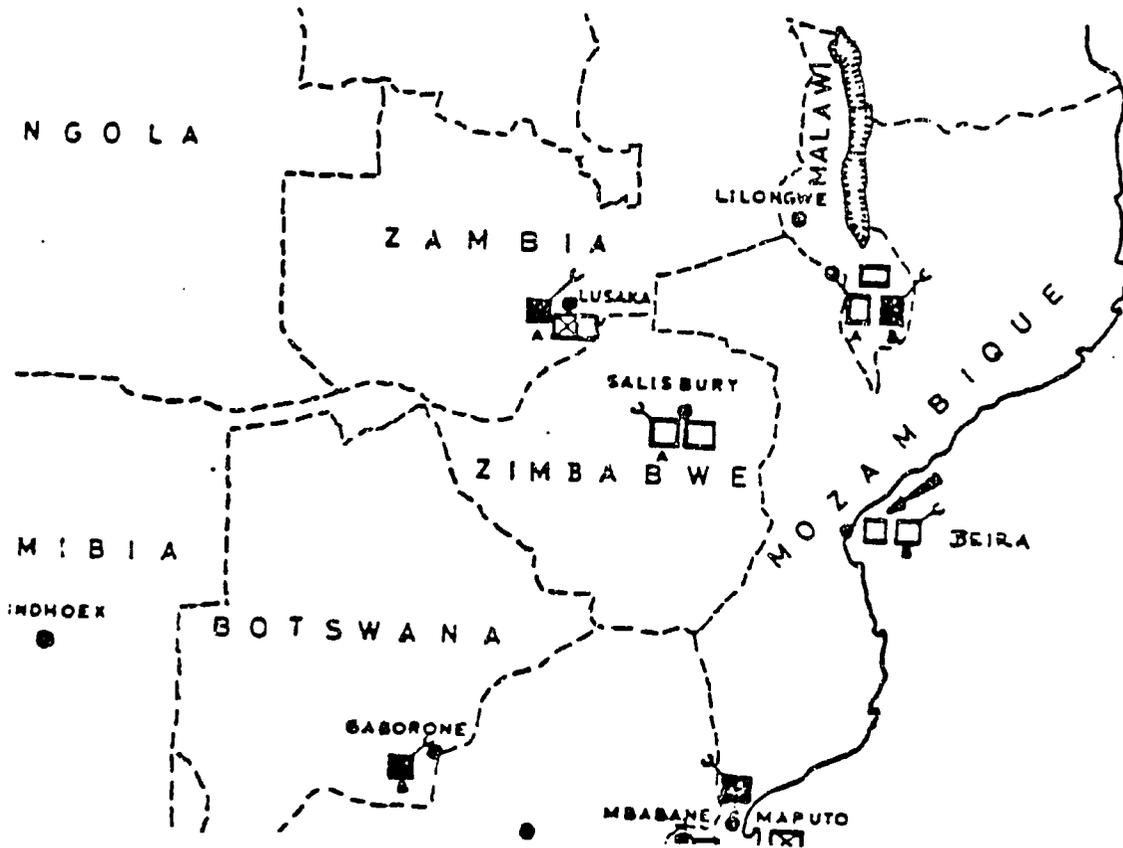
3. COMMENTS BY THE CONSULTANTS

An earth station at Beira may have a negative influence on the viability of the existing standard A earth station at Maputo. Having two earth stations may also create staffing problems.

The quickest and cheapest way of increasing the number of circuits between Mozambique and other countries in the region would probably be to upgrade the existing carrier system Beira-Umtali from a capacity of 30 channels to 60. For this purpose a project has been proposed under category 1 (Rehabilitation/upgrading). Project no. 5.5.4. The telephone traffic has to be switched manually at Beira but telex circuits may be connected to the automatic telex network.

PROJECT NO. 9.9.2

MOZAMBIQUE: INTERNATIONAL TELEPHONE SWITCHING CENTRE AT BEIRA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To provide international dialling facilities to neighbouring countries and beyond.

Cost of the project: US dollars 2.5 million

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1981

Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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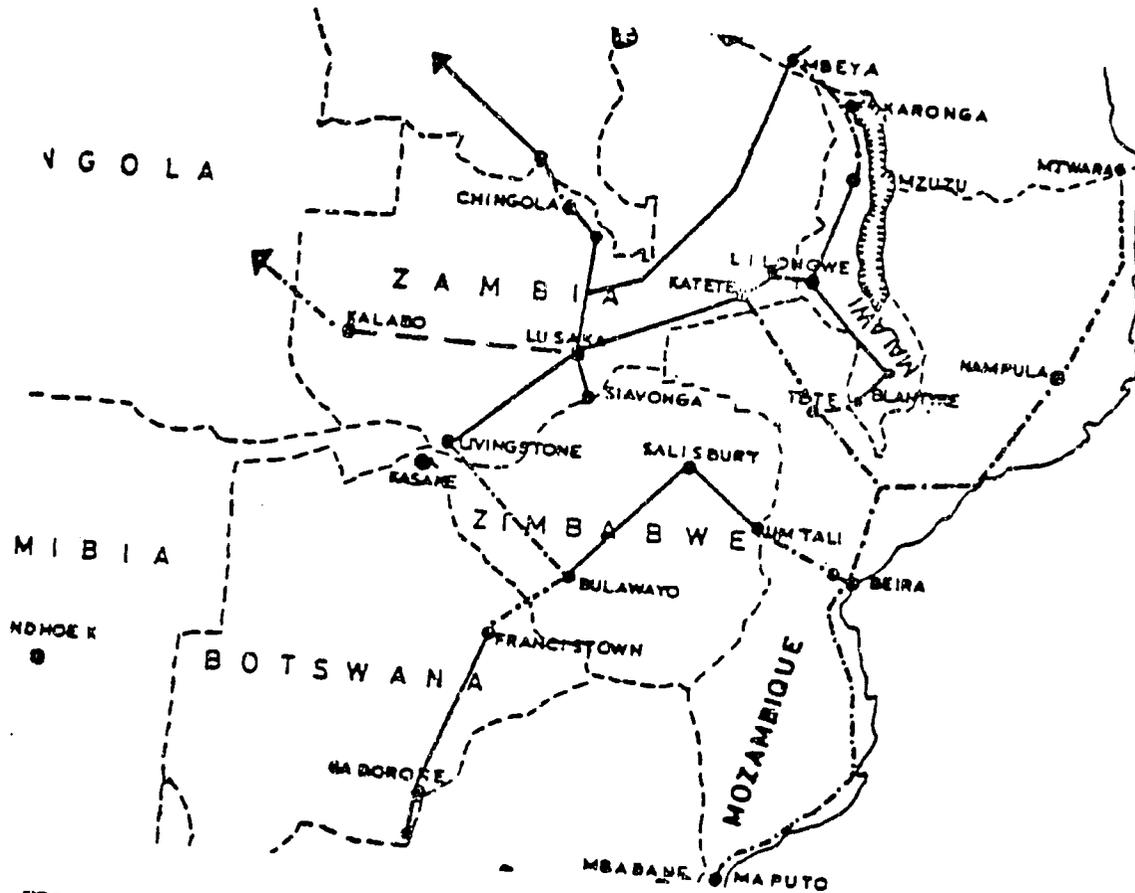
2. DESCRIPTION OF THE PROJECT

The objective of the project is to provide international Direct Dialing facilities between Mozambique and other countries in the region.

3. COMMENTS BY THE CONSULTANTS

The proposed switching centre cannot be fully utilized until routes with sufficient capacity have been established to other countries and that will possibly take some 4 years. Moreover the internal network in Mozambique cannot handle the traffic offered by other countries through the proposed exchange until the national high capacity network has been built up and that will require at least 4 years.

PROJECT NO. 5.5.3 SUMMARY OF SUB-PROJECTS NO. 5.5.3 (1-7)
 MOZAMBIQUE: NATIONAL MICROWAVE BACKBONE NETWORK WITH CONNECTIONS TO NEIGH-
 BOURING COUNTRIES



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication projects
- Nature of the project: To replace the existing obsolescent troposcatter backbone system with high-capacity microwave links and to provide cross-border connections to Zimbabwe, Zambia, Malawi and Tanzania.
- Cost of the project: US dollars 63,25 million, which is the total of sub-projects 5.5.3 (1-7)
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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2. DESCRIPTION OF THE PROJECT

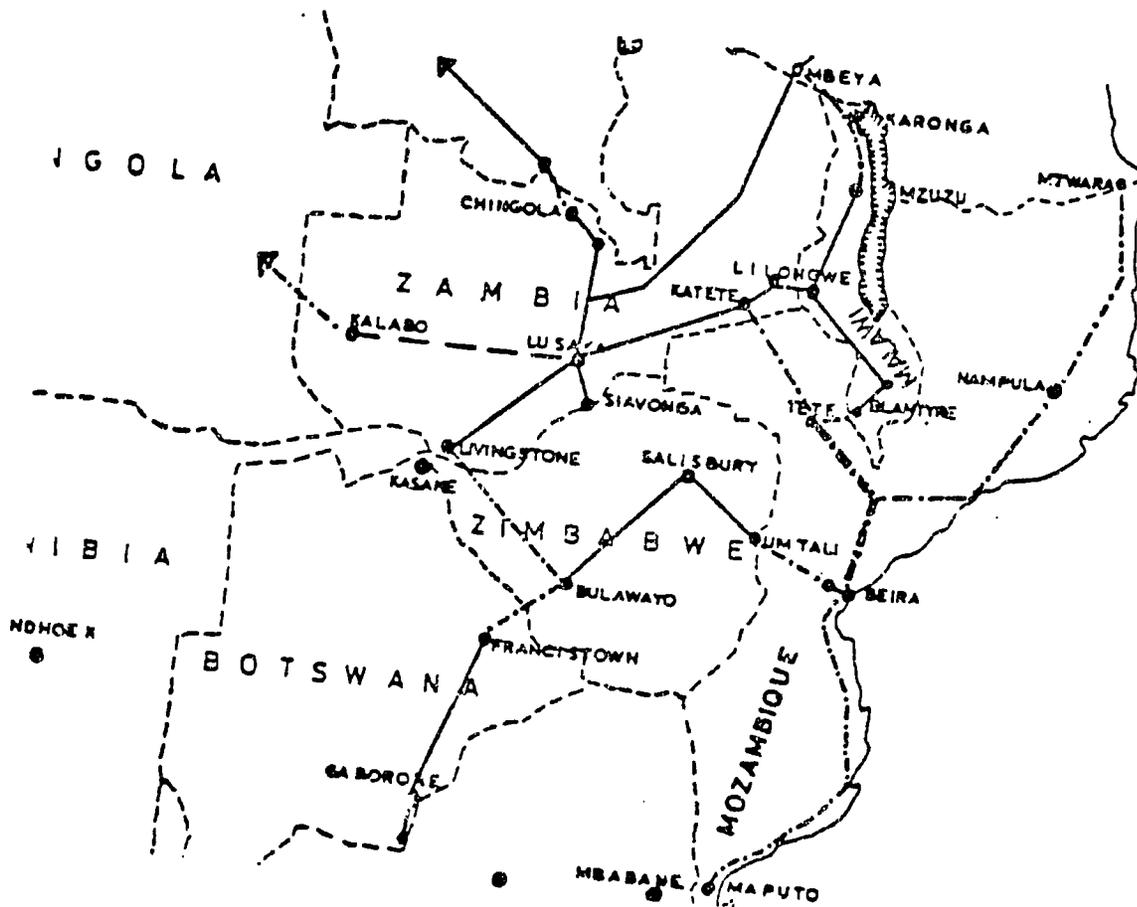
The existing backbone telecommunication system in Mozambique consists mainly of troposcatter links with low capacity (maximum 120 channels) and the transmission quality does not meet the standards recommended by the ITU. In order to enable Mozambique to handle the teletraffic offered from other countries in the region, the existing obsolete system has to be replaced with a reliable high capacity microwave system. The project consists of three domestic sub-projects and four sub-projects which will serve certain areas in the country and in addition to that provide cross-border connections to Zimbabwe, Zambia, Malawi and Tanzania thus linking up the national system with the Panafstel system.

The sub-projects constituting the whole project are presented as projects number 5.5.3 (1-7).

3. COMMENTS BY THE CONSULTANTS

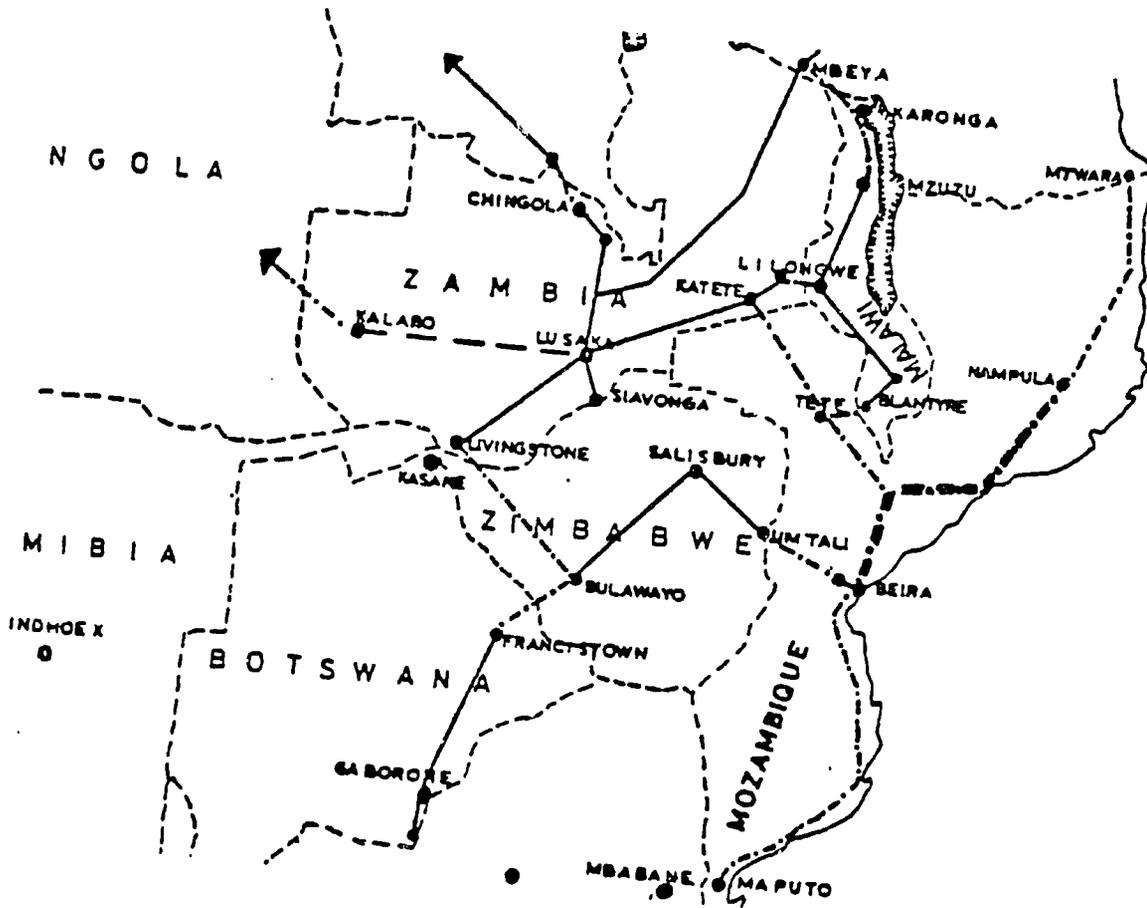
As stated in part 1 under 8.2 a regional telecommunications system cannot be fully developed if the national networks cannot handle the traffic offered by other countries. In the actual case where Mozambique will play an important role by providing outlets to the sea it is necessary that its national telecommunications system can cope with the growing teletraffic caused by increasing activity in the hinterland. Even if the proposed network will be used to 90% for domestic traffic it is indispensable for the regional traffic.

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1. IDENTIFICATION AND SUMMARY

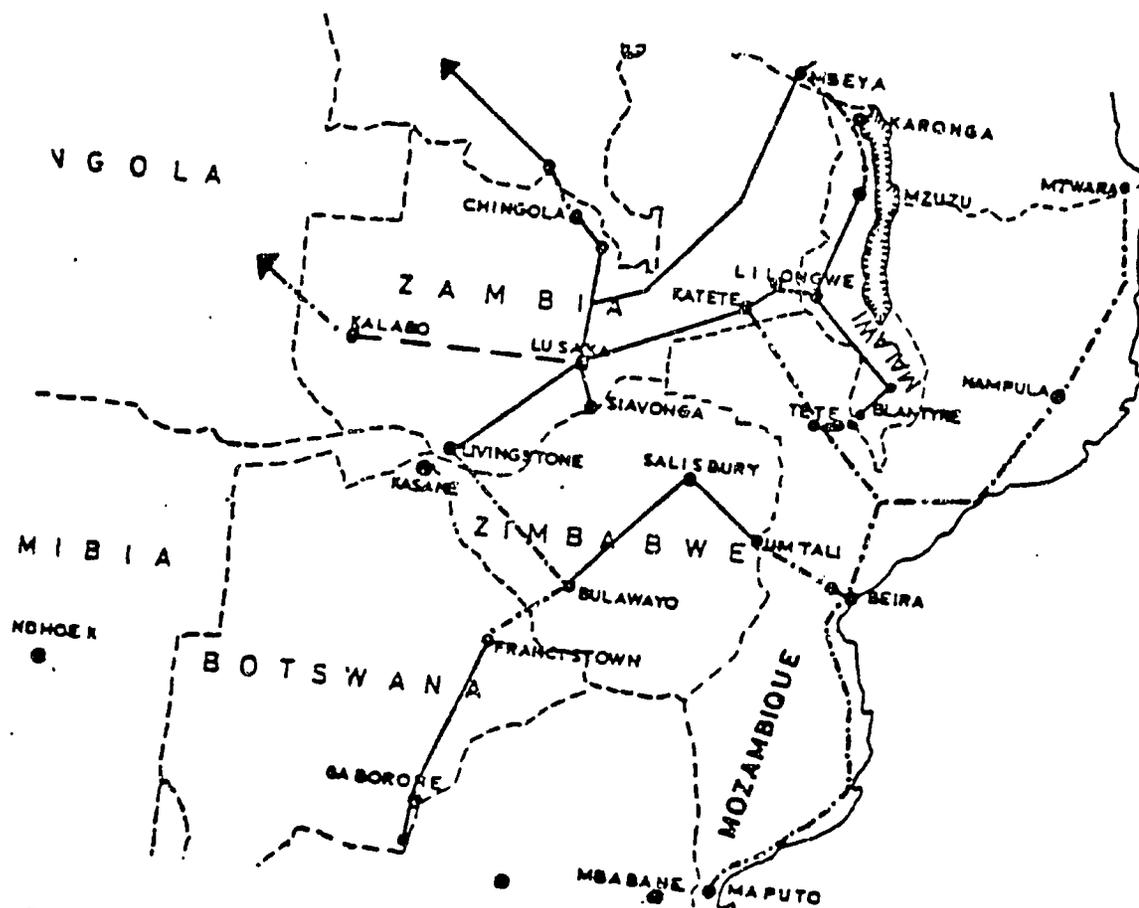
- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: One of the links consisting the backbone telecommunications system in Mozambique
- Cost of the project: US dollars 7,8 million
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Mozambique
 Sub-sector: Telecommunications
 Order of priority: Priority class 2: New Telecommunication Projects
 Nature of the project: One of the links consisting the backbone telecommunications system in Mozambique
 Cost of the project: US dollars 16,5 million
 Foreign currency part: Approx. 90%
 Financing required: Entire amount
 Duration: 5 years
 Desirable start: 1981
 Project authority: Ministry of Posts, Telecommunications and Civil Aviation

PROJECT NO. 5.5.3 (4), SUB-PROJECT TO 5.5.3
 MOZAMBIQUE/MALAWI: MICROWAVE LINK TETE - BLANTYRE

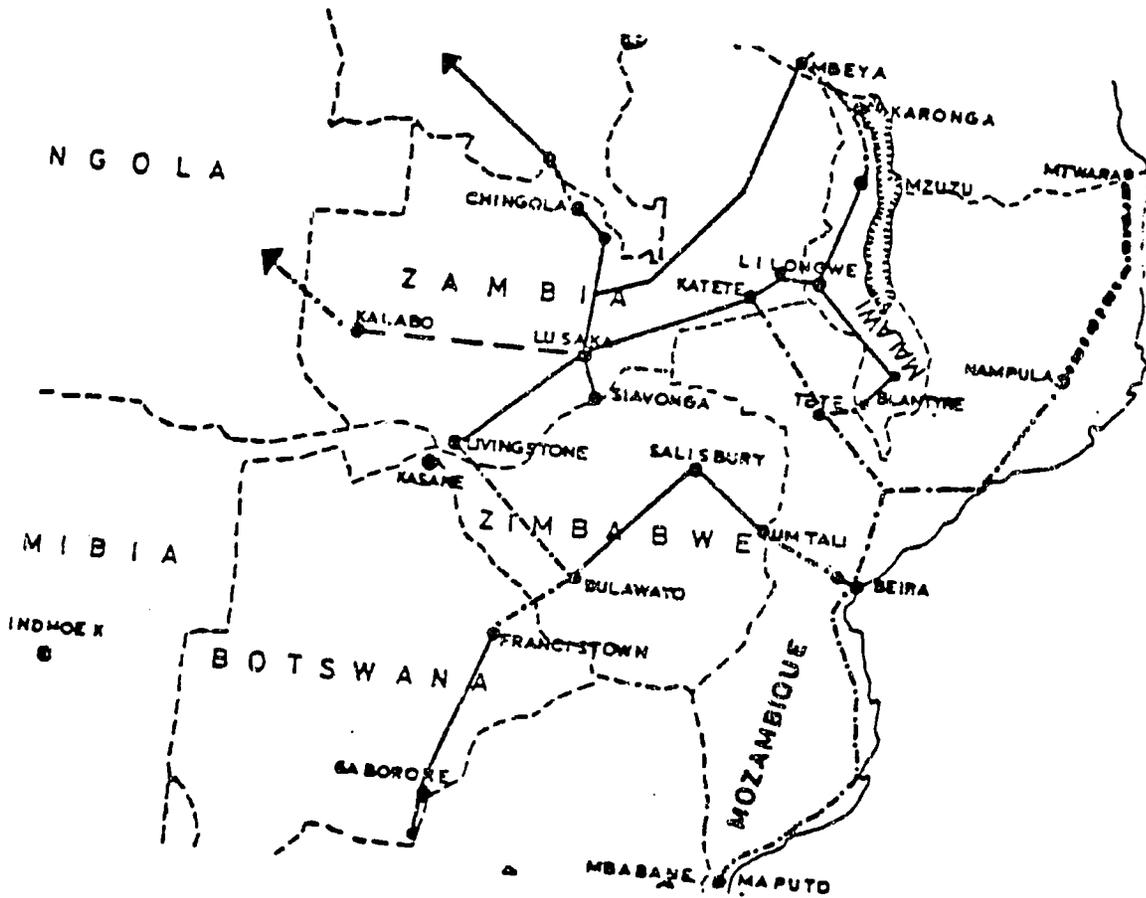


1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: One of the links constituting the backbone telecommunications system in Mozambique, also linking the networks in Mozambique and Malawi
- Cost of the project: US dollars 2,5 million
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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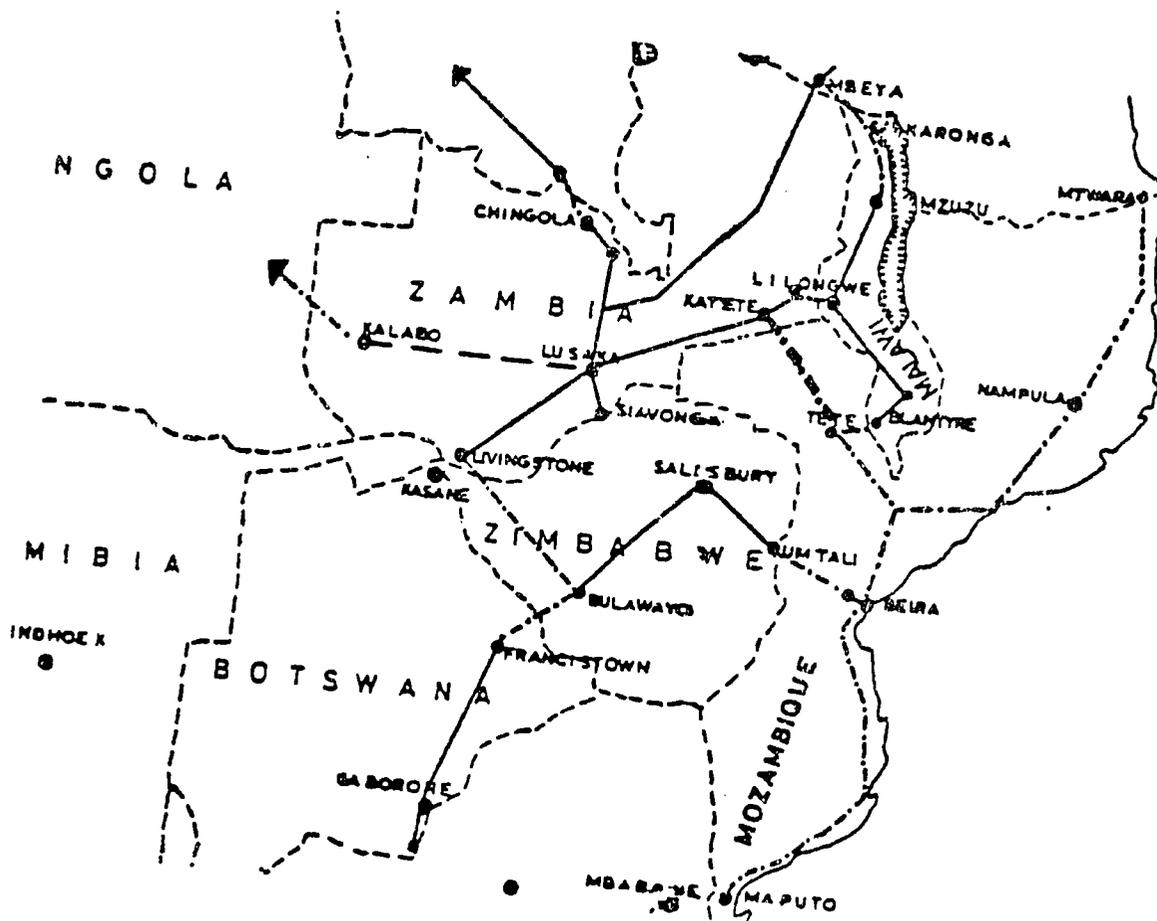
PROJECT NO. 5.5.3 (5), SUB-PROJECT TO 5.5.3
 MOZAMBIQUE/TANZANIA: MICROWAVE LINK NAMPULA -- MTWARA



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: One of the links constituting the backbone telecommunications system in Mozambique, also linking the networks in Mozambique and Tanzania
- Cost of the project: US dollars 7,5 million
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation

PROJECT NO. 5.5.3 (6), SUB-PROJECT TO 5.5.3
 MOZAMBIQUE/ZAMBIA: MICROWAVE LINK TETE - KATETE

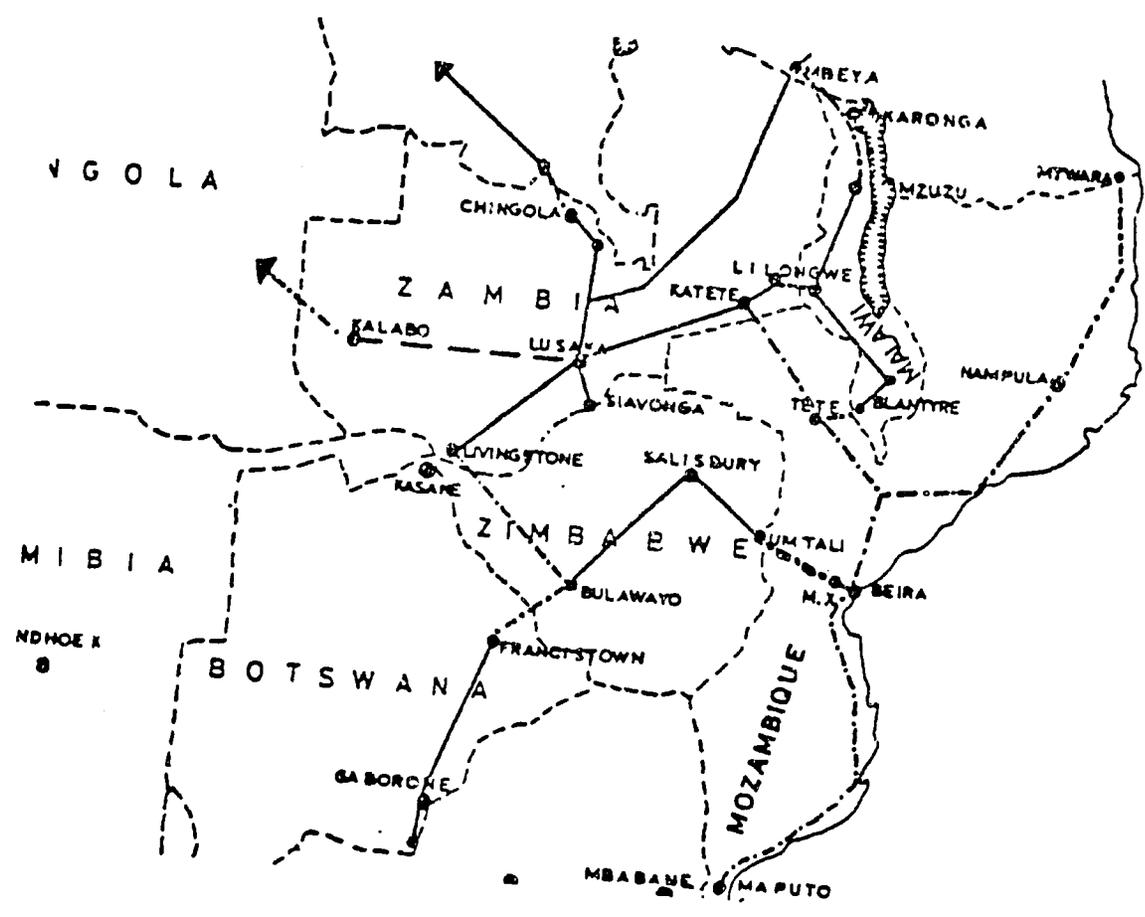


1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: One of the links constituting the backbone telecommunications system in Mozambique, also linking the networks in Mozambique and Zambia
- Cost of the project: US dollars 4,5 million (including 0,2 million for installations at Katete, Zambia)
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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PROJECT NO. 5.5.3 (7), SUB-PROJECT TO 5.5.3
 MOZAMBIQUE/ZIMBABWE: MICROWAVE LINK M. XILUVO - UMTALI

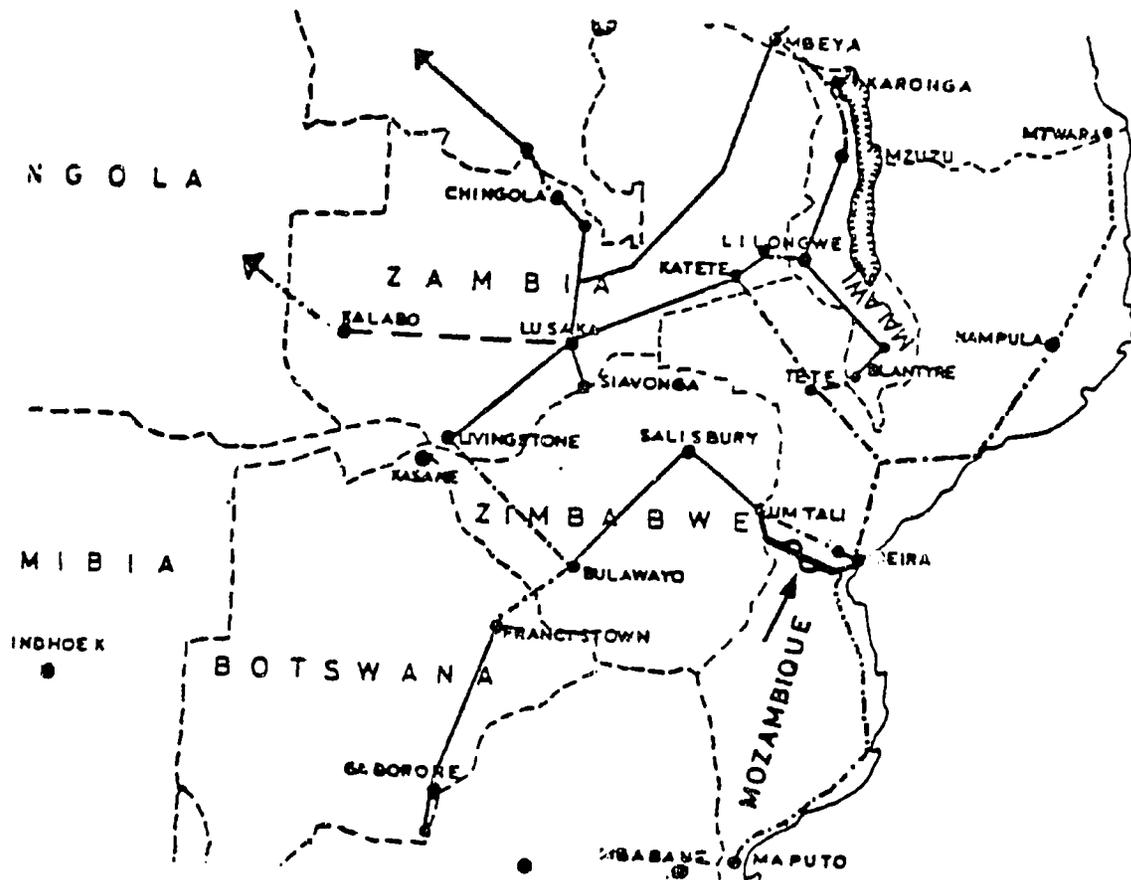


1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Mozambique
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: One of the links constituting the backbone telecommunications system in Mozambique, also linking the networks in Mozambique and Zimbabwe
- Cost of the project: US dollars 2,7 million (including 0,3 million for installations at Umtali, Zimbabwe)
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 5 years
- Desirable start: 1981
- Project authority: Ministry of Posts, Telecommunications and Civil Aviation

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MOZAMBIQUE/ZIMBABWE: UPGRADING OF THE OPEN WIRE CARRIER SYSTEM
BEIRA-UMTALI



1. IDENTIFICATION AND SUMMARY

Origin of the project:

Sub-sector: Telecommunications

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: To increase the number of telephone channels between Mozambique and Zimbabwe from 30 to 60

Cost of the project: US dollars 0.6 million

Foreign currency part: Approx. 60%

Financing required: Entire amount

Duration: 18 months

Desirable start: 1981

Project authority: Ministry of Posts, Telecommunications and Civil Aviation

2. DESCRIPTION OF THE PROJECT

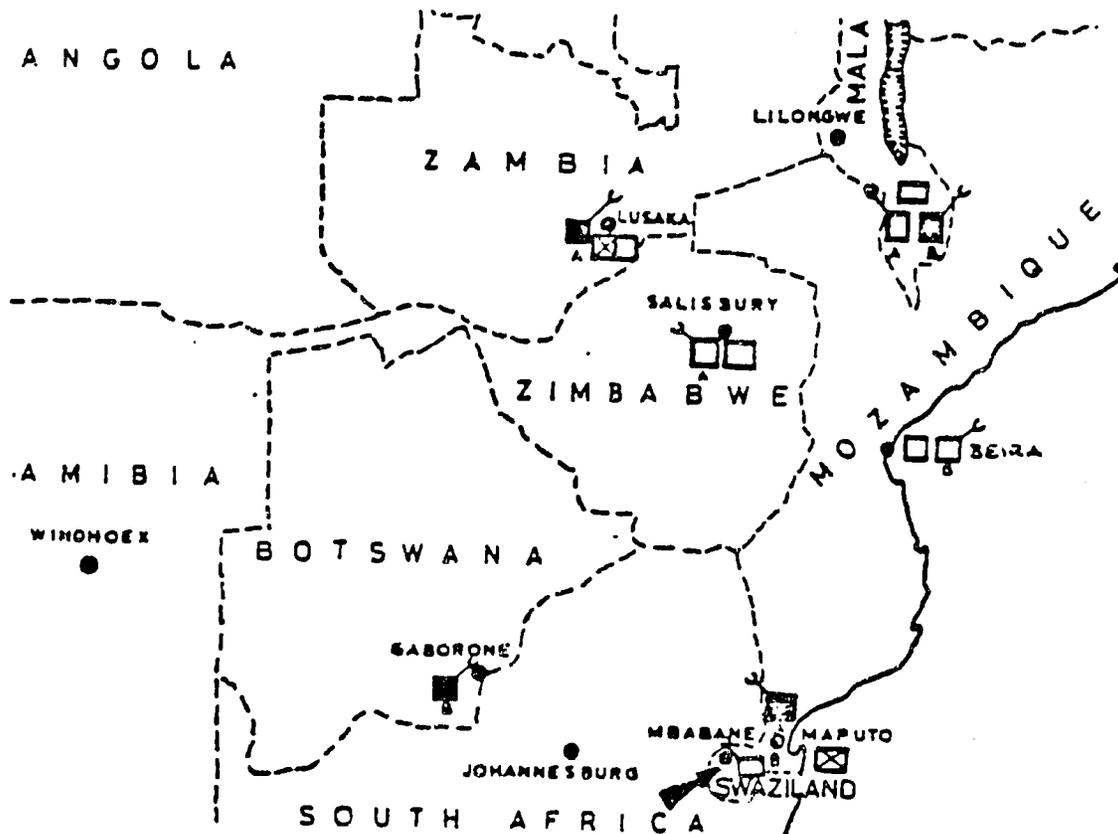
The quickest and cheapest way of increasing the number of circuits between Mozambique and other countries in the region would probably be to upgrade the existing carrier system Beira-Umtali from a capacity of 30 channels to 60.

3. COMMENTS BY THE CONSULTANTS

This project has, after discussions between the Director of Telecommunications and the consultants, been included in the list of projects to be presented in the pledging conference. It is related to the projects no. 5.5.1 and 5.5.2 (Earth Station and International Telephone Switching Centre at Beira).

PROJECT NO. 5.6.1

SWAZILAND: EARTH STATION, STANDARD B



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Swaziland
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: To provide reliable direct international circuits, thus making Swaziland less dependent on South Africa for its international overseas traffic.
- Cost of the project: US dollars, 3 million
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 18 months
- Desirable start: 1981
- Project authority: Ministry of Works, Power and Communications

1.1.1

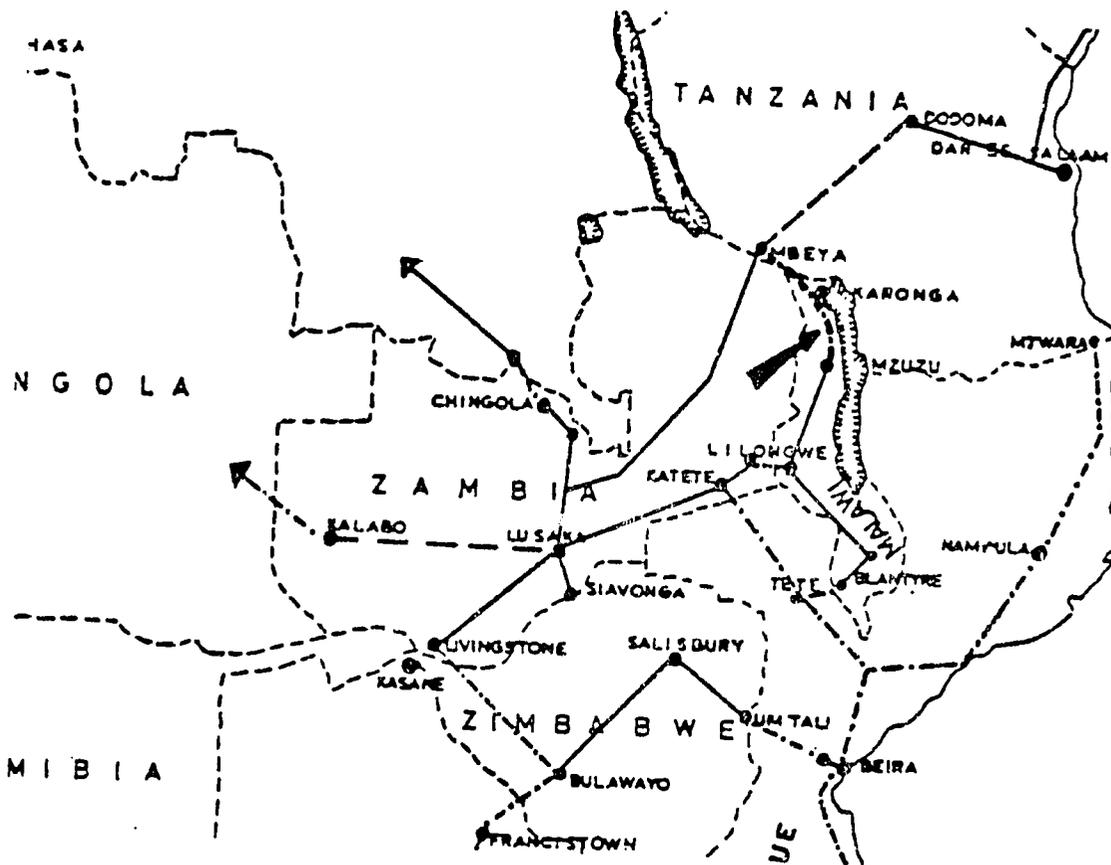
2. COMMENTS BY THE CONSULTANTS

Swaziland is very much dependent on South Africa for its international telecommunications and one solution to the problem would be to install an earth station as proposed. Another solution might be to connect the backbone system in Swaziland to that of Mozambique over a microwave link and use the existing earth station at Maputo. The microwave project is under way and the link will probably be in service by the end of 1981. When the microwave backbone system in Mozambique has been installed Swaziland's traffic to other countries in the region can be routed through Mozambique.

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PROJECT NO. 5.7.1

TANZANIA/MALAWI: MICROWAVE LINK, MBEYA-KARONGA-MZUZU



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Tanzania

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To link the microwave systems in Malawi and Tanzania

Cost of the project: US dollars 4.5 million

Foreign currency part: Approx. 90%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

Project authority: Ministry of Transport and Communications

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2. PROJECT DESCRIPTION

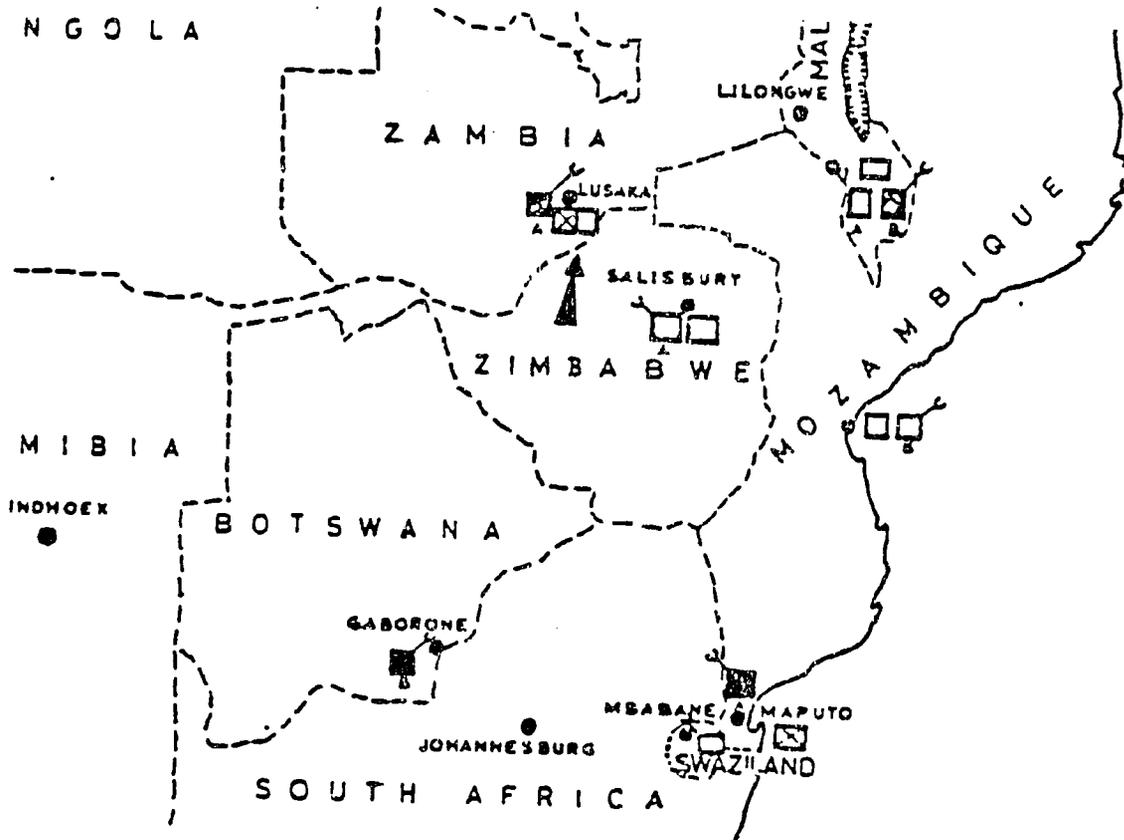
The missing link, Mbeya-Dodoma, in the Panaf-tel system Zambia-Tanzania-Kenya will be put into service by August 1981 and the now proposed link Mbeya-Karonga-Mzuzu will link Malawi's backbone system with the Panaf-tel system.

3. COMMENTS BY THE CONSULTANTS

The proposed project will not only link the Malawi backbone system with the Panaf-tel network but also provide a cross-route from Tanzania (via Malawi) to Mozambique. The project is therefore well justified as part of the regional system.

PROJECT NO. 5.8.1

ZAMBIA: EXTENSION OF THE INTERNATIONAL TELEPHONE SWITCHING CENTRE (ITSC)
IN LUSAKA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To increase the traffic handling capacity of the ITSC to such an extent that it can be used as switching centre for the sub-region.

Cost of the project: US dollars 3.3 million

Foreign currency part: 95%

Financing required: Entire amount

Duration: 4 years

Desirable start: 1981

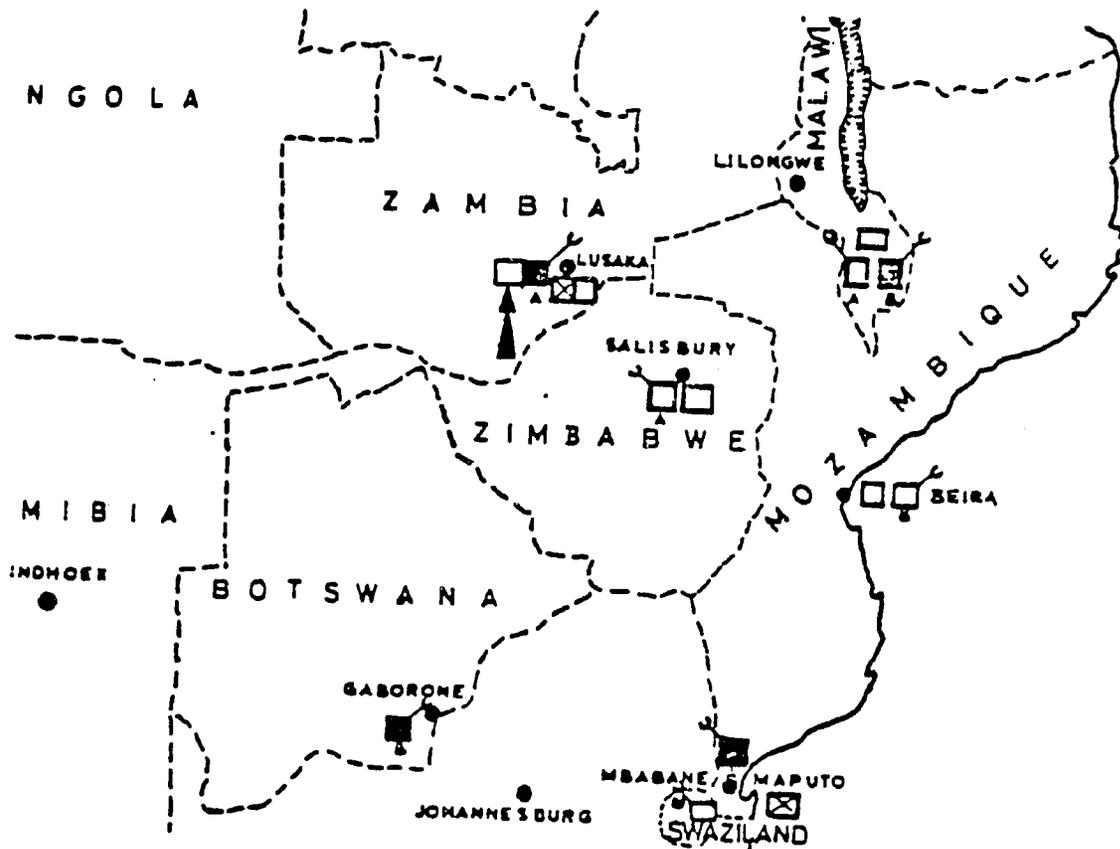
Project authority: Ministry of Power, Transport and Communications

2. COMMENTS BY THE CONSULTANTS

The International Telephone Switching Centres form a hierarchy and each centre is referred to one of the categories CT1, CT2 or CT3, category CT1 being the highest one. The classification is done by the ITU and is based on certain criteria. The present classification of centres in Southern Africa is not known to us, but the actual project may result in an upgrading to a higher category of the centre in Lusaka. However, before any changes in the classification of the centres in the region is made, the configuration of the regional network should be agreed upon by the countries in the region and a regional routing plan be prepared. Each country should have its own gateway exchange, which also can be used as an International Switching Centre.

PROJECT NO. 5.8.2

ZAMBIA: EXPANSION OF THE EARTH STATION AT MWEMBESHI (LUSAKA)



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: Expansion of the existing earth station in connection with the proposed extension of the ITSC in Lusaka

Cost of the project: US dollars 2,1 million

Foreign currency part: Approx. 95%

Financing required: Entire amount

Duration: 3 years

Desirable start: 1982

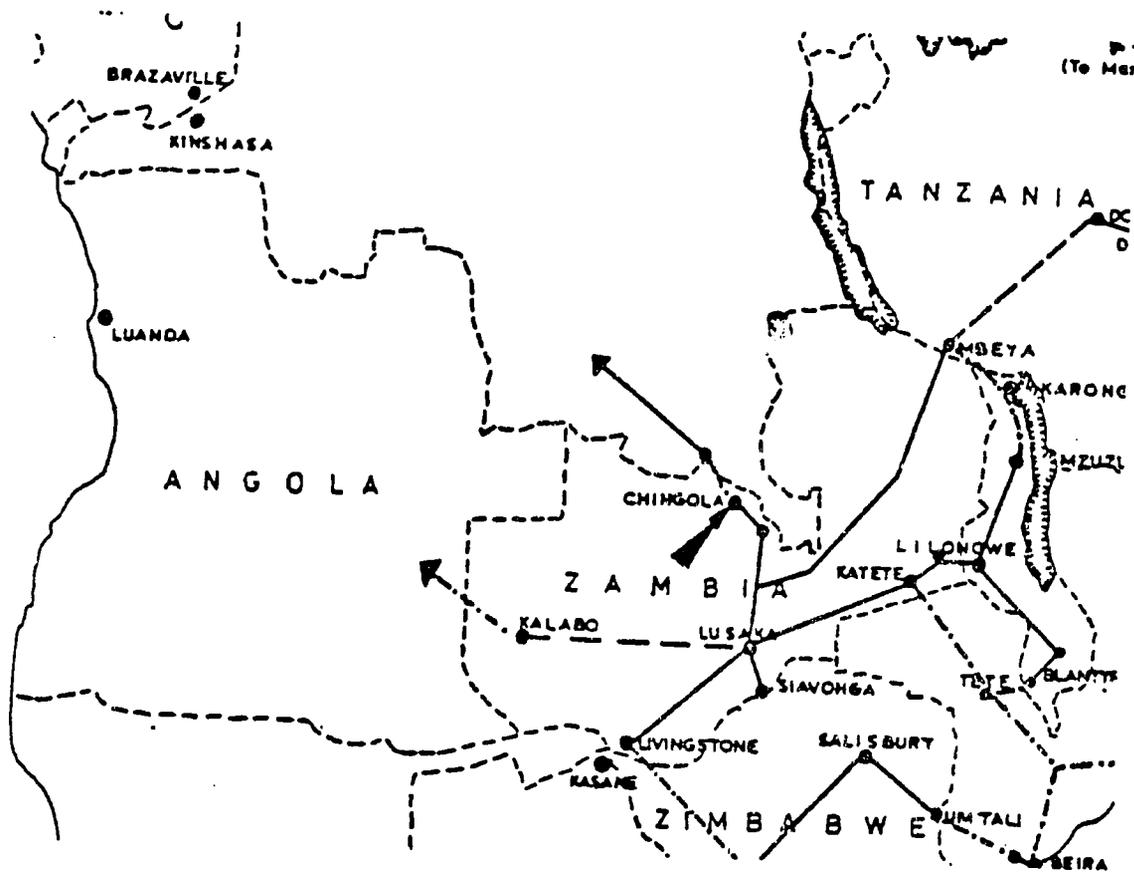
Project authority: Ministry of Power, Transport and Communications

2. COMMENTS BY THE CONSULTANTS

This project is closely related to project no. 5.8.1, extension of the International Telephone Switching Centre (ITSC) in Lusaka and has to be carried out if the ITSC project is implemented.

PROJECT NO. 5.8.3

ZAMBIA/ZAIRE: MICROWAVE TERMINAL AT CHINGOLA TO COMPLETE THE LINK ZAMBIA - ZAIRE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zambia

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To establish the missing link between the East African and West African sections of the Panafstel system

Cost of the project: US dollars 0,15 million

Foreign currency part: 100%

Financing required: Entire amount

Duration: One year

Desirable start: To be decided after negotiations between Zambia and Zaire

Project authority: Ministry of Power, Transport and Communications

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2. DESCRIPTION OF THE PROJECT

In the Panaftel system a link between the East African and the West African sections of the system is planned. The bulk of the work now required to establish this link is in Zaire, but the proposed terminal at Chingola in Zambia will complete the link on the Zambian side.

3. COMMENTS BY THE CONSULTANTS

This project is not directly related to other projects in the region but establishing the missing link will no doubt be beneficial for many of the member states of the Southern Africa Transport and Communications Commission, which now have to route their calls to West African countries over European centres.

2. DESCRIPTION OF THE PROJECT

The microwave link from Lusaka to Kalabo will be completed by April 1981. There are possibilities to link the networks in Zambia and Angola at Kalabo, Zambezi or Mwinilunga. The cost estimate is based on the assumption that the interconnection will be at Kalabo.

3. COMMENTS BY THE CONSULTANTS

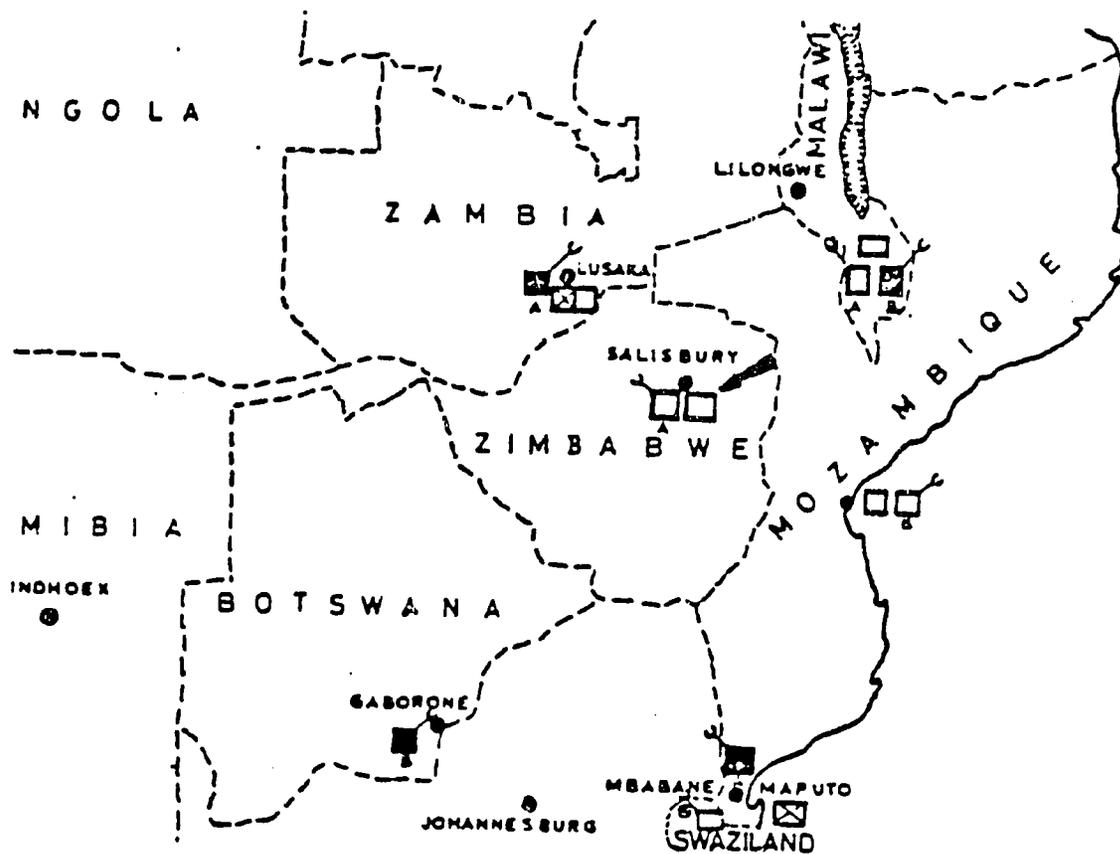
A connection between the networks in Angola and Zambia would form a very important link in the regional network and enable Angola to communicate with countries in the eastern part of the region without the need to go through centres in Europe.

No information about this project has been forthcoming from Angola.

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PROJECT NO. 5.9.1

ZIMBABWE: INTERNATIONAL TELEPHONE SWITCHING CENTRE (GATEWAY EXCHANGE)



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To provide for interconnection between the national, interterritorial and international networks.

Cost of the project: US dollars 1.6 million

Foreign currency part: 90%

Financing required: Entire amount

Duration: 3 1/2 years

Desirable start: 1981

Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

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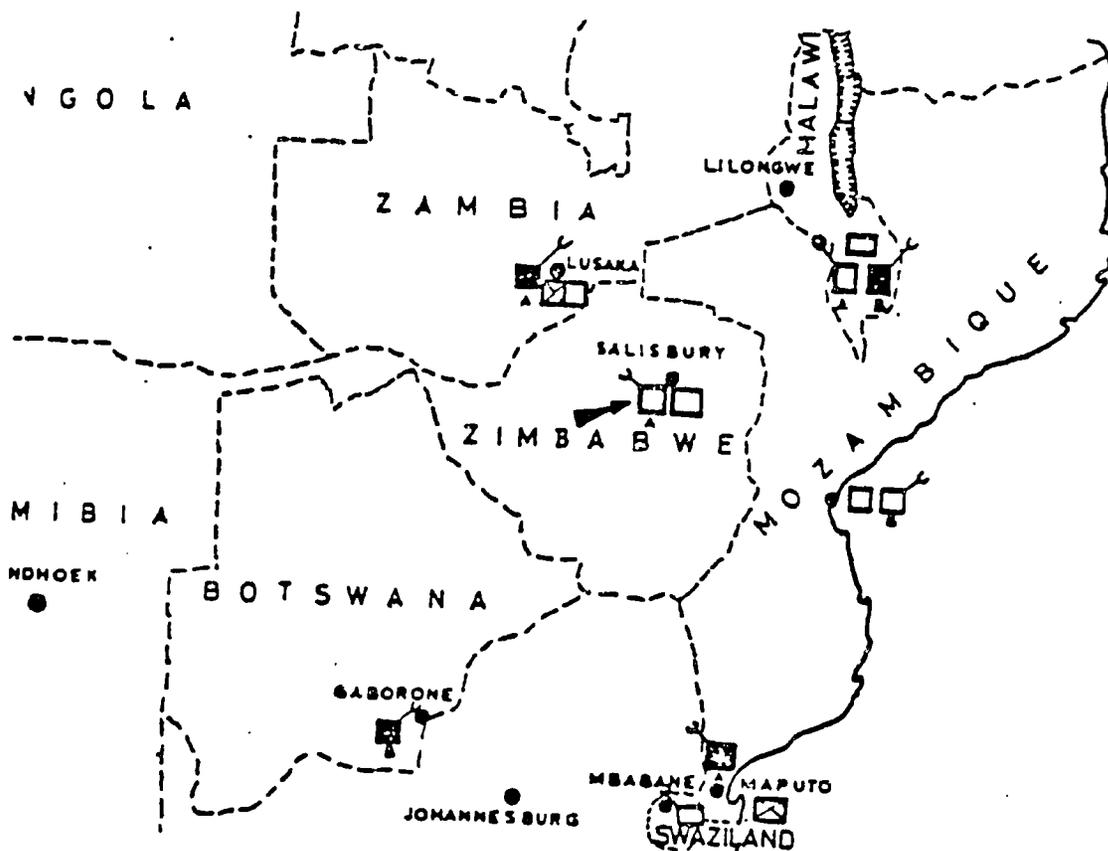
2. COMMENTS BY THE CONSULTANTS

Every country should have its own gateway exchange which also serves as an International Telephone Switching Centre in the interregional/international network.

In accordance with discussions with Zimbabwean authorities an initial feasibility study is recommended.

PROJECT NO. 5.9.2

ZIMBABWE: EARTH STATION, STANDARD A, FACING THE ATLANTIC OCEAN SATELLITE



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Telecommunications

Order of priority: Priority class 2: New Telecommunication Projects

Nature of the project: To provide for international telecommunications services and the transmission and reception of TV programmes.

Cost of the project: US dollars 12.8 million

Foreign currency part: 90%

Financing required: Entire amount

Duration: 3 1/2 years

Desirable start: Study 1981

Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

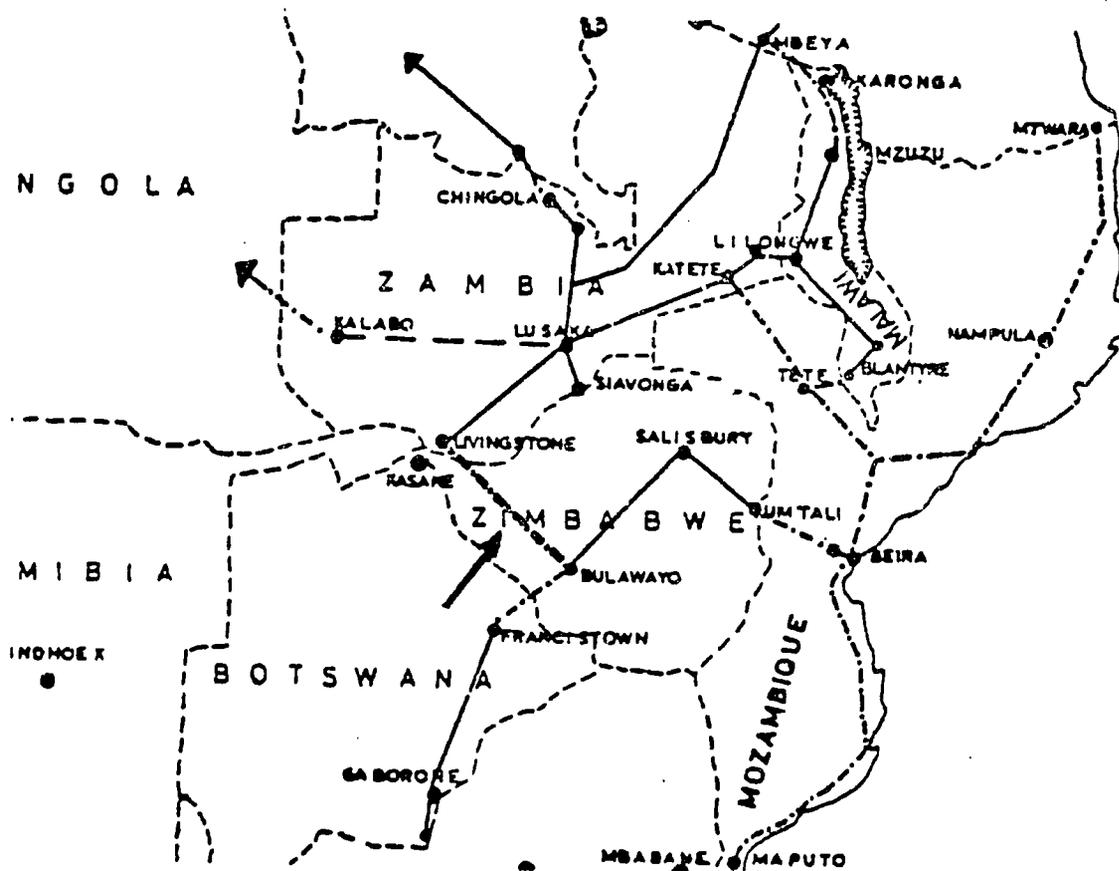
2. COMMENTS BY THE CONSULTANTS

Please refer to PART I, chapter 8.9 "The earth station problem".

In accordance with discussions with Zimbabwean authorities an initial feasibility study is recommended.

PROJECT NO. 5.9.3

ZIMBABWE/ZAMBIA: MICROWAVE LINK BULAWAYO - LIVINGSTONE



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Zimbabwe
- Sub-sector: Telecommunications
- Order of priority: Priority class 2: New Telecommunication Projects
- Nature of the project: To provide for the future demand in telecommunication services between Zimbabwe and Zambia and for the interchange of television programmes. This project will also link Botswana with the Panafstel system.
- Cost of the project: US dollars 5,7 million (including 0,2 million for installations at Livingstone, Zambia)
- Foreign currency part: Approx. 90%
- Financing required: Entire amount
- Duration: 4 1/2 years
- Desirable start: 1981
- Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

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2. DESCRIPTION OF THE PROJECT

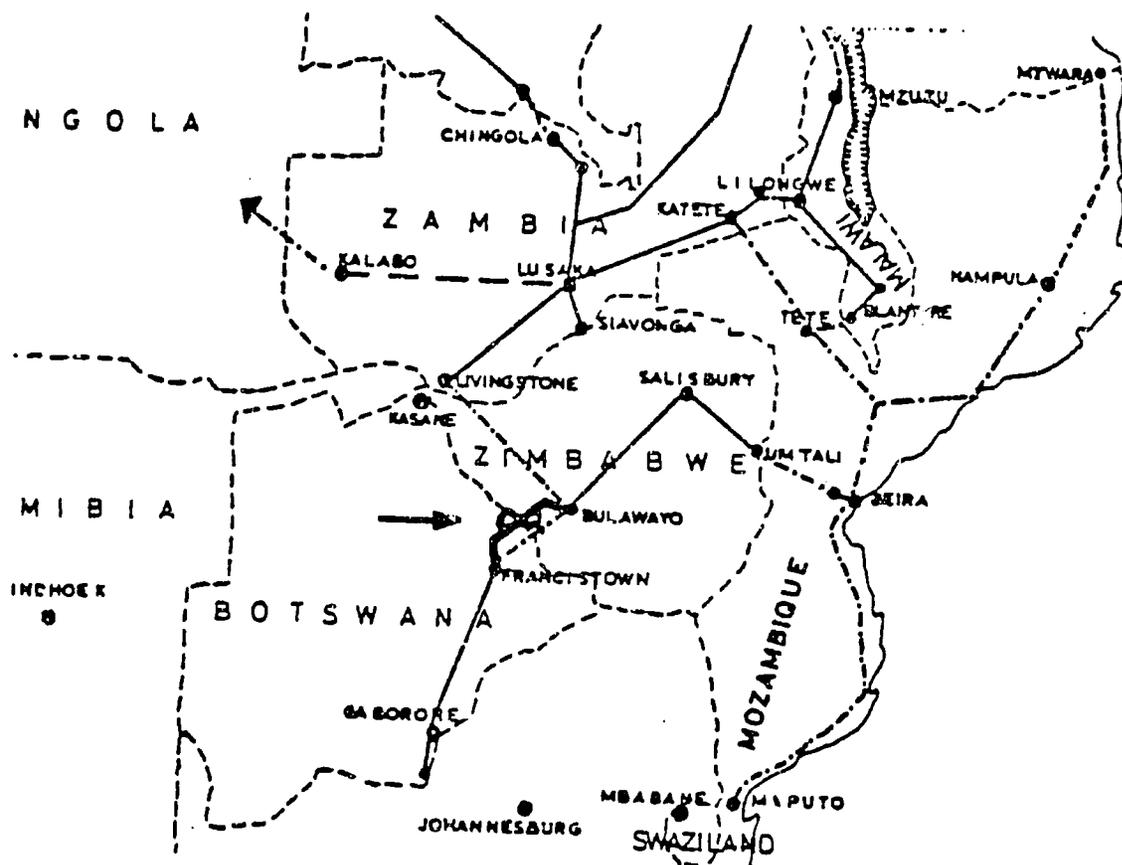
This project is intended to form an integral part of the Panaftel system and will also (together with the link Francistown - Bulawayo proposed by Botswana) link Botswana with the Panaftel system and provide connections to Kasane in Botswana (via Livingstone). The project includes additional equipment in the existing terminal at Livingstone (US dollars 0,2 million).

3. COMMENTS BY THE CONSULTANTS

This project will not only form an integral part of the Panaftel system and as such be justified but will also be beneficial to the development of the western region of Zimbabwe.

PROJECT NO. 5.9.4

BOTSWANA/ZIMBABWE: BULAWAYO - FRANCISTOWN, UPGRADING OF OPEN WIRE CARRIER SYSTEM



1. IDENTIFICATION AND SUMMARY

- Origin of the project: Submitted by the Government of Zimbabwe
- Sub-sector: Telecommunications
- Order of priority: Priority class 1: Rehabilitation/Upgrading
- Nature of the project: Upgrading the Bulawayo - Francistown open wire carrier system to meet the forecast growth in demand for services between Botswana and Zimbabwe
- Cost of the project: US dollars 0,45 million
- Foreign currency part: Approx. 60%
- Financing required: Entire amount
- Duration: 18 months
- Desirable start: 1981
- Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

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2. DESCRIPTION OF THE PROJECT

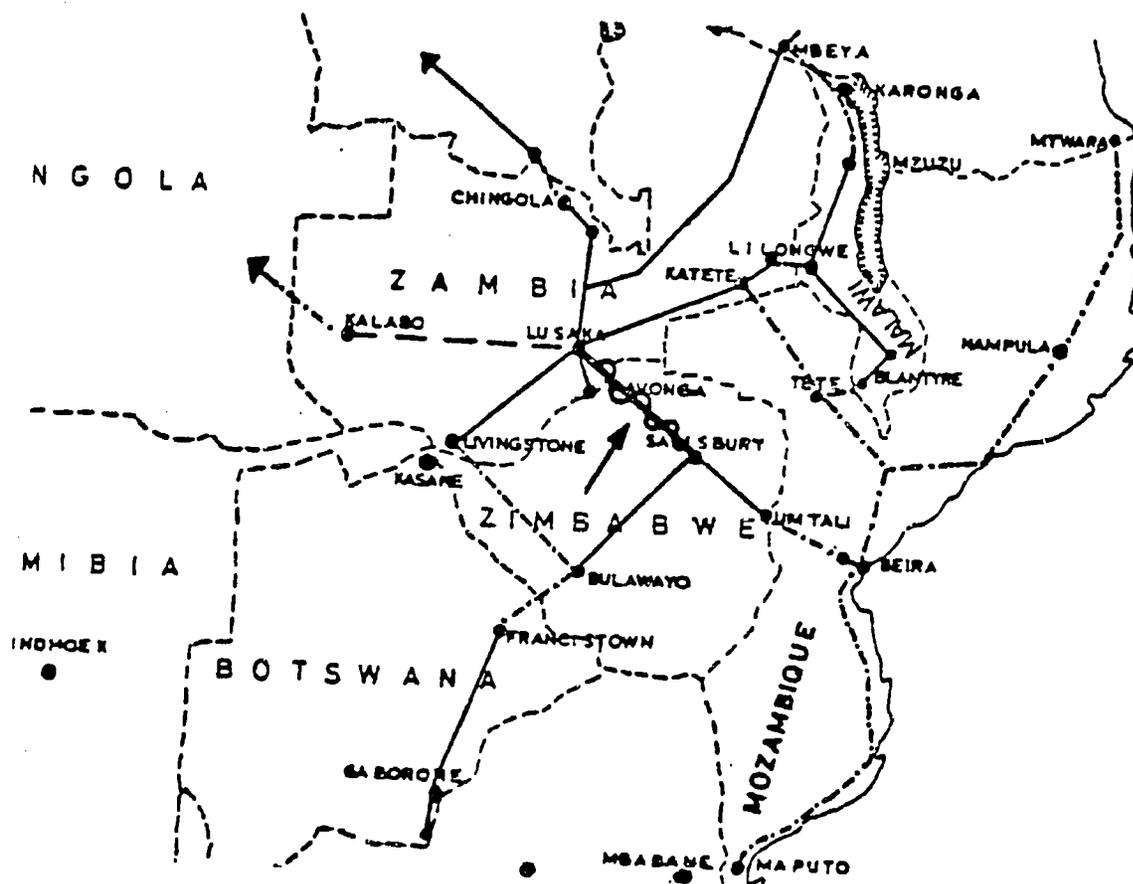
The existing carrier system has a capacity of 12 channels. By upgrading the system it may be possible to increase the capacity to maximum 60 channels.

3. COMMENTS BY THE CONSULTANTS

This project should be seen as a temporary solution pending the installation of a microwave link in 3-4 years.

PROJECT NO. 5.9.5

ZIMBABWE/ZAMBIA: RESTORATION OF OPEN WIRE LINE AND CARRIER EQUIPMENT
SALISBURY - LUSAKA



1. IDENTIFICATION AND SUMMARY

Origin of the project: Submitted by the Government of Zimbabwe

Sub-sector: Telecommunications

Order of priority: Priority class 1: Rehabilitation/Upgrading

Nature of the project: Restoration of open wire line and carrier equipment Salisbury - Lusaka

Cost of the project: New sources of finance not required

Desirable start: Ongoing project

Project authority: Ministry of Roads and Road Traffic, Posts and Telecommunications

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PART III
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1. ANGOLA

The actual Angolan figures for external trade are not relevant, as they do not reflect the true potential of the country. Forecast for imports and exports by commodity groups have not been obtained.

The large natural resources of petroleum oil, iron ore, copper, manganese and diamonds indicate a substantial future trade potential, but it is not going to influence regional transport projects at the present. Future developments may change this situation very much, but the difficulties of forecasting make it impossible for the consultants to evaluate these effects.

2. BOTSWANA FOREIGN TRADE

2.1 Export

2.1.1 Meat

Livestock production cover 80% of the total agricultural production of Botswana. 30.000 tons of meat was exported in 1976/77, nearly all by rail through South Africa. At the end of 1977 the outbreak of foot and mouth disease reduced the export drastically and 17.000 tons were exported in 1977/78. In 1978/79 an export figure of 30.000 tons was resumed. The previous and present offtake rate for cattle is about 11% which is very low (Namibia has an offtake rate of 20%). An increased offtake and export seems possible and probable and we assume a future growthrate of 6% per year.

2.1.2 Hides and Skins

Present exports of about 7.000 tons per year is expected to grow with the same rate.

2.1.3 Copper-Nickel

The copper-nickel mines at Selebi-Pikwe produce and export at the present about 40.000 tons per year. Investigations of new mines are being carried out. The best results have been obtained at Makgadikgadi (see fig. App. 1.2.1) but no decision on production has been made. We assume a constant future production, but are aware that detailed geological surveying of the mineral potential of Botswana is far from complete and new opportunities may change the picture totally.

2.1.4 Soda Ash

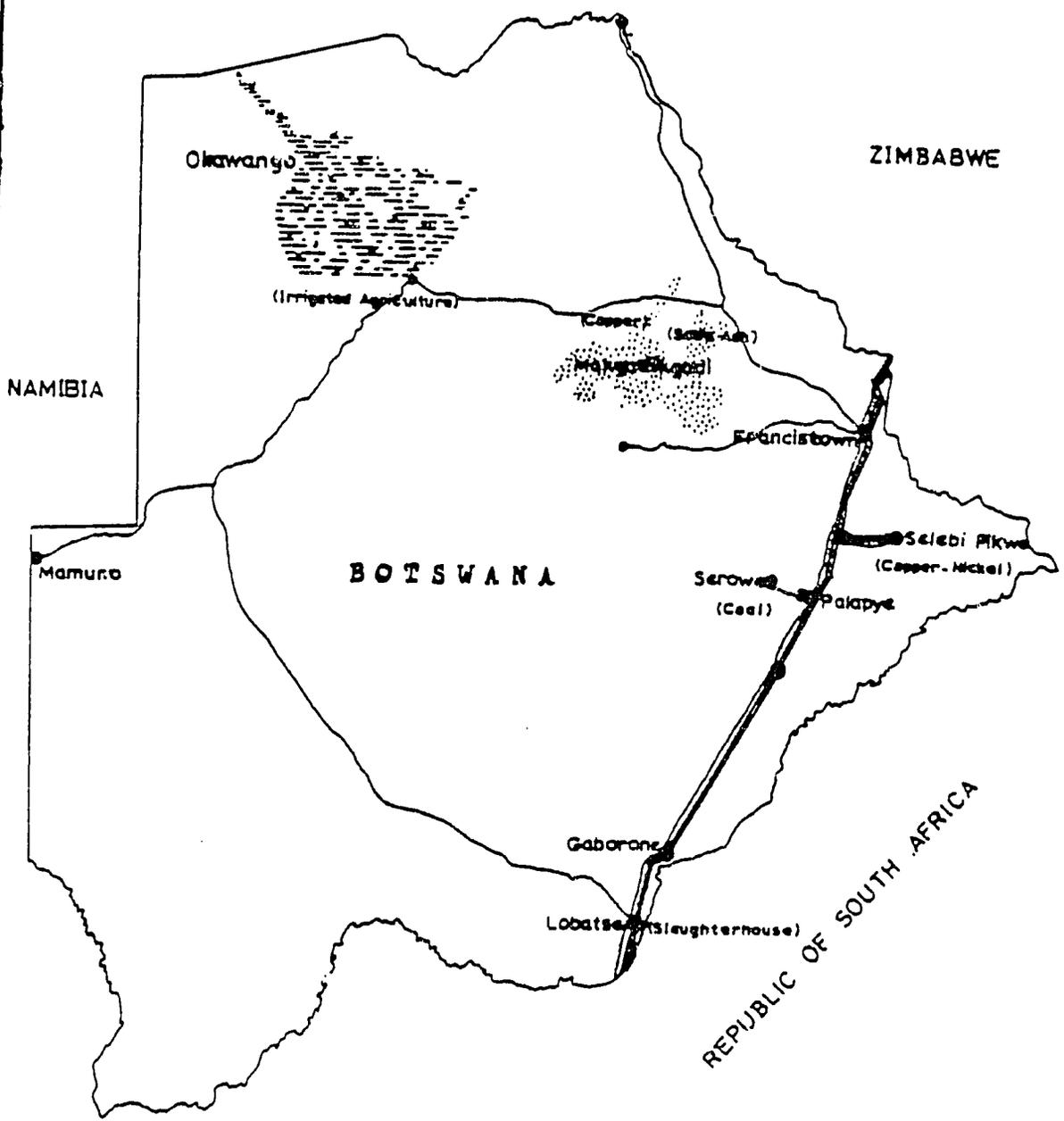
Considerable resources of Soda Ash are in Makgadikgadi. A production of 200.000 tons per year with export to South Africa has been discussed. Present transport costs are probably prohibitive for exports to the world market, but if combined with a coal-railway such exports may be feasible. Reference is made to chapter 3.3 .

2.1.5 Coal

Currently about 350.000 tons of coal is being mined at Morupule for domestic use in power generation and to operate the copper-nickel smelter at Selebi-Pikwe. The resources at Morupule are very large, the mining conditions and the coal quality are good, and the major obstacle to export at the present price of coal is the cost and availability of transport. A yearly production of 5 million tons per year have been discussed and is used as the basis for the pre-feasibility study of the Trans-Kalahari Railway. Even higher figures - up to 10 million tons a year - have been mentioned. Reference is made to chapter 3.3.

2.1.6 New Agricultural Production

A number of studies have been carried out to make use of the waters of Okavango and the fertile soils of this region (see fig. App. 1.2.1). Large scale sugar plantations have been discussed (involving transports of up to 100.000 tons a year) but the risk of frost may be a hindrance.



 RAILWAY
 ROAD

100 50 0 50 100 150 200
 Kilometers

A SWECO report from 1976 identifies 14.000 ha of suitable cropland which could be irrigated if the copper mining and/or soda ash developments went ahead and water for irrigation was supplied at marginal costs. We are however not including such developments in our forecast.

2.1.7 Other Products

65.000 tons of other products were exported from Botswana in 1978/79. We assume a yearly growthrate of 7% for such exports.

TABLE APPENDIX 1.2.1

Forecast of Export from Botswana
(without a coal-railway)

1.000 tons

	1980	1985	1990	1995	2000
Meat	30	40	50	65	80
Hides and Skins	7	10	13	17	22
Copper-Nickel	40	40	40	40	40
Other Products	65	90	127	178	248
Total	142	180	230	300	390

2.2 Imports

2.2.1 Maize

Import of maize fluctuated from 30.000 tons in 1976/77 to 50.000 tons in 1977/78 with 45.000 tons in last year of statistics 1978/79. Increased consumption counterbalanced by a higher degree of self sufficiency points to a constant future import figure.

2.2.2 Sugar

37.000 tons of sugar were imported from Zimbabwe in 1978/79 and a growth-rate of 5% is probable assuming that no important domestic production is taking place.

2.2.3 Cement

60.000 tons of cement were imported in 1978/79 and we are also here assuming a growthrate of 5% per year.

2.2.4 Coal

17-19.000 tons of coal have been imported during the last three years from South-Africa - probably because of the shorter distance from South African mines to the main consumption center in the South East than from Morupule. Morupule production may substitute this import which anyway is a short-distance transport crossing the border, and we look away from coal import in our forecast.

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2.2.5 Oil Products:

Imports of Diesel Fuel and Petrol exceeded 100.000 tons in 1978/79. A 5% increase per year is foreseen.

2.2.6 Timber

The last years import of 13-15.000 tons is also expected to grow with 5% per year.

2.2.7 Other Products

1978/79 imports of other products (chemicals, paper, textiles, metal products, machinery, vehicles, etc.) amounted to 220.000 tons. The value of these imports given in the latest statistics from 1979/80 indicates however a growth of 35% corresponding to a volume increase of at least 20-25%. This considerable growth is probably made possible by the increased wealth and foreign exchange earnings stemming from export of diamonds (245 mill US Dollars in 1979 against 50-60 mill USDollars 1975/77). We assume a 1980 import of 270.000 tons and a growth-rate of 5% per year.

TABLE APPENDIX 1.2.2

Forecast of Import to Botswana

1.000 tons

	1980	1985	1990	1995	2000
Maize	50	50	50	50	50
Sugar	40	50	65	80	100
Cement	60	75	95	120	150
Oil Products	100	125	160	200	260
Timber	1.5	20	25	30	40
Other Products	270	340	440	560	700
Total	535	660	835	1.040	1.300

2.3 Origins and Destinations

2.3.1 Export

The percentage of Botswana export in tons going to or passing through R.S.A. has been :

1976/77	90%
1977/78	95%
1978/79	75%

All meat and hides and copper-nickel exports pass R.S.A. while the change in 1978/79 came from general goods and "other goods". It seems probable, that all copper-nickel from Selebi-Pikwe and possible new mines at Makgadikgudi will be diverted to railroutes through Zimbabwe and Mozambique when these lines and ports are upgraded. Meat transport from Lobatse (where far the most of the cattle is slaughtered) will have shorter and cheaper routes through R.S.A., while general goods is

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assumed to have 50-50 distribution between North and South. Our estimate of present and future destinations and routes are given in Table App. 1.2.3.

2.3.2 Import

About 70% of all imports to Botswana came from or through R.S.A. during the last three years.

All sugar import and most of the cement had origin in Zimbabwe and one third of general goods and "other goods" came from the North. All oil imports, timber and most maize was imported from or through R.S.A. We assume, that future oil imports may be diverted and sent from Beira through the pipeline to Umtali and from there by rail. Zimbabwe will probably have an export surplus of maize (Ref. 9.1.1) which may substitute present R.S.A. exports. Timber will still be needed from R.S.A. and many of the "other goods" at the present imported and used in the south-eastern region of Botswana are originating in R.S.A. or will still be cheaper to import through that country. We assume, however, that two thirds of future imports of "other goods" will come from the North. The estimates of origins are made in Table App. 1.2.3

TABLE APPENDIX 1.2.3

Forecast of Origins and Destinations
in foreign trade - Botswana

1.000 tons

Country of origin or destination	1980			1990			2000		
	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.	Exp.	Imp.	Tot.
Malawi	-	-	-	5	5	10	10	5	15
Mozambique	-	-	-	5	10	15	10	15	25
Zambia	5	5	10	10	20	30	15	30	45
Zimbabwe	5	150	155	10	265	275	20	430	450
R.S.A.	10	120	130	15	65	80	25	100	125
Others via Mozambique	47	60	107	90	360	450	150	550	700
Others via R.S.A.	75	200	275	95	110	205	160	170	330
Total	142	535	677	230	835	1065	390	1300	1690

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3. LESOTHO FOREIGN TRADE

3.1 Export

The export quantities from Lesotho are negligible from a transportation point of view. The main articles are wool (2-3.000 tons per year) and Mchair (500 tons per year).

3.2 Import

Present import and forecast is prepared by Dorsch Consultants in Lesotho Transportation Study (May 1980) and is used unchanged here.

TABLE APPENDIX 1.3.1
Forecast of Import to Lesotho

1.000 tons

	1979	1985	2000
Grain, grain products, beans, bread	140	174	300
Fruit and vegetables	20	25	45
Animal feed, lucerne, etc.	8	11	20
Livestock, live animals, hides, skins	24	32	60
Agricultural materials (fertilizers, pesticides, seeds, etc.)	10	13	25
Domestic and general hardware, machinery, tools, incl. furniture, agricultural implements	53	72	140
Grocery, beverages, meat, soap, household chemicals, etc.	88	117	225
Softs (blankets, textiles, etc.) including shoes	11	15	30
Manufactured construction materials (bricks, cement, steel, timber, etc.)	110	149	290
Unprocessed construction materials (sand, stones, etc.)	92	125	250
Coal, firewood	37	50	100
Oil, petrol, paraffin, gas	48	64	125
Others	2	3	5
Total	643	850	1.615

4. MALAWI FOREIGN TRADE

4.1 Export

4.1.1 Sugar

Until 1970 Malawi was a net importer of sugar. Two sugar estates were established and 1980 production is estimated at 150,000 tons with a local consumption of about 40,000 tons. Future exports are depending on world market prices on which World Bank Analysts at the present are optimistic. We are assuming a 1985 export of 130,000 tons and a 5% growthrate.

4.1.2 Molasses

25,000 tons was exported in 1979 and a 1980 export of 35,000 tons is expected. A 5% future growthrate is assumed.

4.1.3 Tea

Malawi tea industry is very well established in overseas markets and dispose of a cheap supply of labour. Difficult transport to ports is mentioned as a main drawback. 1980 production is estimated at 40,000 tons and The Tea Association has given a forecast of 64,000 tons in 1990. The consultants assume a 3% per year growth during the 1990's.

4.1.4 Tobacco

Appropriate soil, climate and labour resources make Malawi highly competitive in producing top quality tobacco for the world market. Well established estates dominates and production expanded from 10,000 tons to 40,000 tons from 1970 to 1980. The Tobacco Control Commission estimates an increase to 50,000 tons in 1990 which seems to be conservative. Scarcity of land may however limit expansion and the consultants have adopted this forecast.

4.1.5 Groundnuts

75% of groundnut production in Malawi is consumed on the farms as an important ingredient in the diet. Estimates of production was made in 1969 and 1975 (200,000 tons and 120,000 tons respectively). Marketed quantities and exports declined during the 1970's due to the price policy which squeezed the farmers between increasing input prices and insufficient salesprice. Exports fell from 36,000 tons in 1972 to 15,000 tons in 1977 and is estimated at 18,000 tons for 1980. There is at the present a greater overseas demand for Malawian groundnuts than is currently being met. The consultants assume that the obviously damaging price policy is changed by 1985 and that present high transport prices are reduced. Our forecast is based on a resumption of the 1972 export level by that year and a 5% future growthrate.

4.1.6 Maize

This is by far the most important staple food crop of Malawi covering 80% of all arable land. 85% of production is consumed locally on the farms. In 1970 and 1975/76 droughts compelled Malawi to import maize at high cost and a strategic reserve of 180,000 tons is now being established. The domestic consumption requirements are about 1.4 mill tons per year and the 1980 production level is estimated to about 1.5 mill tons, leaving

100,000 tons for stockbuilding. Maize acreage is difficult to increase due to scarcity of arable land, but yields could be increased considerably (even tripled from 900 to 2,800 lb per acre) by introduction of hybrid maize and increased use of fertilizers. Exports - when they have occurred - have been in the 30,000 - 40,000 tons range. Considering present prospects for international maize prices, Malawi could be competitive and a considerable export is possible.

4.1.7 Other Agricultural Products

Efforts have been made to diversify agricultural production. Macadamia nuts have been produced and exported with success, but an expansion will take time as the trees take 15-30 years to mature. Coffee, tea, seed, oil and beef are other possibilities. The present productivity of agriculture is very low. Considerable efforts are made to improve it, and much of the production increase - maize and/or other products - may be exported. The 1980 estimates for export of "other products" - 87,000 tons - is increased in our forecast with 10% per year to cover these possibilities.

4.1.8 Coal

Investigations have been made on the prospects of utilizing the coal deposits at Ngara. We have been informed, that these investigations have been negative.

4.1.9 Pulp

The major pulp project in the Viphya highlands of the Northern Region is a combined forestry and mill project to produce 180,000 tons of bleached pulp for export. Planting started several years ago, and are currently averaging 6,000 hectares per year. The first pulp from the mill at Chinteche should be exported in 1982 with full production being reached in 1985-86. The final decision on mill construction is not taken, but we assume that the project will be on schedule.

TABLE APPENDIX 1.4.1
Forecast of Export from Malawi

1,000 tons

	1980	1985	1990	1995	2000
Sugar	100	130	165	210	270
Molasses	35	45	55	70	90
Tea	40	50	65	75	85
Tobacco	40	50	65	75	85
Groundnuts	18	35	45	60	70
Pulp	-	100	180	180	180
Other Products	87	120	195	310	500
Total	370	530	770	980	1,280

4.2 Imports

4.2.1 Wheat and Cereals

Malawi is expected to have an export surplus of maize, but wheat and other cereal products will probably have to be imported. A forecast made early 1978 by Coopers & Lybrand for the pre-feasibility study of the Port of Beira indicated 100.000 tons for 1977 increasing to 150.000 tons in 1992. The Malawi Railways, however, only carried 15.000 tons in 1979 and estimated 25.000 tons for 1980. We have used the latter figure with a 5% growthrate per annum.

4.2.2 Fertilizer

Malawi Railways have estimated an import of 150.000 tons of fertilizer for 1980 which we have used as a starting point for our forecast. Coopers & Lybrand suggest a forecast factor of 7% per annum due to the emphasis on rural development and increased agricultural productivity. We find this forecast factor reasonable, especially considering the fertilizer requirements of hybrid maize. A project of building a fertilizer factory based on local raw materials is discussed. It would reduce or avoid fertilizer imports even if certain raw materials would have to be imported anyway. However, a decision has not been made, and according to our discussion with relevant Ministries in Malawi, the project implementation is doubtful. Our forecast assume that the plant is not built before 1990 and will have a capacity of 150.000 tons per year.

4.2.3 Coal

1980 coal import is estimated at 80.000 tons. We are assuming that local production is not feasible and estimate a growthrate of 5% per year.

4.2.4 Petroleum Products

1980 import is estimated by Malawi Railways to 160.000 tons. The pulp mill will need additional 15.000 tons from 1985 and a growthrate of 5% for other purposes is assumed.

4.2.5 Iron & Steel

Malawi Railways 1980 estimate is 25.000 tons and a 5% growthrate is used.

4.2.6 Other Imports

Malawi Railways 1980 estimate is 115.000 tons and a 5% growthrate is also assumed here.

TABLE APPENDIX 1.4.2

Forecast of Import to Malawi

1.000 tons

	1980	1985	1990	1995	2000
Wheat and Cereals	25	30	40	50	60
Fertilizer	135	190	265	200	200
Coal	80	100	130	165	210
Petroleum products	160	215	275	345	440
Iron&Steel	25	30	40	50	60
Other Products	110	140	180	225	290
Total	535	705	930	1.035	1.260

4.3 Origins and Destinations

4.3.1 Export

Nearly all Malawi export is sold to countries outside the region and at the present exported via Moçambique ports - 80.000 tons via Nacala and 240.000 tons via Beira is the Malawi Railway estimate for 1980. The main export commodities sugar, tobacco and tea are mostly export products for all countries in the region (except Botswana) and Malawi produced them for the world market. Small amounts of "other products" are probably exported to Zambia and Moçambique.

4.3.2 Import

Neither Wheat, Fertilizer nor Petroleum products - covering 60% of Malawi imports - are expected to be exported from neighbour countries and will continue to be imported via Moçambique ports, probably Nacala when the railway is improved. At the present 300.000 tons of these products are passing Beira and 200.000 tons Nacala. Coal is imported from Moatize in Moçambique (30.000 tons) and via Beira (60.000 tons). All future coal import will probably come from Moatize. Iron and Steel is imported via Beira, but Zimbabwe may in the future deliver ingots, billets, bars, rods, sections and wire, while sheets and plates still have to be imported from Nacala. We assume 70% from Zimbabwe and 30% via Nacala. "Other goods" is anticipated to come partly from Nacala (70%), partly from neighbour countries. Our estimates are given in Table App. 1.4.3. The planned pulp production will probably be very competitive in Zimbabwe and Zambia and in Moçambique until this country's own factory in Chimoi is established. Zimbabwe is expected to import 30.000 tons of pulp by 1990 and Zambia probably 15.000 tons.

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TABLE APPENDIX 1.4.3
Forecast of Origins and Destinations
in foreign trade - Malawi

1.000 tons

Country of origin or destination	1980			1990			2000		
	Exp.	Imp.	Total	Exp.	Imp.	Total	Exp.	Imp.	Total
Botswana	-	-	-	5	5	10	5	10	15
Mozambique	5	65	70	30	150	180	50	250	300
Zambia	5	10	15	30	20	50	50	30	80
Zimbabwe	-	30	30	40	80	120	65	110	175
R.S.A.	10	45	55	15	25	40	20	30	50
Other countries via Nacala	80	200	280	650	650	1300	1090	830	1920
Other countries via Beira	220	300	520	-	-	-	-	-	-
Total	320	650	970	770	930	1700	1280	1260	2540

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5. MOÇAMBIQUE FOREIGN TRADE

5.1 Export

5.1.1 Sugar

The peak year of sugar production was 1972 with 324.000 tons. The last three years production figures are far below, but have been increasing : 158.000 tons, 190.000 tons and 212.000 tons. Exports for the same years amounts to 37.000 tons, 25.000 tons and 118.000 tons leaving about 130.000 tons in average for domestic consumption or about 11 kg per inhabitant.

1980 production (the season is finished) was about 225.000 tons, but the export was only 80.000 tons, everything from the port of Beira. The biggest of the 5 sugar mills - Marroneu - had difficulties and no production in 1977 and in 1978, but is now working and could reach 100.000 tons in 1985 and 125.000 tons in 1990. We assume a production of 325.000 tons - corresponding to the peak in 1972 - in 1985 and a 5% growthrate. Consumption is also assumed to grow with 5% per year.

5.1.2 Molasses

Molasses export was 100.000 tons at the preliberation peak and was 65.000 tons in 1979. The output in tons is about 30% of raw sugar production and at the present everything is exported. A factory for cattle feed is, however, planned and will use all Molasses as raw material. The export is consequently phased out between 1985 and 1990.

5.1.3 Copra

Copra export which was at 48.000 tons in 1973 has dropped steadily and was at 29.000 tons in 1979. Difficulties in the commercialization of agricultural products in the main producing area, Zambezia, seems to be responsible for much of the decline. Our forecast is that preliberation levels will be reached by 1980 and a growthrate from then of 5% per year.

5.1.4 Cotton

Peak production before liberation was 144.000 tons in 1973 with an export of 51.000 tons. Production fell to 37.000 tons in 1976 further to 31.000 in 1979 with exports both years about 16.000 tons. The big slump 1973-1976 came because cotton production previously had been forced on the population. Severe flooding in Zambezi spoiled much of the harvest of 1977. The Cotton Institute is convinced that a target of 68.000 tons will be reached. The target for 1985 is 200.000 tons. The installed capacity in the factories is 400.000 tons, and we have adopted the 1985 target as production forecast and furthermore assumed a growthrate of 5% per year 1985-2000.

Present consumption of cotton is about 40.000 tons leaving 25.000 tons for export in 1980. The import of cotton textiles is about 4.000 tons. Assuming a strong increase in consumption and a certain import substitution (but no export of textiles) a growthrate of 10% per year was estimated. Several new textiles factories are planned (one in each province) which should increase consumption much more and form the basis for textiles exports. These plans are not included in our forecast.

Our assumptions will give the following pattern :

	1980	1985	1990	1995	2000
Production	65	200	255	325	415
Consumption	40	65	100	170	270
Export	25	135	155	155	145

5.1.5 Tea

Tea production increased from 14.000 tons in 1976 to 17.000 tons in 1980 near the preliberation maximum of 19.000 tons. There are approved plans for establishment of three new factories and new machinery in the existing factories by 1985, financed by the African Development Bank. Based on these plans 1985 exports are estimated at 25.000 tons. A future growth-rate of 3% per year is assumed.

5.1.6 Fruits

16.000 tons of citrus fruit were exported in 1979 as compared with 12.000 tons in 1978 and 21.000 tons preliberation. The 1980 figure is estimated at 20.000 tons, half from Beira, half from Maputo. Areas are reported to be planted ensuring an export of 30.000 tons in 1985. We assume that the export will grow with 5% per year.

25.000 hectares in the Maputo - Gaza area near the Limpopo river is prepared for banana plantations and target exports are 100.000 tons in 1985 and 400.000 tons in 1990. The bananas are supposed to be transported to the port of Maputo in refrigerated containers and shipped to eastern Europe. We find the targets too optimistic and have estimated the figures to 50.000 tons in 1985 and 100.000 tons in 1990.

5.1.7 Cashew Nuts and Oil

Exports of cashew nuts dropped from 30.000 tons in 1973 to a level of 17-18.000 tons 1977-1979 and cashew oil from 15.000 tons preliberation to 6.000 tons 1979. In 1978 a storm destroyed a considerable part of the trees. We assume that the preliberation level will be reached in 1985 and allow a 3% yearly growth from then.

5.1.8 Timber

127.000 tons of timber (including logs, sleepers for railways, planks etc.) were exported in 1973, but exports fell after liberation and reached a minimum of 20.000 tons in 1979. During the first months of 1980, however, 15.000 tons were exported, and a total of 50.000 tons is probable for this year, most of it to R.S.A. Considerable increases in production are expected and our forecast is a resumption of preliberation export of 130 000 tons in 1985 and a 5% yearly growthrate.

5.1.9 Pulp

Construction of a pulp mill at Chimio has been decided upon and the trees were planted 10 years ago. The pulp export is anticipated to be 250.000 tons per year from 1990.

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5.1.10 Signal and Signal Rope

A 1973 export of 27.000 tons was reduced to 20.000 tons in 1979. The target for 1980 is also 20.000 tons and a 5% yearly growth is probable.

5.1.11 Coal

The reserves of coal at Moatize have been estimated at 400 mill tons, and still bigger reserves are identified in the area northwest of Cabora Bassa. Production has fluctuated due to incidents as a serious accident in 1977 and destruction of a railway bridge by military action from Rhodesia in 1979. From May-June 1980 a monthly production of 40.000 tons was achieved, and with sufficient supply of railway wagons the mine could now turn out about 1 mill tons per year. An agreement with the German Democratic Republic for exploitation of coal include plans for a production of this size. If transport was available, a yearly production of 10 mill tons could be exported. Reference is made to Chapter 3.3. Our forecast is a production of 2 mill tons and export of 1.4. mill tons in 1985, 3.7 mill in 1990 and 10 mill tons export starting between 1990 and 1995.

5.1.12 Oil Products

Information from Petromoc indicates an import of 700.000 tons of crude oil as a basis for a consumption of 150.000 tons petrol and an export of 350.000 tons. Furthermore 200.000 tons of diesel oil is imported. Extension of the refinery in Matola will increase the capacity to 900.000 tons of crude, and we assume, that this will cover increased consumption. The export of 350.000 tons petrol and the import of 200.000 tons diesel is consequently expected to continue.

5.1.13 Cement

Cement production is expected to reach 370.000 tons in 1980 and 550.000 tons in 1981. Previous target figures were not reached, and export markets are not very promising. However, 115.000 tons cement and 30.000 tons clinker will be exported in 1980 and a high growth is planned for 1981. We assume an export of 200.000 tons from 1985 onwards.

5.1.14 Other Agricultural Products

The Ministry of Agriculture has made forecasts for production and export of Rice, Maize and Cassava. Several million tons are expected including huge export figures. The following facts have influenced us not to include these export forecasts.

Maize

Statistics on maize production and consumption are extremely bad. There was no import in 1973 but 80.000 tons in 1978 and 117.000 tons in 1979. A FAO mission visited the country in June 1980 and estimated the 1980 import needs to 265.000 tons due to drought in several provinces. The domestic consumption is estimated at 450.000 -480.000 tons out of which 140.000 tons are used in industry for production of maize flour and animal feedstuff. The actual import, however, seems to be limited to 105.000 tons, so the FAO estimate was much exaggerated.

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Rice

Production of rice fell from 110.000 tons (agricultural census of 1970) to 60.000 tons in 1976, 17.000 tons in 1977 and 53.000 tons in 1979. The 1980 production is estimated at 78.000 tons. Imports for 1978 was 102.000 tons, 1979 66.000 tons and the FAO Special Report NO. 6 estimates the import need for 1980 at 75.000 tons. Actual imports are in the range of 35-40.000 tons.

Climatic conditions have been extraordinary bad for both rice, maize and wheat during the last years. The flooding in the southern provinces in 1977 destroyed much of the harvest and droughts in 1979 and 1980 have reduced output considerably. Even with normal or very good conditions a big export seems to be difficult to obtain during the next years. We find, that selfsufficiency in 1985 is a reasonable guess and that a certain export in the range of 100.000 to 200.000 tons may occur in the 1990's.

Cassava

Cassava production is not reported but may be estimated at 2 mill tons per year, all of it consumed locally. Ideas of exporting 2 mill tons in 1985 and 4 mill tons in 1990 are based on the fact that Cassava can be used to production of Methanol. If a considerable excess production could be obtained it would probably be advantageous to make this production in Moçambique.

5.1.15 Other Products

Export statistics show an export of 200.000 tons of other products for 1979 (shrimps, vegetables, oil extracts, copraoil and many other products). A forecast factor of 5% per year is used.

TABLE APPENDIX 1.5.1

Forecast of Export from Moçambique

1.000 tons	1980	1985	1990	1995	2000
Sugar	80	160	200	260	330
Molasses	60	100	-	-	-
Copra	30	50	60	60	100
Cotton	25	135	155	155	145
Tea	20	25	30	35	40
Citrus	20	35	55	60	80
Bananas	-	50	100	125	150
Cashew nuts & oil	25	45	50	60	70
Timber	50	130	165	210	270
Pulp	-	-	250	250	250
Sisal & Sisal Rope	20	25	30	35	40
Rice & Maize	-	-	100	150	200
Cement & Clinker	145	200	200	200	200
Other Products	250	320	400	620	660
Total without fuel	725	1275	1795	2240	2535
Coal	210	1400	3730	10165	10210
Oil	350	350	350	350	350
Total	1285	3025	5875	12755	13095

5.2 Imports

5.2.1 Wheat

148.000 tons of wheat were imported in 1979 as compared with 116.000 tons in 1973. 1980 imports seem according to information from ports to be about 100.000 tons. The Government wishes to encourage wheat production and anticipate to increase the present production of 2.000 tons to 15.000 tons in 1985 and 30.000 tons in 1995. These targets are probably optimistic, but we assume that domestic production will cover future increase in consumption so we keep forecast constant at the present level.

5.2.2 Coal

Most of the Moatize coal is exported, while coal consumption in the Maputo area for the power station, the railways and the cement factory is covered by import from South Africa. The import was 243.000 tons in 1973 but fell to an average of 150.000 tons 1976-1978. In 1979 it increased to 180.000 tons and we assume a figure of 200.000 tons for 1980 with increased transports and cement production. We think, however, that the import from 1985 will be switched from R.S.A. to Swaziland, where rich mines will be opened.

5.2.3 Other Products

The three main ports are estimating a 1980 import of other products than cereal and coal of 530.000 tons, and 60.000 tons are probably imported from R.S.A., Swaziland and Malawi. The present import is restricted. Considering the expected increase in the standard of living a yearly growthrate of 12% is anticipated. With this increase the preliberation import will be reached in the late 1980's.

TABLE APPENDIX 1.5.2

1.000 tons	Forecast of Import to Moçambique				
	1980	1985	1990	1995	2000
Cereals	240	150	150	150	150
Coal	200	150	150	150	150
Other Products	590	1040	1830	2340	3100
Total except oil	1030	1340	2130	2640	3400
Crude oil	700	900	900	900	900
Diesel	200	200	200	200	200
Total	1930	2440	3230	3740	4500

5.3 Origins and Destinations

Table 1.5.3 and 1.5.4 shows the estimates of present and future origins and destinations. The distribution on ports is of course depending on the future transport system, but is made under assumption of rehabilitation of existing railways and ports. The big coal export from Moatize is assumed to pass Beira until 1990. Then most of it is moved to Nacala, as

Beira never will be able to receive ships of more than 70,000 tons, and as a coal export of 10 million tons per year will require bigger ships.

The present distribution on ports has been estimated in collaboration with port representatives, but a considerable margin of error exists.

Our estimates of origins and destinations are given in table app. 1.5.3 and 1.5.4.

1,000 tons

TABLE APPENDIX 1.5.3
Forecast of foreign trade by commodity,
origin and destination - Moçambique

Export	MAPUTO			BEIRA			NACALA			INLAND			TOTAL		
	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000	1980	1990	2000
Sugar	-	30	60	80	170	270	-	-	-	-	-	-	80	200	330
Molasses	-	-	-	60	-	-	-	-	-	-	-	-	-	-	-
Copra	5	10	20	25	50	80	-	-	-	-	-	-	60	-	-
Cotton	-	-	-	-	-	-	-	-	-	-	-	-	30	60	100
Tea	-	-	-	-	-	-	25	155	145	-	-	-	25	155	145
Fruit	10	140	210	10	15	20	20	30	40	-	-	-	20	30	40
Cashew	5	10	20	-	-	-	-	-	-	-	-	-	20	155	230
Timber	-	15	40	-	-	-	20	40	50	-	-	-	25	50	70
Pulp	-	-	-	-	100	180	-	-	-	50	50	50	50	165	270
Sisal	-	-	-	-	250	250	-	-	-	-	-	-	-	250	250
Cement	70	100	100	45	70	70	20	30	40	-	-	-	20	30	40
Cereals	-	100	200	-	-	-	-	-	-	30	30	30	145	200	200
Other	5	10	30	180	220	300	50	75	135	-	-	-	-	100	200
Total without fuel	95	415	680	400	875	1170	135	330	410	95	175	275	725	1795	2535
Coal	-	-	-	150	3600	2000	-	-	-	-	-	-	210	3730	10210
Oil	350	350	350	-	-	-	-	-	8000	60	130	210	210	350	350
Total	445	765	1030	550	4475	3170	135	330	8410	155	305	485	1285	5875	13095
Import															
Cereal	240	80	80	-	40	40	-	30	30	-	-	-	240	150	150
Coal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Other	140	300	775	310	835	1000	80	200	400	200	150	150	200	150	150
Oil	900	1100	1100	-	-	-	-	-	-	60	495	925	590	1830	3100
Total	1280	1480	1955	310	875	1040	80	230	430	260	645	1075	930	3230	4500

TABLE APPENDIX 1.5.4
Forecast of Origins and Destinations
in foreign trade - Mozambique

1.000 tons

Country of origin and destination	1980			1990			2000		
	Exp.	Imp.	Total	Exp.	Imp.	Total	Exp.	Imp.	Total
Botswana	-	-	-	10	5	15	15	10	25
Malawi	65	5	70	150	30	180	250	50	300
Swaziland	35	5	40	50	200	250	70	250	320
Zambia	5	-	5	30	10	40	50	15	65
Zimbabwe	-	-	-	15	350	365	50	700	750
R.S.A.	50	250	300	50	50	100	50	50	100
Other countries via Maputo	445	1280	1725	765	1480	2245	1030	1955	2985
Other countries via Beira	550	310	860	4475	875	5350	3170	1040	4210
Other countries via Nacala	135	80	215	330	230	460	8410	430	8840
Total	1285	1930	3215	5875	3230	9005	13095	4500	17595

6. SWAZILAND

6.1 Export

6.1.1 Iron Ore

More than 2 mill tons per year were mined and exported through the port of Maputo 1973-1975. The mine is now empty and closed. Consideration is given to the possibility of upgrading lower-grade iron ore reserves for pelletising, either for export or for internal consumption in a steel mill. There are considerable reserves of lower-grade ore, but no decision has been made and the project is not included in our forecast.

6.1.2 Coal

Three firms have started mining or is preparing mining activities with plans to mine at least 2 mill tons in 1985 and onwards. 1980 production was 200.000 tons which were exported through the port of Maputo.

6.1.3 Asbestos

Exports have been in the range of 40.000 tons per year and a constant export of this magnitude is expected.

6.1.4 Sugar

Export increased from 170.000 tons in 1973 to 250.000 tons in 1980. A new sugar mill with a capacity of 150.000 tons was opened in 1980 and will produce 90.000 tons next year. Exports are expected to grow 3% per year.

6.1.5 Molasses

100.000 tons of Molasses are exported through Maputo 1980 and the growth rate follows sugar production with 3% per year.

6.1.6 Citrus Fruit

50.000 tons were exported during the 1970's and 60.000 tons in 1980. The National Development Plan expect an increase by 9-10% per year. Our forecast is more modest.

6.1.7 Other Products

30.000 tons is estimated for 1980 and a 10% growthrate is anticipated for the 1980's.

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1.000 tons

TABLE APPENDIX 1.6.1

Forecast of Export from Swaziland

	1980	1985	1990	1995	2000
Asbestos	40	40	40	40	40
Sugar	250	275	300	325	350
Pulp	140	140	140	140	140
Molasses	110	125	150	170	200
Citrus	60	75	90	100	120
Other Products	30	50	80	110	150
Total except coal	630	705	800	885	1000
Coal	200	1000	2000	2000	2000
Total	830	1705	2800	2885	3000

6.2 Import

The 1980 import of about 700,000 tons is expected to grow with 4% per year.

1.000 tons

TABLE APPENDIX 1.3.2

Forecast of Import to Swaziland

	1980	1990	2000
All Products	700	1000	1400

6.3 Origins and Destinations

Forecast of origins and destinations is given in Table 1.6.3.

1.000 tons

TABLE APPENDIX 1.6.3
Forecast of Origins and Destinations in
Foreign Trade - Swaziland

	1980			1990			2000		
	Exp.	Imp.	Total	Exp.	Imp.	Total	Exp.	Imp.	Total
Mozambique	5	35	40	200	50	250	250	70	320
Zimbabwe	-	-	-	-	50	50	-	100	100
R.S.A.	95	650	745	100	800	900	100	1000	1100
Other through Maputo	730	15	745	2500	100	2600	2650	230	2880
Total	830	700	1530	2800	1000	3800	3000	1400	4400

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7. TANZANIA

Tanzania's total export and import are not referred to here, as they have only little relevance to the projects.

The traffic through the port of Dar-Es-Salaam was somewhat over 2 mill. tons per year 1976-1978 but fell to 1.7 mill tons in 1979. This do not include oil for which the Zambian part is sent by pipeline. Other Zambian transit goods amounted to 1.3 mill tons in 1976-1977 but was reduced to 1 mill tons in 1978 and 800.000 tons in 1979. Forecast of this traffic is given in Chapter 8.

No forecast was made for Tanzania's domestic traffic through the port. Only parts will use various sections of the Tazara Railway.

Trade statistics show only negligible export and import between Tanzania and the other countries of the region, and no transit traffic from Tanzania is using transport facilities of the neighbour countries. No long term forecasts of production, consumption, import and export of Tanzania were available.

8. ZAMBIA

8.1 Export

8.1.1 Copper

1972-78 production fluctuated between 650.000 tons and 710.000 tons per year with 663.000 tons for 1978, but fell to 585.000 tons in 1979. The capacity of existing mines is about 700.000 tons per year, but may decrease due to falling grade of ores processed. The present below-capacity production is explained by shortage of skilled labour and decreasing labour productivity combined with very unstable copper prices and unreliable and expensive transport.

The mining companies suffered large losses in recent years and copper prices were too low to justify expensive development of new mines. The present mines have a limited capacity, but some smaller mines are being developed in the present copperbelt. Exports for the first 7 months of 1980 was at about the same level as 1979, when 10% of the export was from stocks. With present copper prices an export of 700.000 tons could be reached this year.

Long term forecasts depend on new mines. The proven reserves have for the last ten years remained at a level corresponding to 20-25 years of extraction at the current rate. Considerable, but low grade, reserves are identified in the Lumwana region in North-West Province. Development of these resources depends on future copper prices and future production and transport costs.

Coopers & Lybrand give the forecast shown in brackets in Table App. 1.8.1. They assume that the mines in the Lumwana region will be established about year 2000.

Higher copper prices and cheaper transport may accelerate the development so that smaller mines in the existing copperbelt more than compensate for possible decline in the extraction of current mines, and the Lumwana mines may be opened much earlier.

The western world consumption of refined copper increased from 5.4 mill tons in 1976 to 7.3 mill tons in 1979 or with 8% per year. We are assuming, that the Zambia production will grow with 4% per year - which probably will mean that the Zambian share of this market is diminishing

8.1.2 Zink

The production fell from a level of 56.000 tons in 1972-74 to about 40.000 tons in 1975-79. The mine - Broken Hill - has probably reserves to about 1995 but other deposits have been identified.

Coopers & Lybrand assume a constant future production at the present low level of 40.000 tons as shown in Table Appendix 1.8.1. The consultants find - and are in agreement with Contingency Planning Secretariate - that better transport and constant supplies of sinter and coke will induce more production. Our more optimistic forecast is shown in Table App. 1.8.1.

8.1.3 Lead

Production fell from a level of 25.000 tons per year 1972-74 to about 13.000 tons per year 1976-78. The mine - Broken Hill - has, like for zink, reserves for most of this century and other deposits have been identified.

Coopers & Lybrand assume a constant future production of 15,000 tons per year. The consultants find that improved transport facilities will create economic opportunities to increase production and are using the more optimistic forecast shown in Table App. 1.8.1.

8.1.4 Cobalt

Cobalt is an important source of export earnings and the output is expected to reach 6,000 tons per year in a few years time. It is, however, exported by air due to security reasons and to the high price of 50,000 US dollars per ton. It is not included in Table App. 1.8.1.

8.1.5 Coal

A considerable drop in coal production took place from the 1972 level of nearly 1 million tons per year to the 1978-79 production about 600,000 tons. The reason seems to be partly economic depression, which reduced the domestic demand, partly the lack of transport, which reduced the domestic as well as the export sales, partly the bad state of the mining equipment.

The coal reserves in the Maamba region should be sufficient for 20-25 years production of about 800,000 - 1,000,000 tons per year. Obsolete equipment is being replaced, financed by foreign aid. A future production of 1,000,000 tons per year is probable, which covers the domestic demand and leave an export surplus which can be sold, if easy transport is available. Table App. 1.8.1 give the Cooper & Lybrand forecast and a more optimistic forecast prepared by the consultants.

8.1.6 Cement

The Chilanga Cement Company exported small amounts previously but expanded export to nearly 50,000 tons in 12 months 1978-79, half of it to Malawi, the rest to other neighbouring countries.

Malawi and Tanzania, the main present markets, will probably be self-sufficient within the next few years and prospects for the cement market in this region are dubious. Angola and Zaire have surplus capacity and Coopers & Lybrand forecast shown in Table App. 1.8.1 seems realistic.

8.1.7 Maize

Zambia's marketed maize production fluctuated 1971-78 between 400,000 tons and 750,000 tons but fell to 330,000 tons in 1979 due to bad weather conditions, a price policy which influenced farmers to shift from maize to beef farming, and late delivery of fertilizer and seed. 300,000 tons of the country's requirements of about 630,000 tons of maize had to be imported placing considerable strain on the country's transport routes.

A considerable natural production potential and government efforts to promote rural development indicates a high future growth rate for maize. Growing domestic requirements and substitution of present import will limit export and high production costs may reduce export possibilities on world markets. Coopers & Lybrand export forecast of 40,000 tons per year 1980-2000 seems reasonable. (Table App. 1.8.1)

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8.1.8 Tobacco

Production has been disappointing since the independence at the level of about 7,000 tons a year. In 1978 and in 1979 it fell further to less than 4,000 tons and 5,000 tons respectively. The reason is partly the small farmers lack of skill, partly the price policy which is not encouraging production.

The efforts of the Tobacco Board of Zambia and a more encouraging price policy (which we assume) may increase production and export which is estimated in Table App. 1.8.1 (Corresponding to the Coopers & Lybrand forecast).

8.1.9 Other Agricultural Products

Cotton production declined during the 1970's but recovered in 1978 and reached 14,000 tons in 1979. Beef production recently expanded to cover domestic consumption. Sugar production was three times higher in 1979 than in 1971 reaching 100,000 tons with the commissioning of a new sugar mill at Nakambala. Oilseeds production has been fluctuating.

It is impossible to foresee which agricultural products will be produced for export during the 1980's and 1990's. However, the considerable agricultural potential of Zambia, the efforts made by the Government and interested organizations and the assumed improvements in transport facilities, will without doubt encourage production and export of agricultural products for which the regional market will expand. Coopers & Lybrand expect an export of 30,000 tons in 1985 growing with 10% a year to 127,000 tons in 2000 which seems realistic (Table App. 1.8.1).

TABLE APPENDIX 1.8.1

Forecast of export from Zambia 1980-2000

1,000 tons	1980	1985	1990	1995	2000
Copper	700	850	1050	1250	1500
(Coopers & Lybrand)	-	(665)	(675)	(690)	(700)
Zink	45	50	60	70	80
(Coopers & Lybrand)	-	(40)	(40)	(40)	(40)
Lead	13	17	21	24	27
(Coopers & Lybrand)	-	(15)	(15)	(15)	(15)
Coal	-	150	175	200	250
(Coopers & Lybrand)	-	(25)	(30)	(35)	(40)
Cement	50	60	35	15	10
Maize	-	40	40	40	40
Tobacco	5	8	10	13	16
Other Agricultural Products	7	30	54	88	127
Total	820	1205	1445	1700	2050
(Coopers & Lybrand)	(606)	(830)	(1018)	(1262)	(1477)

8.2 Import

8.2.1 Wheat

Domestic consumption is estimated to 130.000 - 140.000 tons a year, most of which is imported. Local production will increase - partly from internationally financed projects - but consumption will also be higher. A slight reduction in import is forecast by Coopers & Lybrand and is used in Table App. 1.8.2.

8.2.2 Other food, oils and fats

Present import consists mostly of rice, barley, processed food and beverages, various animal and vegetable oils and fats for human consumption and industrial use. Efforts to increase domestic production may counter-balance increasing demand. The Coopers & Lybrand forecast of a limited import increase is used in Table App. 1.8.2. The considerable import of maize - hopefully not to be repeated - dominates the 1980 figure.

8.2.3 Crude materials

Present import consists mostly of timber, clays and chemicals for the mining industry, rubber, seeds and in the future substantial imports of bulk phosphate rock for the planned fertilizer factory in Kafue. In the 1990's local phosphate rock may be available reducing the import demand. Coopers & Lybrand give the forecast shown in Table App. 1.8.2. We are assuming high mining and industrial activity and have increased the forecast with 25% as shown in the table.

8.2.4 Mineral fuels

Crude oil is mainly imported through the Tazama pipeline and we assume that this line or supplementary lines will have sufficient capacity to cover this import in the future. Crude oil is therefore left out of the import statistics. Other mineral fuels include coke, lubricating and industrial oils and greases, waxes and gases. Coke import fluctuated between 160.000 tons and 84.000 tons in the 1970's, but with the assumed higher coal production from the Maamba Coal Mine, local coke production will probably cover most of the demand. Demands for other mineral fuels will increase with higher industrial activity. Our forecast follows Coopers & Lybrand forecast as shown in Table App. 1.8.2.

8.2.5 Fertilizers

The optimal fertilizer requirements of Zambia are at the present estimated at 150.000 - 160.000 tons per year. The capacity of the N.C.Z. factory is 50.000 tons but investments are made to expand it to 200.000 tons. Coopers & Lybrand expect that this target will only be reached gradually and that requirements will increase. We are using their forecast in Table App. 1.8.2.

8.2.6 Other Chemicals

This group includes acids and solvents, insecticides, paints, industrial compounds and pharmaceutical products. We believe that these imports will increase with a higher percentage per year than the assumed 5-7% growth in G.N.P. We assume a 10% yearly growth in the 1980's and a 7% growth in the 1990's which are higher than the Coopers & Lybrand forecast (see Table App. 1.8.2)

8.2.7 Manufactures classified by materials

This group includes paper and wood products, iron and steel products, tyres and rubber products, textiles and industrial fabrics, and is a mixture of investment goods and consumer goods. Some of the products may be locally produced but we are following the Coopers & Lybrand forecast (6% yearly growthrate).

8.2.8 Machinery, transport equipment and other manufactures

Imports under these items have been reduced substantially under the latter years' economic depression (110,000 tons in 1975, 67,000 tons in 1977). The expected economic recovery will bring the import back to previous levels. The import elasticity is probably higher than 1 and we foresee a growthrate of 10% per year for the 1980's and 7% in the 1990's like the group mentioned under 8.2.6.

TABLE APPENDIX 1.8.2
Forecast of Import to Zambia 1980-2000

1,000 tons

	1980	1985	1990	1995	2000
Wheat	110	130	120	120	100
Other food, oils and fats	155	60	65	70	75
Crude materials	60	130	175	200	165
Mineral fuels	95	95	110	130	160
Fertilizers	110	35	40	50	40
Other chemicals (Coopers & Lybrand)	50	80	130	180	255
Manufactures classified by materials	-	(56)	(75)	(101)	(135)
Machinery, transport equipment and other manufactures (Coopers & Lybrand)	160	225	300	400	540
	100	160	260	360	500
(Coopers & Lybrand)	-	(124)	(165)	(221)	(297)
Total	840	915	1200	1510	1835
(Coopers & Lybrand)	-	(830)	(1018)	(1262)	(1477)

8.3. Origins and Destinations

8.3.1 Exports

Zambia Railways have provided information on all exports from Zambia by route (road and rail) for the first 7 months of 1980. More than 90% of the tonnage is copper, zinc and lead. Apart from 30,000 tons going to Zaire and 4,000 tons to Malawi the rest was distributed with 42% through Zimbabwe to the port of East London in R.S.A., 32% by rail and 25% by road to Dar-Es-Salaam. Rhodesian military destroyed a bridge and closed the Tazara Railway in January. This is the reason for the high R.S.A. percentage. For the last three months the R.S.A. transit

was reduced to 18% while 53% and 29% was sent by rail and road respectively to Dar-Es-Salaam. Assuming that the Tazara Railway and the port of Dar-Es-Salaam will function better, nearly all Zambia export out of the region will use this line in the 1980's.

8.3.2 Imports

A similar change in import routes has not taken place during May to July 1980. On the opposite, import from or via Zimbabwe has increased and was 55% of all imports.

This may indicate that Zimbabwe is starting a considerable export to Zambia. Several of the Zambia import goods in the food sector, iron and steel and many manufactured products are available in Zimbabwe. We are assuming that 20% of such products will be imported from Zimbabwe in 1980 increasing to 50% in 1990 and 2000. Mineral fuels, fertilizers and "other chemicals" are, however, not exported from any of the Zambian neighbour countries and are assumed to be imported via the Tazara Railway.

TABLE APPENDIX 1.8.3
Forecast of Origins and Destinations
in foreign trade - Zambia

1.000 tons

Country of origin or destination	1980			1990			2000		
	Exp.	Imp.	Total	Exp.	Imp.	Total	Exp.	Imp.	Tot.
Botswana	5	5	10	20	10	30	30	15	45
Malawi	10	5	15	20	30	50	30	50	80
Mozambique	-	5	5	10	30	40	15	50	65
Zimbabwe	-	100	100	10	400	410	15	600	615
Zaire	45	-	45	20	-	20	30	-	30
R.S.A.	-	25	25	-	30	30	-	50	50
Other countries via Dar-Es-Salaam	600	350	950	675	350	1025	915	535	1450
Other countries via Lobito	-	-	-	690	350	950	1015	535	1550
Other countries via R.S.A.	160	350	510 ^{+))}	-	-	-	-	-	-
Total	820	840	1660	1445	1200	2645	2050	1835	3885
+) Via Beira	10	50	60						
Via R.S.A.	150	300	450						

9. ZIMBABWE

9.1 Export

9.1.1 Maize

The production fluctuated enormously during the later years from 600.000 tons in 1973 to 1.700.000 tons in 1974 and 1.400.000 tons in 1975 and 1976. Domestic consumption requirements have been estimated at about 850.000 tons. Exports have consequently varied between zero and 850.000 tons (1974). 1979 was another bad harvest year and exports in the first 6 months of 1980 amounted to 63.000 tons.

Wide variations may be expected in export in the future. We assume that the decrease in production which may follow the war conditions and the exodus of some european farmers will be recovered by 1985, and that a 5% yearly increase will take place during the 1980's and 1990's.

9.1.2 Raw Sugar

This export is expected to reach 130.000 tons in 1980 and 150.000 tons in 1981. Assuming sufficiently high price levels a future growthrate of 5% per year is expected.

9.1.3 Refined Sugar

A yearly export of 25.000 tons to Botswana is expected to increase slightly in the future.

9.1.4 Other Food

This group includes meat, animal feed, wheat, tea and coffee. 54.000 tons of these products were exported during the first 6 months of 1980 and a total of 100.000 tons is expected. We assume a future growthrate of 5% per year.

9.1.5 Tobacco

Production averaged 110.000 tons per year during 1961-1965 with a domestic consumption of 10-15.000 tons. It fell during the 1970's but is now at a level of about 100.000 tons with an export of 40.000 tons in the first half of 1980. Our forecast is a growthrate of 5% per year from an export figure of 80.000 tons in 1980.

9.1.1 Cotton Lint

Production has been growing from 35.000 tons in 1973 to about 55.000 tons in 1980 with domestic consumption of about 10.000 tons. A 10% growthrate is probable during 1981 and 1982 with a 3% yearly growth onwards.

9.1.7 Asbestos

This production was at a level of 165.000 tons per year 1973-1975 but exports reached 143.000 tons in the first half of 1980. An export of 290.000 tons in 1980 growing to 300.000 tons in 1982 is expected. It is however improbable that future growth will take place.

9.1.8

Other crude materials

This group include cattle hides, timber, railway sleepers and several minor items. About 15.000 tons were exported in the first half of 1980 and a 5% growth rate is assumed.

9.1.9 Ore and Scrap Metal

An export value of 10.000 dollars probably corresponding to at least 50.000 tons were exported during 6 months of 1980. A constant export of 100.000 tons per year is our forecast.

9.1.10 Copper

Two copper mines closed during the 1970's and yearly production fell from 72.000 tons to 30.000 tons. Export in 6 months of 1980 amounted to 12.000 tons and is expected to reach 30.000 tons in the whole of 1981. No further increase is forecast.

9.1.11 Nickel

8.000 tons was exported in 6 months of 1980 and no increase is likely.

9.1.12 Ferro-Alloys

Production rose from 250.000 tons in 1965 to 300.000 tons in 1975. 175.000 tons was exported in the first half of 1980 and a 4% growth rate is expected.

9.1.13 Steel ingots, billets, etc.

Earlier export of chrome ore (300.000 tons per year in the 1970's) has stopped. Chrome is now extracted and used in domestic production. Export of steel products reached 300.000 tons in 6 months of 1980 but is not expected to grow as increased production probably will be counter-balanced by increased domestic consumption.

9.1.14 Steel wire

Present export at the level of 20.000 tons per year is expected to grow with 5% per annum.

9.1.15 Cement

25.000 tons was exported in 6 months of 1980 to Botswana. A constant export of 50.000 tons per year is probable.

9.1.16 Other manufactured goods, classified by material, include textile yarn and fabrics, leather manufactures, wooden products, paper manufactures and sundry metal products

First half of 1980 - export is estimated at 15.000 tons and a 5% growth-rate is foreseen.

9.1.17 Machinery, transport and electrical equipment and miscellaneous manufactured articles

The export of articles within this mixed group is estimated at 5.000 tons for 6 months of 1980 with a growth rate of 5% per year.

9.1.18 Coal and Coke

As mentioned in Chapter 3 , nearly unlimited resources of coal are identified in western and north-western Zimbabwe. The forecasts shown in Table App. 1.9.1 are given by the Ministry of Mines in Salisbury. It was indicated that figures for the 1990's may be still higher, depending on transport possibilities.

TABLE APPENDIX 1.9.1

Forecast of Export from Zimbabwe

1,000 tons

	1980	1985	1990	1995	2000
Maize	120	500	640	820	1200
Raw Sugar	130	180	250	270	310
Refined Sugar	25	28	34	40	45
Other Food	100	128	160	210	265
Tobacco	80	100	130	165	210
Cotton Lint	45	60	70	80	90
Asbestos	280	300	300	300	300
Ores, Scrap Metal, etc.	100	100	100	100	100
Other Crude Materials	30	38	50	62	80
Copper	24	30	30	30	30
Nickel	16	16	16	16	16
Ferro Alloys	340	410	500	610	750
Ingots, Billets, Bars	600	600	600	600	600
Rods, Sections of Steel	600	600	600	600	600
Steel Wire	20	24	33	44	50
Cement	50	50	50	50	50
Other manufactured Goods classified by Material	30	38	50	62	80
Machinery and miscella- neous	10	13	17	21	24
Total	2000	2615	3010	3480	4200
Coal	250	5000	10000	10000	10000
Coke	120	150	200	250	300
Total	2370	7765	13210	13730	14500

9.2 Import

9.2.1 Food, Beverages and Tobacco

Zimbabwe is selfsufficient or exporter in most of this commodity group. 1980-import is estimated on the basis of the import value for 6 months to 20,000 tons. The assumed growthrate is 5% per year in the 1980's and 3% in the 1990's.

9.2.2 Crude material except fuel

On the basis of 6 months import value the following quantity estimate was made for 1980:

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Crude and Synthetic rubber	50.000 tons
Wood and Pulp	20.000 tons
Synthetic Fibres	15.000 tons
Salt	45.000 tons
Sulphur	15.000 tons
Others	15.000 tons

Total	150.000 tons
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Industrial production is expected to revive and a growthrate of 8% was applied for 1981 and 1982, 5% 1983-1990 and 3% 1991-2000.

9.2.3 Lubricating Oil, Asphalt

1980 estimate: 40.000 tons. Forecast as 9.2.1.

9.2.4 Animal and Vegetable oils and fats (mostly tallow)

1980 estimate: 15.000 tons. Forecast as 9.2.1.

9.2.5 Urea, Nitrate, Potassium Sulphate, Nuriate of Potash

These materials for fertilizer production will count for about 70.000 tons in 1980 imports. A high growthrate (8% per year) is expected for the next 10 years, 5% per year in the 1990's.

9.2.6 Ammonium Anyhydrous

The expected 1980 import of 20.000 tons will probably remain unchanged in the future.

9.2.7 Sodium Carbonate, Sodium Hydroxide, Ammonium Sulphate

The 1980 import of about 40.000 tons is expected to grow with a rate of 4% per year.

9.2.8 Other Chemicals

This includes dyes, pharmaceutical preparations, explosives, plastic materials, insecticides, etc.

The 100.000 tons 1980 import is expected to grow with 5% per year in the 1980's and 3% in the 1990's.

9.2.9 Iron and Steel Plates and Sheets

Zimbabwe does not produce these plates and sheets and imported during the first 6 months of 1980 about 50.000 tons. The same growthrate as in 9.2.8 is used.

9.2.10 Paper

1980 estimate: 15.000 tons. Forecast as 9.2.1

9.2.11 Other manufactured Goods

1980 estimate: 85.000 tons. Forecast as 9.2.1

9.2.12 Machinery, Miscellaneous

1980 estimate: 100.000 tons. Forecast as 9.2.1

TABLE APPENDIX 1.9.2

1.000 tons

Forecast of Import to Zimbabwe

	1980	1985	1990	1995	2000
Food, Beverage	20	25	35	40	45
Crude Materials except fuel	160	215	275	320	370
Lubricants, Asphalt	40	50	65	75	90
Animal and Vegetable Oil and Fats	15	20	25	30	35
Urea, Nitrate, Potassium Sulphate, Nuriate of Potash	70	100	150	200	250
Ammonium Anhydrous	20	20	20	20	20
Sodium Carbonate, Sodium Hydroxide, Ammonium Sul- phate	40	45	55	60	65
Other Chemicals	100	125	165	190	220
Iron & Steel Plates and Sheets	100	125	165	190	220
Paper	15	20	25	30	30
Other manufactured Goods, classified by material	85	110	140	160	185
Machinery, Miscellaneous	100	125	165	190	220
Total without petroleum products	765	980	1285	1505	1750
Petroleum Products	700	900	1140	1320	1530
Total	1465	1880	2425	2825	3280

9.3 Origins and Destinations

Figures for the first 6 months of 1980 were obtained for Zimbabwean foreign trade by commodity groups but not by origin and destination. Previous figures are of little value. Table App. 1.9.3 give our estimates of present and future distribution, assuming that Moçambique railways and ports are upgraded and well functioning within a few years. The distribution of 1980 imports and exports between Moçambique routes and R.S.A. routes is not known and we have very little basis for our guess.

TABLE APPENDIX 1.9.3
Forecast of Origins and Destinations in
foreign trade - Zimbabwe

1.000 tons

Country of Origin and Destination	1980			1990			2000		
	Exp.-	Imp.	Total	Exp.-	Imp.	Total	Exp.-	Imp.	Total
Botswana	150	5	155	265	10	275	430	20	450
Malawi	30	-	30	80	40	120	110	65	175
Moçambique	-	-	-	350	15	365	700	50	750
R.S.A.	110	110	220	50	50	100	30	50	100
Swaziland	-	-	-	50	-	50	100	-	100
Zambia	100	-	100	400	10	410	600	15	615
Others via Moçambique	480	350	830	12015	2300	14315	12510	3080	15590
Others via R.S.A.	1500	1000	2500	-	-	-	-	-	-
Total	2370	1465	3835	13210	2425	15635	14500	3280	17780

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