
**STRATEGIES FOR THE REGIONAL PLANNING
OF THE MINERALS INDUSTRY IN SOUTHERN
AFRICA: THE CASE OF THE SADCC**

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Abstract

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The Southern African Development Coordination Conference (SADCC) was launched in 1980 and includes all of the states of southern Africa with the exception of South Africa. It seeks to promote regional development through collective self-reliance. The region is exceptionally rich in mineral resources and, as a whole, the SADCC falls within the classification of a "minerals economy". The minerals sector currently has the role of providing the state with foreign exchange and revenues as almost all minerals are exported. Due to the small size (population, economy, resources) of each SADCC state it would be difficult to redeploy their minerals sector from its current colonial role to that of providing the foundation for resource-based industrialisation. However, the regional context provides greater possibilities for delinking and the initiation of an autonomous and sustained development process. Strategies for the regional planning of the sub-continental minerals sector are numerous and could include the substitution of mineral and mineral-based imports; the development of basic fertiliser minerals for regional agricultural sector; the regional rationalisation of the iron, steel and ferro-alloys sector to provide the basic inputs for an indigenous capital goods sector; the retention of further value-added in the region through cross-border mineral beneficiation and mineral transformation projects; the regional rationalisation of mining and mineral processing manpower training programmes; intra-regional cooperation in mineral exploration projects and the establishment of regional research and development facilities to localise mining technologies; the creation of mineral finance mechanisms that bring together the resources of the region allowing investment in major minerals development projects without resorting to the transnational companies; the development of a regional minerals fiscal and legislative regime to maximise the capture of mineral rents by the state and the establishment of a regional strategy towards the mining transnational corporations. However, to realise these regional objectives the SADCC will have to move on from its current project approach to greater trade integration with some form of currency convertibility. The project approach served the region well for the rehabilitation of the infrastructure, but for realisation of the full potential of the regional mineral sector as the basis for industrialisation, greater regional integration would be necessary.

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Preface

My interest in regional coordination and mining date to the same period in the late seventies when working for the National Directorate for Geology and Mines in Mozambique. At that time the two interests were unconnected: the formation of the Front Line States to help prosecute the struggle for the independence of Zimbabwe was, to me, an excellent example of the positive results that could be achieved through regional coordination, particularly the coming together of independent African states to form a block against the racist "white" block of South Africa and Rhodesia. My interest in mining and its role in development was at that time restricted to Mozambique and my work in mineral exploration.

The two threads came together in 1982 when working on the delineation of further reserves at the Marropino tantalum pegmatite mine in Zambezia in 1982. In September of that year two large columns (200-300 men) of MNR (Mozambique National Resistance) bandits entered Zambezia from Malawi and one of them headed for the mining area of Marropino and Morrua. We were evacuated with the East German and Soviet technicians and in 1983 these mines were attacked, when several Soviet engineers were murdered, and were later forced to close due to the security situation. In this way I was suddenly faced with South African destabilisation of mining in the region and the collaboration of an independent state with them.

The Front Line States grouping had developed into the SADCC by then and it appeared that only through regional cooperation would the southern African states be able to weather the rapid escalation of aggression from South Africa that came with the Presidency of Ronald Reagan in the USA. In addition, at a national level, it became clear that the development of the Mozambican mining sector with the limited national resources available would be an extremely difficult task. Regional strategies seemed to offer the most viable alternative as the region contained states with well-established mining sectors, and in many cases the technologies used by them were more appropriate than those imported from eastern and western Europe.

In 1983 I went to the United Kingdom to sort out my passport problem and thought that it would be a good opportunity to go deeper into some of the ideas that I had on regional strategies for the southern African mining sector. I discussed these at several universities, but by far the best response I got was from my supervisor, Lionel Cliffe, at Leeds University where I then registered to do this study. The first year of the study was carried out in England and was mainly a survey of literature related to mining and mineral processing in the Third World. In the same year I presented a paper on the effects of the global crisis on mining in the SADCC and, due to the critical but positive response to this paper, I decided to carry out the study by progressively publishing the chapters on the minerals industry of each SADCC member country. At the end of 1984 I finally obtained travel papers from the British authorities and I immediately went to Zimbabwe where I was attached to the Institute of Mining Research (IMR) at the University of Zimbabwe as a research associate under Professor Keith Viewing. In 1985 I was contracted to do two studies by UNIDO on non-ferrous metals, one in Zimbabwe and another in Zambia, which I visited in early 1986. These two studies provided my first insight into the range of regional strategies that would be possible in the minerals sector. The studies also focused on the upstream and downstream linkages of the sector where further numerous regional strategies were immediately apparent. In 1986 I was selected for the post of minerals economist at the IMR and from then on the study was done on a part-time basis. The study was suspended in 1989 during my term as Acting Chairperson of the IMR.

During the study a comprehensive database was built up on all mines, processing plants, smelters, refineries and mining companies in the region. This was done by sending questionnaires to many of the operations, by the use of secondary sources, company reports and visits to many of the mines. During the past six years all of the member countries were visited, generally several times, except for Lesotho

(due to security problems) and Namibia, which only became independent this year. The initial idea of the database was to identify areas of mineral and mineral product complementarity, but unfortunately this was not as evident as had been expected. The database has however provided the factual background to the thesis and parts of it are presented as appendices. It was installed on the computer at the SADCC Mining Coordination Unit in Lusaka in 1989.

During the period of study papers were published on the mineral sectors of all the member countries except for Lesotho and Swaziland and four papers on mining in the region as a whole were prepared. All in all, sixteen studies on different aspects of mining in the SADCC were completed. From 1985 close collaboration with the SADCC Mining Coordination Unit in Lusaka was maintained and I was seconded onto the Secretariat for the annual SADCC Mining Ministers Meetings in 1987 (Swaziland), 1988 (Zimbabwe) and 1989 (Botswana). Through this close liaison I was able to propose a series of regional mining projects coming out of my research for inclusion on the SADCC Mining Programme. These included the manufacture of coke at Moatize Colliery, the manufacture of activated carbon from coconut shells, the production of bentonite at Luzinanda, the creation of a regional geology, minerals and mines data facility, the creation of a regional geophysical and geochemical map compilation facility and the creation of a regional coal research and data centre. All of these, except for the last were approved by the Council of Ministers and incorporated onto the SADCC Mining Programme. In 1987 I was subcontracted by Bonifica Spa (Italy) to redraft the SADCC study on geology, minerals and mining inventory.

The main thrust of the study is that the southern African region is exceptionally rich in mineral resources, but that these have been exploited by the industrialised countries (initially as colonisers) for their economies. The region has very little to show for the millions of tonnes of minerals exported to the West over the last ninety years. An alternative strategy for the mining sector would be for it to constitute the foundation for a resource-based industrialisation strategy. As there are numerous problems in attempting to execute this strategy in any one of the small member countries, the regional context is considered as a more viable area for integrating the mining sector into the rest of the economy due to the greater opportunities offered by the larger economies of scale. The arguments for regional integration are even more applicable to the possibility of a regional organisation including a democratic South Africa.

The study was financed initially by the Africa Education Trust and I would like to take this opportunity of thanking the Trust and its Director Kees Maxey. Later financial support came from SAREC in the form of a research project grant and my thanks go to Malur Bhagavan who handled the project. At the IMR, Professor Keith Viewing gave great support, for which I am grateful, from 1985 until he left in 1989. My thanks also go to all my colleagues at the IMR, and particularly to Rei Fernandes, current Chairman, for allowing me the time to write up the thesis. I would also like to thank the Raw Materials Group in Sweden for their support, critical comments and help, during our SADCC mining project, particularly Magnus Ericsson and Olle af Geijerstam, who published several papers in their journal "Raw Materials Report". Thanks also go to my colleagues at the SADCC Mining Coordination Unit, particularly Veston Malongo, Steve Wapakwenda, Arnold Chitambo and Marc Lebrun. Special thanks go to my supervisor Lionel Cliffe for his constructive and useful comments and I would like to apologise to him for the long periods when I was involved in other projects and was unable to do much work on the thesis. I am also grateful to Anthony Waddel and Rose Campbell for their help in formatting and printing the thesis and to Pam Barry for her meticulous editing.

Finally, I am extremely grateful to my wife Anne for her support and help throughout the long period of research.

Abbreviations

AAC	Anglo American Corporation of South Africa Ltd.
AAM	African Associated Mines (Pvt.) Ltd.
AECI	African Explosives and Chemical Industries Ltd.
ANC	African National Congress.
Anglo	Anglo American Corporation of South Africa Ltd.
BCL	Bangwamato Concessions Ltd.
BGS	British Geological Survey.
BIC	Bushveld Igneous Complex.
Bimco	Buchwa Iron Ore Mining Company (Pvt.) Ltd.
BNC	Bindura Nickel Corporation Ltd.
BRST	Botswana RST Ltd.
BSAC	British South Africa Company.
BSR	Bindura Smelting and Refining Company (Pvt.) Ltd.
Cabgoc	Cabinda Gulf Oil Company.
CAF	Central African Federation.
Carbomoc	Companhia Carbonifera de Mocambique .
CCR	Continuous Cast Rod.
CDM	Consolidated Diamond Mines Ltd.
CIIR	Catholic Institute for International Relations.
CISB	Copper Industry Service Bureau.
CMEA	Council for Mutual Economic Assistance.
CMJ	Chamber of Mines Journal (CMZ)
CMN	Chamber of Mines of Namibia
CMSA	Chamber of Mines of South Africa
CMZ	Chamber of Mines of Zimbabwe
CNP	Comissao Nacional de Plano.
CONSAS	Constellation of Southern African States.
CPI	Consumer Price Index
CSO	Central Selling Organisation
CSO	Central Statistical Office.
De Beers	De Beers Consolidated Diamond Mining Company Ltd.
DeBs	De Beers Consolidated Diamond Mining Company Ltd.
Debsa	Development Bank of Southern Africa.
Debswana	De Beers Botswana (Pty.) Ltd.
DRI	Direct reduced iron.
EAC	East African Community.
EAF	Electric arc furnace.
EEC	European Economic Community.
EIU	Economist Intelligence Unit.
Endjama	Empresa Nacional de Diamantes de Angola.
ENH	Empresa Nacional de Hidrocarbonetos.
ENR	Empress Nickel Refinery.
FLS	Front Line States.
forex	foreign exchange.
Frelimo	Frente Popular de Libertacao de Mocambique.
GDP	Gross Domestic Product.
GFCF	Gross Fixed Capital Formation.
GNP	Gross National Product.
GSD	Geological Survey Department.
GSP	Gross Social Product.
IDC	Industrial Development Corporation Ltd.
IDU	Industrial Development Unit (Commonwealth Secretariat).
IMR	Institute of Mining Research.
Indeco	Industrial Development Company Ltd.
ING	Instituto Nacional de Geologia.
ITC	International Tin Council.
KTM	Kamativi Tin Mines (Pvt.) Ltd.
LME	London Metals Exchange.
LSM	Lomagundi Smelting and Mining (Pvt.) Ltd.
Ltd.	Limited
MBCA	Merchant Bank of Central Africa Limited.
MCM	Mhangura Copper Mines Limited.

Memaco	Metals Marketing Corporation of Zambia Limited.
Midcor	Mining Investment and Development Corporation.
MIGA	Multilateral Investment Guarantee Agency.
MIREM	Ministerio de Recursos Minerais
MMCZ	Minerals marketing Corporation of Zimbabwe Ltd.
MNR	Mozambican National Resistance
MPLA	Movimento Popular de Libertacao de Angola
MVA	Manufacturing Value-Added
NCZ	Nitrogen Chemicals of Zambia
NDC	National Development Corporation.
NUM	National Union of Mineworkers (South Africa).
OECD	Organisation for Economic Cooperation and Development
OPEC	Organisation of Oil Exporting Countries
PTA	East and Southern African Preferential Trade Area.
Pty.	Propriety
Pvt.	Private
Renamo	Resistencia Nacional de Mocambique
RSA	Republic of South Africa
RST	Roan Selection Trust
RTZ	Rio Tinto Zinc Corporation PLC.
RTZim	Rio Tinto Zimbabwe Ltd.
SA	South Africa
SACU	Southern African Customs Union
SADCC	Southern African Development Coordination Conference
SATCC	Southern African Transport and Communications Commission
Sonangol	Sociedade Nacional de Combustiveis de Angola
Stamico	State Mining Corporation Ltd.
TAU	Technical and Administrative Unit (of the SADCC Energy Sector)
Teba	The Employment Bureau of Africa (CMSA)
TNC	Transnational corporation.
TPDC	Tanzania Petroleum Development Corporation.
UN	United Nations
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa.
UNIDO	United Nations Industrial Development Organisation
UNITA	Uniao Nacional de Independencia Total de Angola.
UNU	United Nations University
UNZA	University of Zambia
USA	United States of America
USSR	Union of Soviet Socialist Republics
ZCCM	Zambia Consolidated Copper Mines Ltd.
ZESA	Zimbabwe Electricity Supply Authority Ltd.
ZESCO	Zambia Electricity Supply Corporation Ltd.
ZGGM	Zimbabwe German Graphite Mines (Pvt.) Ltd.
Zimalloys	Zimbabwe Alloys Ltd.
Zimasco	Zimbabwe Mining and Smelting Company
ZIMCO	Zambia Industrial and Mining Corporation Ltd.
Zisco	Zimbabwe Iron and Steel Company Ltd.
ZMDC	Zimbabwe Mining Development Corporation Ltd.

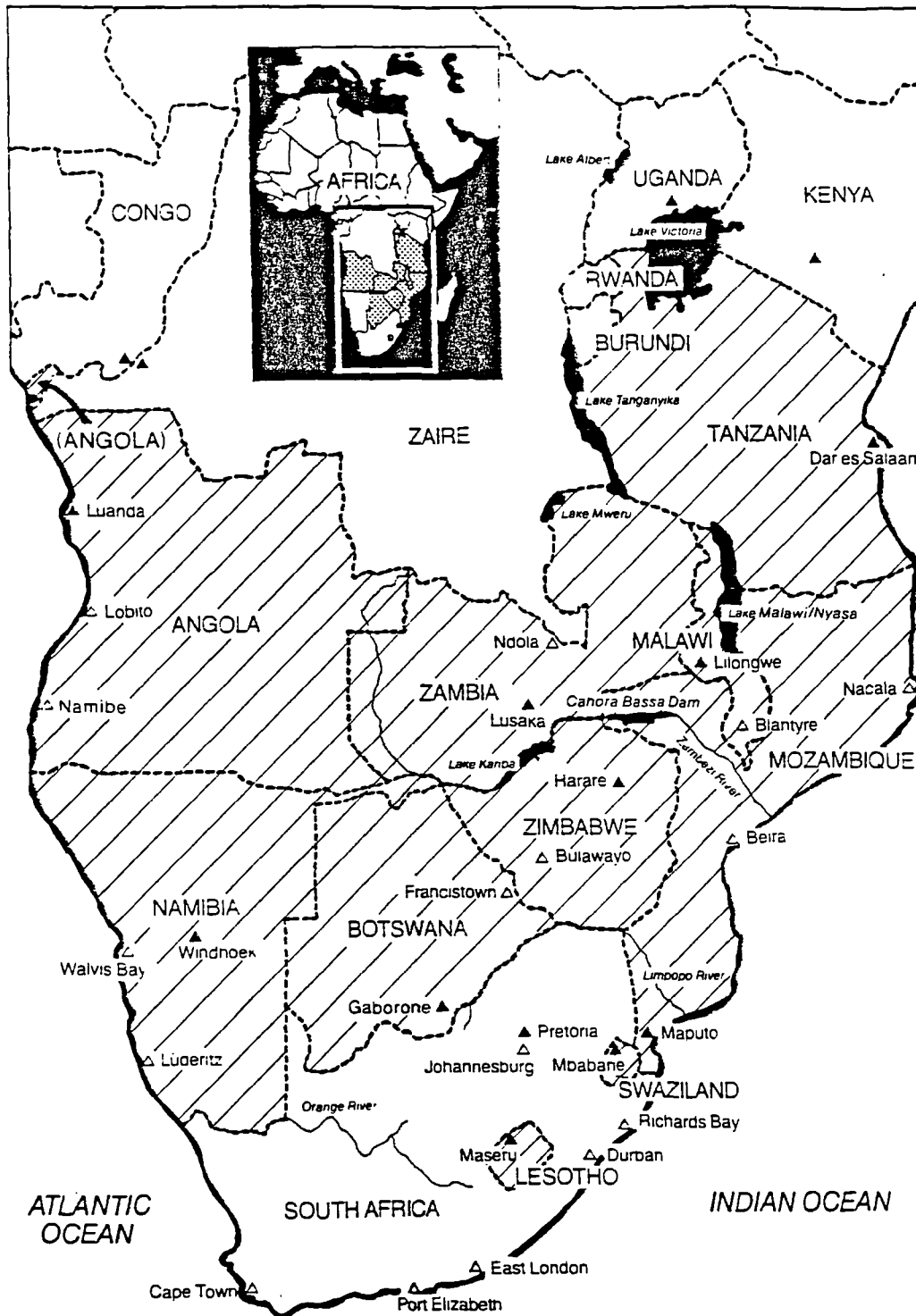
Currencies

AKz	Angolan Kwanza
E	Elangeni (Swaziland)
M	Lesotho Maloti
MK	Malawi Kwacha
MT	Mozambique Meticais
P	Botswana Pula
R	South African Rand
TSh	Tanzanian Shillings
UKP	United Kingdom Pounds
USD	United States dollars
ZK	Zambian Kwacha
ZD	Zimbabwe dollars

Units

an.	annum
cts	carats (.2053 grams)
kg	kilograms
km	kilometres
kt	kilotonnes
kW	kilowatts
MW	Megawatts
m	metres
m ³	cubic metres
oz	Troy ounces (31.103481 grams)
toe	tonnes of oil equivalent
tonnes	metric tonnes (1000 kg)
Gt	Gigatonnes
Ga	Giga-annum (billions of years ago)
Mt	Megatonnes

Fig. 1



SADCC Member States

Chapter 1: Introduction

1.1 Aims and Structure of the Study

The states of the Southern African Development Coordination Conference (SADCC) stretch from the equator in the north to the Republic of South Africa (RSA) in the south and span southern Africa from the Atlantic to the Indian Oceans. In 1989 their total population was about 80 million and total area 4.9 million square kilometres (5.7 million km² including Namibia), more than double the size of the EEC (2.3 Mkm²), resulting in a relatively low population density of 16 persons per square kilometre. The region is exceptionally rich in natural resources. It includes a range of climatic zones suitable for producing almost all agricultural products. It currently mines over sixty different minerals and possesses resources of almost every mineral necessary for industrialisation, including all the energy minerals. Moreover, the huge regional hydropower potential has only partly been utilised. Yet, the people of the SADCC region rank as some of the poorest in the world. In 1988 the regional GDP was 324 USD per capita¹, only 9% of the world average (3470 USD²). The average weighted regional life expectancy was only 52 years³ (compared to 76 for high income economies and 64 for the world); in 1984 there were twenty-one thousand people per physician⁴ (compared to 450 in the OECD⁵); and, in 1986, the daily regional calorie supply per capita was but 60% of the OECD countries⁶.

At independence these countries were full of promise, with expectations of a rapid improvement of the living standards of their peoples through the modernisation of their economies, once colonial control had ceased. But this did not come about. What went wrong?

This study attempts to answer part of this question by looking at one of the ostensibly richest assets of the region: its huge and varied mineral resource base, which should have provided the basis for industrialisation, and how the regional planning of this sector might help to bring this about. But firstly, before we can appreciate the minerals sector of the region, it is necessary to consider the region's position in the world capitalist economy which determines the options and limits of any development strategy. In this regard two themes are touched upon; that of unequal development, to understand the structural constraints limiting the region, and that of unequal exchange, to understand the unequal nature of the region's trade (mainly minerals) integration into the world capitalist economy. The SADCC is, however, not only part of the world economy, it is also part of the sub-continent dominated by the Republic of South Africa which is in turn dependent on the developed world.

Following a brief discussion of the global dimension, consideration is given to some general aspects of regional integration in the Third World, in order to better understand the possibilities for regional planning of the minerals industry, and a brief theoretical analysis of the SADCC initiative. This is followed by a presentation of the SADCC: its economic features, its origins, its objectives, its modus operandi and its successes and failures after ten years of existence.

The SADCC as a whole can be characterised as a "mineral economy"⁷ and thus the particular advantages, disadvantages and problems of mineral economies are discussed, particularly those of Third World mineral economies, in order to identify the constraints to development and the possibilities for development, given the larger regional context. From the general context, the specific mining and mineral processing sector of the SADCC is discussed. Regional mineral production, mineral exports, mining ownership and mining company finances are presented, followed by a presentation of the development, the programme and the workings of the SADCC Mining Coordination Unit, including a discussion of its relative efficacy.

An important part of an analysis of the region is the South African dimension. Much of what happens in the region is determined directly or indirectly by the SADCC's economically powerful and bellicose neighbour. Any regional strategy will be clearly affected by South African dimension. The effects of South African destabilisation of the region are considered in general and the effects of destabilisation on the regional mining sector are discussed in greater detail. Three of the SADCC members belong to a South African dominated regional organisation, the Southern African Customs Union (SACU), and a fourth, Namibia, is a *de facto* member. Thus a large part of the regional minerals sector is linked to South Africa, particularly in terms of input supply. The mechanisms of the SACU agreement will be presented, followed by a brief discussion of its effects on its members.

The bulk of this study is contained in the country chapters: the minerals sector of each member is described and discussed in order to bring out potential strategies for the regional planning of this sector. The origins, development, current operations and potential of each mining sector is considered. These are brought together in a discussion of potential regional strategies for the minerals sector. The following aspects of the minerals sector are discussed: the substitution of mineral and mineral-based imports, the development of the regional fertiliser minerals, the regional iron and steel sector, the manufacture of inputs to the minerals sector, possibilities for further mineral beneficiation and transformation into finished products, regional strategies for mining manpower training, regional opportunities in the areas of mineral exploration and mining research and development, regional mineral financing mechanisms and, finally, a discussion of minerals legislation and the mining transnational corporations (TNCs).

The last chapter is a discussion of the possibilities of achieving the possible strategies identified, given two scenarios: one that the SADCC continues as it is and a second that the SADCC moves towards greater economic integration. As a postscript, a post-apartheid SADCC is briefly considered, as are the effects of "glasnost" on the region.

Footnotes to Chapter 1.1

1 IMR SADCC Databank 1990. The sources of the Institute of Mining Research (IMR) Databank are given at the end.

2 World Bank 1990. 3 Calculated from World Bank 1990, Table 1, page 221 and 243.

4 Calculated from World Bank 1990, Table 28, page 232.

5 World Bank 1990, page 233. OECD: Organisation for Economic Cooperation and Development.

6 2034 compared to 3390, World Bank 1990, page 233.

7 The mining sector contributes more than 10% of GDP and 40% of exports. Nankani 1979, page i.

1.2 Unequal Exchange and Unequal Development

All of the SADCC states are ex-colonies, of Britain and Portugal (and, before World War I, Germany), and can broadly be described as being “Third World”. According to the World Bank classification they all belong to the “low-income” and “lower- middle-income” groups¹. The regional economy is typified by the export of primary commodities to the “First World”² and the import of finished products from the First World³, or vertical integration into the world capitalist economy. This specialisation was developed during the colonial period and the region’s relationship to the West is much the same today.

The most important primary commodities exported are minerals which make up about two thirds of total exports, almost all of which are destined for the OECD countries⁴. One of the most striking features of the region’s exports has been the steadily falling terms of trade. Using the US GNP deflator adjusted for US dollar exchange rate fluctuations, Shearson Lehman Hutton⁵ have calculated that in 1987 the price of one tonne of copper was 37% of its 1970 value, lead was 59%, nickel was 28%, zinc was 98% and as a group the unit value of base metals was about 60% of that of 1970. The precious minerals, on the other hand, have fared somewhat better with platinum at 107% of its 1970 unit value, silver 102% and gold 346%⁶. As recognised by Prebisch and Singer⁷, in the long term, the terms of trade for the Third World’s primary commodity exports are steadily deteriorating.

The SADCC region is characterised by a large smallholder agricultural sector coexisting with a “modern” large-scale commercial agricultural sector, still largely settler-owned, and mining sector with a small manufacturing sector which includes almost no capital goods sub-sector. Its external trade is essentially colonial with primary commodities being exchanged for manufactured goods at declining terms of trade. The region can be said to be characterised by both unequal development and unequal exchange with regard to the First World. What are the reasons for the region’s failure to industrialise?

The objective of this study is not to develop a new development theory or to rehash the debate between the broad dependencia, modes of production or other schools of thought, but to understand the situation of the SADCC region and its mining sector within the world economy with a view to defining development strategies for the regional planning of the minerals industry. To that end, certain aspects of development theory, that appear to be useful to the exercise, will be touched upon.

Declining terms of trade between manufactured products on the one hand and raw materials on the other has been recognised for some time, initially by Gunnar Myrdal and Ragnar Nurkse⁸, but was specifically taken up immediately after the Second World War by Raul Prebisch and H. W. Singer who developed a thesis based on lower long-term structural demand⁹ for primary products and the pressure of excess labour¹⁰ in the Third World to explain it¹¹. The latter aspect would, however, apply to all Third World exports, not just raw materials. Arghiri Emmanuel recognises this and proposes that the place of production (the Third World) rather than the type of commodity (raw materials) was the determining factor:

“The ‘worsening terms of trade for primary products’ is an optical illusion. It results from a mistaken identification of the exports of the rich countries with the export of manufactured goods and of the export of the poor countries with the export of primary products.”¹²

“...what worsens is not the terms of trade of certain products but those of certain countries, regardless of the kind of products they may export or import.”¹³

The concepts of unequal exchange and unequal development were developed by Arghiri Emmanuel and Samir Amin respectively, to explain the inferior position of ^afall in terms of trade for Third World products and the underdevelopment in the Third World. In an attempt to explain the main features of the SADCC region (both Third World and victims of declining terms of trade) some of their ideas are considered to be worthwhile exploring in the context of regional strategies for the mining, mineral processing and mineral transformation sectors of the region.

Amin's theory of unequal development¹⁴ proposes that global capitalist accumulation (development) does not tend towards equalisation between different social formations, but, on the contrary, tends to divide them into two groups, those of the centre and those on the periphery (the First World and the Third World), to which Wallerstein has added semi-periphery¹⁵ states (such as South Africa). Accumulation in the centre is governed by its own internal dynamic and follows the laws of classical Marxism while accumulation in the periphery is dependent on or constrained by the centre¹⁶. International specialisation is not determined by comparative advantage but rather determined by absolute cost levels which depend on productivity and wages. The First World developed first under favourable conditions and managed to get a large lead in productivity over the Third World at a time when wages were comparable in both. Wages later started to increase in the centre, but due to their productivity advantage, costs in most sectors remained low. "Unequal specialisation is thus both a cause and a consequence of unequal development"¹⁷.

Once the unequal specialisation system is in operation capitalism in the centre continues to develop according to classical Marxism, but capitalism fails to develop in the periphery, because it can only compete in, or becomes biased towards, resource-based export activities (minerals and tropical and sub-tropical agriculture). Limited, tariff protected, industrialisation can only take place for the domestic market (import substitution). However, this import substitution industrialisation could be substantial if the domestic market (population) and resource base were large enough as in some of the larger (size and population) Latin American states (Brazil, Mexico and Argentina). However, the colonial balkanisation of much of the third world (particularly southern Africa) has meant that import substitution industrialisation is extremely limited, not only by the small market and limited resource base, but also because demand was oriented in the colonial period towards a small luxury market of the colonial elite rather than the large mass market (the peasantry). Moreover, the main commercial economic activity is producing primary commodities for the First World at declining terms of trade which ensures low mining and agricultural wages which in turn stunt the development of the market for local products. There is thus in Amin a strong argument for regional integration (such as the SADCC) to widen the resource base and increase the market. Due to falling real forex receipts, there is continuous pressure on imports necessitating a large resource base for domestic industries to source their raw materials without the use of forex.

Emmanuel's theory¹⁸ of unequal exchange asserts that trade between two wholly capitalist countries can be systematically unequal. The mechanism for this is based on an extension of Marx's theory of "prices of production" to international prices¹⁹ based on the assumption that capital and goods are mobile while labour is not. Hence prices and profits are "equalised" over the capitalist world while wages are not, they are divided into First World and Third World wages. In a simple commodity producing society without skilled specialisation there is only one factor, labour: prices will tend towards labour values because labour can move to different activities depending on remuneration. In a capitalist economy the mobility of workers will equalise wages between industries and the mobility of capital will equalise the rate of profit. Prices of production (equilibrium prices) consist of "money costs" (wage costs, materials, depreciation of fixed capital) plus a profit sufficient to yield the general rate of return (on capital) and

will differ from the labour value of the commodities produced. Emmanuel then projects this latter pattern to a two-economy international system assuming that capital is mobile internationally²⁰, and hence an equilibrium rate of profit will be approached, but labour is not mobile so that workers in different countries are not directly in competition with each other and hence an equilibrium wage rate is never approached; rather, different wage structures are formed in different countries or parts of the world (groups of countries, eg EEC).

If two areas have different wage structures there are two ways in which profits may still be equalised without any product having two different prices: Firstly, if the same products are produced, profits can only be equalised if the higher wage country also has higher productivity so that the costs are the same, or so that the sum of labour, materials, depreciation and profit equals the same price of production. Secondly, if they produce completely different products, so they are not in direct competition with each other, profits can only be equalised if the one group of products command less than their value and the other group receives more, resulting in “unequal exchange” and a transfer of part of the value of what is produced in one country to the other country (and even from the workers of one country to the other)²¹.

Emmanuel considers low wages in the periphery to be the cause of unequal exchange. In addition there must be a barrier preventing all production moving to the low-wage country and also benefiting from the lower costs of production. This, according to him, happens due to predetermined specialisation. In many cases Third World products cannot be produced in the rich world (certain minerals or tropical and sub-tropical agriculturals). If the possibility of producing them exists they are not because it would be uneconomic given the high labour costs, even with their significant transport, infrastructure and capital advantages. An extension of unequal exchange is that the low wage (poor) country must export more to obtain a given amount of imports from the high wage (rich) country resulting in deteriorating terms of trade.

Similarly, Amin argues that high wages in the centre and low wages in the periphery lead to unequal exchange, but unlike Emmanuel he postulates that one of the main reasons is the higher productivity of the centre²², although he also emphasises that in certain restricted areas of resource based export production the periphery has relatively high productivity with low wages which, with the equalisation of profits, will result in Emmanuel's type of unequal exchange. Emmanuel proposes that unequal exchange acts as the basis for unequal development for two reasons: Firstly capital is attracted to demand in the high wage areas promoting development and, secondly, high wages will result in capital intensive methods which in turn increases productivity. But in general, high wages will tend to reduce profits and drive away capital unless the high wages are combined with high productivity.

Emmanuel's thesis clearly needs some modification to explain why capital does not flow from the high-wage to the low-wage country. However, if we assume that some goods are traded internationally while some are not (such as bulky or perishable goods, construction materials and, of great importance, services) then the high wage countries will have high demand for both types, but capital will be attracted to the high wage area to produce the non-traded goods as they can only be produced there. Also, import tariffs will act in much the same way to make certain activities only profitable in the high wage area²³. In addition there is a multiplier effect in that the high incomes from the non-traded goods sector will generate greater local demand for the traded goods, greater employment, greater demand, etc... The developed (high-wage) country also has a transport advantage in being in the middle of high demand in the high wage areas which applies for all goods, but more so for the high value to weight/volume goods (such as industrial minerals). High wages increase the personal tax base and allow for better education

and training of the workforce which in turn allows for greater sophistication (mechanisation) in production resulting in greater productivity. A further result of this division is that moderate differences in wages will lead to large differences in prices for non-traded goods (due to the high wages), i.e. a much higher cost of living, which results, indirectly, in much higher purchasing power for traded goods.

Another important argument put forward by Emmanuel as to why free competition has not led to the development of the Third World is that the rich countries benefit from existing specialisation and economies of scale; therefore if a poor country were to try and enter the market it would have the problems of an infant industry and during the initial start-up “acclimatisation” period with high financial costs (to pay off the initial capital) it would be a higher-cost producer, even with cheap labour, than an established producer with amortised plant²⁴. Many plants in Europe started up in the 19th-Century on a very small scale then slowly, with the accumulation of capital and skills, expanded into the mega plants of today. The minimum economic size for an integrated steel works is considered to be around one million tonnes per annum, but the early steel plants in Europe were only around fifty thousand tonnes per annum. This means that a poor country would have to put up several times the initial capital to enter the market as a newcomer than the rich country had to last Century. Put in another way, when Britain industrialised and started exporting a few tens of looms per annum, they did not face competition from another, already much more industrialised power, with an economy more than a hundred times larger, that had plant that could produce thousands of looms per annum, with a much lower unit cost.

In addition, new industries in Third World countries usually require the establishment of extensive infrastructure to support the new industry such as road, rail, ports, handling facilities, power, water, housing and, sometimes, the establishment of ancillary industries to supply vital inputs. For new mining developments in the Third World, infrastructure can typically constitute 80% of the total capital outlay compared to 20% in the First World. This results in much higher initial capital outlay for the Third World producer than the established First World producer which has a sophisticated infrastructure, slowly built up and paid for over the last Century and generally already produces all the inputs vital to the industry, particularly the low value to weight/volume inputs that would be costly to import.

Within the periphery, due to limited capitalist development, restricted to primary commodity export industries, a large part of the population continues in the pre-capitalist mode of production, often also with certain limited interaction with the modern sector (migrant labour to plantations/mines and limited cash crop production). Amin calls this “peripheral capitalism”. The tendency towards specialisation between the First and Third worlds is, according to Amin, due to the fact that economic development in the periphery is restricted by the greater competitiveness of...

“...the superior productivity of the centre in all fields, which compels the periphery to confine itself to the role of complementary supplier of products for the production of which it possesses a natural advantage: exotic agricultural produce and minerals. When, as a result of this distortion, the level of wages in the periphery has become lower, for the same productivity, than at the centre, a limited development of industries focused on the home market of the periphery will have become possible, while at the same time exchange will have become unequal”²⁵

This lack of development results in the population continuing in pre-capitalist agriculture and an overexpanded service sector, due to the lack of industrial investment opportunities for industrial capital, given the income distribution and concentration on the manufacture of luxury goods. Foreign investment in this periphery capitalism is mainly in export industries, but also in the service sector and

light industry, reinforcing unequal specialisation. The failure of capitalist development forces the population into agriculture and reinforces the pre-capitalist (landlord) ruling classes control over the economy and, similar to Frank's argument (below), the adoption of anti-development policies: policies of underdevelopment²⁶.

A major reason for capital not to locate industrial production in the low wage periphery are the external economies mainly consisting of infrastructure which are the range of conditions that an individual company cannot provide for itself such as a skilled labour force, a transport network, input supplies, etc... This would reinforce Amin's unequal specialisation thesis in that even when industrial productivity in the centre is not high enough to offset the high wages (meaning that the rate of profit in the low productivity but low wage periphery would be higher), capital will not relocate to the periphery due to the financial charges from the enormous capital outlay necessary to also create the required external economies (infrastructure).

In addition, industries at the centre always have a transport cost and transport time advantage in that they are located in the market. The latter means that they can respond much faster to orders that cannot be airfreighted. This applies particularly to downstream mineral/metal processing. If the final product is undifferentiated, such as copper cathodes, then the Third World supplier can stockpile in or near the market in order to respond rapidly to an order or he can buy-in from other producers in order to satisfy his customers, but when the mineral is transformed into a semi or manufactured item, the products become more differentiated and are made to order, such as for copper alloy semi-manufactures, it then becomes more difficult to satisfy the (First World) customer in time due to the long period necessary to transport the product from the Third World producer to the First World customer.

As with Amin, an essential part of Emmanuel's theory is that we have a predetermined or inherited system of specialisation between countries or groups of countries and the possibilities for the growth in exports (traded goods) is determined outside any specific country, on the global market. The pricing system of the theory of unequal exchange, resulting from higher wages, determines the (unequal) terms on which the Third World participates in the global division of labour, which determines the possibilities for growth, particularly in the production of non-traded goods.

This predetermination based on who developed first is a weak aspect of Emmanuel's theory because it does not take into proper consideration late starters such as Japan and the Nordic countries (particularly Finland) and because it tends to negate possibilities for change (ostensibly, following Emmanuel's logic, if the SADCC raised miners' wages mineral prices should increase, but he admits that this would not be a solution²⁷). However, Kay argues convincingly that underdevelopment is a result of the early penetration of a "primitive" underdeveloped form of capital, merchant capital (trading companies and also, later, plantation and mining companies), rather than industrial capital. Merchant capital's control over the Third World started in the fifteenth century with the Portuguese and Spanish states and was later taken over by the Dutch, English and French monopolies (trading companies). With the rise of industrial capital in Europe in the nineteenth century, merchant capital lost its ability to profit in the First World and...

"...it had to rely increasingly on the surplus it could extract abroad. But even these profits were not sacrosanct and productive capital began to eat them. All merchant capital could do was to try to increase its profits abroad through ever-more unequal exchange: an initiative experienced in the underdeveloped world as a decline in its terms of trade."²⁸

As the rate of profit from trade fell merchant capital ceased to operate independently and became an agent of industrial capital through the development of plantation agriculture and mining in the Third World to supply raw materials to industrial capital in the First World. Finally industrial capital itself moved to the Third World but...

“...was forced to operate in the conditions of underdevelopment which it had itself created... Thus when industrialisation finally started in the underdeveloped world... It took place in conditions of deeply established underdevelopment which it could not overcome but only reinforce.”²⁹

But when industrial capital finally penetrated the Third World in the twentieth century, it came with already capital-intensive techniques that could not absorb the huge unemployed masses created from the earlier phases, resulting in low wages and the “predetermined” situation that both Amin and Emmanuel take as their point of departure. But how do we bring together the insights of unequal exchange and unequal development? Emmanuel clearly puts forward two mechanisms for profits to be equalised in two areas, with unequal wages, without any product having two different prices: 1) higher productivity in one area and 2) product specialisation with one group of products losing value (traded below value in unequal exchange), but he thought the effect of the former to be minor with the major mechanism being the latter. If, however, we recognise that the effect of increased productivity in the centre would be substantial, particularly if we take a broader definition of capital intensity to include the total national investment, not only in production, but also in infrastructure and skills/training, then the centre, with a much longer period of capitalist development and accumulation, would have a clear productivity advantage in any one industry over a competitor in the Third World.

However, if we also recognise that for certain industrial lines (modern mines and plantations) the Third World is as productive as the First World and that the lower wages in the former lead to unequal exchange, then there is no major problem in marrying the two theories of unequal exchange and unequal development. In other words the current world situation of a widening gap between the First World and the Third World, is due to a combination of both unequal exchange and unequal development. This combination could apply not only discretely to different industries (unequal development where there is a high productivity difference and unequal exchange where there is not), but as a combination in any industry (i.e. even where the First World has marginally higher productivity, to a certain degree unequal exchange would still apply), but it would be virtually impossible to quantify the relative contribution of each effect in any specific industry or for any specific commodity. Emmanuel recognises that unequal exchange can only explain part of the huge difference between the First and Third Worlds but nevertheless he claims that it...

“...is the elementary transfer mechanism, and that, as such, it enables the advanced countries to begin and regularly to give new impetus to that unevenness of development that sets in motion all other mechanisms of exploitation and fully explains the way that wealth is distributed.”³⁰

Within the periphery the linkages between sectors is low due to an almost complete absence of industries producing the means of production (capital goods sector); this structural feature Amin terms disarticulation. At a global level the linkages between Marx’s departments I and II (capital goods and consumer goods) exist within the First World and between the First World and Third World, but within the Third World national economies the links are almost non-existent. Due to the “development of underdevelopment” Amin also notes that the periphery also displays unevenness of productivity as the, usually foreign owned, export industries, use modern methods of production, particularly the mining

sector, while the pre-capitalist agricultural sector uses primitive methods of production. In addition, the tertiary sector becomes overexpanded due to the weak demand and the lack of investment opportunities in industry. With the development of modern capitalism in the centre, trade flows of their high value goods between First World countries become more important in value terms than trade between the centre and the periphery, though in quantitative (volume) terms it continues to expand, but due to unequal exchange the real unit value continues to fall.

The concepts of unequal exchange and development provide us with a partial understanding of the failure of capitalist development in southern Africa and thus give us some insights into how the problem might be tackled. But, so far we have failed to explain how the “new” capitalist, settler, centres managed to develop (USA, Canada, Australia) even though some of them (Canada, Australia and to some extent South Africa) are both primary commodity exporters (principally minerals) and high-wage countries.

According to Amin the emergence of the “new” capitalist centres was a by-product of proletarianisation at the centre causing emigration and the formation of petty commodity production settler societies, which provided an extremely favourable environment for the capitalist development which subsequently took place. In addition, with the virtual unrestricted movement of capital, goods and labour between the capitalist metropole and the settler colony, classical Marxist theory would then apply, with the equalisation of profit and the simultaneous capitalist development of the settler colony, which in fact might be considered an overseas extension of the centre³¹.

Andre Gunda Frank’s reason for the emergence of the “new” centres, particularly the USA, and the failure of capitalist development in Latin America, is that the latter was dominated by an agricultural (plantation) bourgeoisie who perpetuated a policy of underdevelopment by favouring cheap imports (agricultural inputs), and higher profits for themselves, rather than domestic industrial development which would, in an initial protected phase, have produced more expensive products, while the former (northern America) did not favour agriculture (except in the South) and...

“...consequently, the class structure which developed there, based at the start on small farmers, did not present any obstacle to a development policy which permitted the Northern bourgeoisie to become strong enough to use independence to promote integrated development, to defeat the planter/exporters of the South in the Civil War, to impose a policy of industrialisation and arrive at their own industrial ‘take-off point’³².

This mechanism would apply just as much to the mining industry as to plantation agriculture, as it would also be in the mine owners’ interests to keep input costs down by favouring cheap imports and in fact in southern Africa the mining companies have consistently opposed import tariffs to assist the infant manufacturing sector. But, to some extent, the behaviour of the mining owners will depend on whether ^{they} are national or international companies as national mining companies will often invest their surplus in local, protected, manufacturing, such as the large mine houses in South Africa. Also, it is the settler agricultural sector that tends to suppress local agriculture rather than the mine owners who would like to favour the cheapest producer.

Frank’s view is not in contradiction to, and in fact could be considered complementary to the view of Emmanuel, that the difference in development between north and south America was caused by the social conditions under which migration took place and the form of appropriation of land: In northern America, due to the extermination of the local population, land was relatively freely available, compared to Latin America, which favoured higher wages and resultant unequal exchange and development and

different modes of colonial production. In addition there was not a suitable large and cheap indigenous labour force for the settlers to exploit in north America (the South had to import slaves for its plantation agriculture), as in African and Asian colonies, which favoured the establishment of numerous small holdings. Also, the settlers brought with them many industrial skills from an already capitalist metropole, which they applied in the colonies in petty commodity and later, industrial, production, while the Latin American immigrants came from a feudal metropole (Spain, Portugal and Italy) and were mainly industrially unskilled peasants.

A major criticism of development theories that postulate a predetermined inferior position of the Third World and the impossibility of industrialisation is, of course, that they cannot explain why were the “Newly Industrialised Countries” (NIC’s), such as Taiwan, South Korea, Brazil and, to some extent, South Africa, able to develop within the confines of the world capitalist system that was meant to preclude any real development of Third World countries? There is a complex set of detailed reasons for their relative success, but the main lesson of their experience is that any theories that completely preclude any development or freedom of action by the Third World are basically wrong. Their inherited specialisation, internal development of class forces and position in the world capitalist economy are clearly limiting factors that make it extremely difficult for many of them to industrialise, but there is still room for action in which the domestic dynamic, or balance of forces, is of paramount importance. In addition, even within their inferior role, the Third World states are undergoing momentous changes brought about by increasing cash crop production and resource exploitation for the world market, increasing urbanisation, increasing unemployment, environmental degradation, rapid population growth, etc... In other words there is a dynamic situation which is constantly restructuring the internal (domestic) balance of forces and international relationships. This study would not have been embarked upon if the author had felt that the states of southern Africa were doomed to the same static peripheral role in the global economy. Within the constraints of unequal exchange and unequal development, there are therefore strategic options that could either enhance or retard development and it is the argument of this thesis that regional planning and integration, particularly in the mineral exploitation, processing, transformation and inputs industries, is one such aspect of a strategy that could well overcome some of the constraints.

Arghiri Emmanuel concludes that there are two strategies that Third world countries can embark upon in order ^{to} escape from the inequality of exchange and the continual worsening of their terms of trade. Firstly they can try and maximise the amount of surplus value remaining in their country by a tax on exports that will transfer the excess value to the state. This solution, of increasing the retained surplus value, is difficult to impose on the TNCs as they will merely move their investment elsewhere and therefore it would...

“...presuppose agreement between several producing countries (which is) difficult to apply except where there is a natural monopoly...”³³

But if the producers formed cartels they would be able to raise the price and, given the low wages, retain the superprofits for national development. Unfortunately mineral cartels have not fared well over the last three decades, except for diamonds and oil, due to significant resources in developed countries (eg. copper in USA, nickel in Canada, bauxite in Australia) or because they can be substituted for by other products. However, another method of preventing the “leakage” abroad of superprofits would be to have large Third World mining companies capable of large scale exploration and development. This would be difficult under the small economies of scale of any one country, but such companies might be viable in a regional Third World context. Emmanuel’s second strategy is the

“...diversification of production through transfer of factors from the traditional exporting branches to the branches that can replace imports, which will enable the national consumer to benefit from the low national wage level.”³⁴

This diversification will generally be into the substitution of imported manufactured products which is a strategy that has been tried in several countries and, after initial success, has often come up against the low economies of scale when producing for the small domestic market only. Thus, due to the improved economies of scale, regional integration would provide a better base for diversification away from traditional (mineral) exports. In addition, manufactured imports are usually based on Third World exports (primary commodities), but any one country only has a limited range of possible primary commodities. Here again a regional strategy would make available a vastly expanded range of raw materials (especially minerals such as iron ore) for the production of manufactured goods.

The terms of trade theorists (Lewis, Prebisch and Singer) come to the same conclusion: that of diversification into manufacturing by import substitution and regional integration (to overcome the economies of scale limitations) and the formation of producer cartels for primary commodities to stabilise prices and maintain real value³⁵.

Footnotes to Chapter 1.2

1 World Bank 1989a, page 164.

2 By “First World” what is meant are the developed or industrialised countries (also sometimes referred to as the OECD countries) which fall under the World Bank group of “High-income economies” with a GDP/capita greater than 6,000 USD in 1988; it consists of the OECD countries plus Israel, Singapore and Hong Kong, but excluding the high income oil economies (Kuwait, UAE, Saudi Arabia). World Bank 1990, page 179.

3 Throughout this study the terms “First World”, “developed countries”, “industrialised countries”, “OECD countries” and the “West” are used interchangeably.

4 A SADCC table of mineral exports as a percentage of total exports is presented under the chapter on “Mining in the SADCC”.

5 Shearson Lehman Hutton 1989.

6 But it should be noted that the price of gold was fixed until 1972. If a longer term view is taken, the real gold price in 1989 was 145% of 1907 (IMR SADCC Databank)

7 Prebisch 1950, Singer 1950. 8 Discussed in Emmanuel 1972, page xxvi.

9 Or, more correctly, lower income elasticity of demand.

10 The fact of a virtual infinitely elastic supply of labour in the Third World which would, however, apply to all their products, not just primary products (Spraos 1983).

11 Initially Prebisch and Singer claimed that in rich countries increased labour productivity resulted in higher incomes but in poor countries increased productivity (in primary production) resulted in lower prices due to unionisation in rich and not poor countries, but their later writing emphasised the aspects of income inelastic demand and excess labour in the Third World. Several authors claim, however, that the Prebisch-Singer thesis is can be explained by a “...careful application of established, neoclassical theory...” (Sodersten 1980, page 163).

12 Emmanuel 1972, page xxx. 13 Emmanuel 1972, page 266.

14 Amin 1976

15 Wallerstein divides the capitalist world system into three tiers of states: the core (centre) states, the semi-periphery states and the periphery states (Wallerstein 1979). The semi-periphery is seen by Brewer (1980) as where new core states can emerge from and what declining core states become.

16 This has much in common with the “dependistas”, particularly Frank (1969) from whom he develops several aspects of unequal development

17 Brewer 1980, page 235.

18 Emmanuel 1972 and Geoffrey Pilling also presents a useful examination of Emmanuel's book (Pilling 1973).

19 David Evans and Richard Brown both consider Arghiri Emmanuel's theory of unequal exchange to be fully compatible with a neo-Ricardian analysis of trade (prices). (Evans 1976, see his appendix "Diagrammatic Exposition of "Unequal Exchange" Model", page 153, and Brown 1978)

20 Mandel argues that this assumption is false and that capital is not mobile internationally and hence no equalisation of the rate of profit occurs as this would presuppose the "equalisation of all economic, social and political conditions propitious to the development of modern capitalism on a world scale" (Mandel 1978, page 352). But there clearly is mobility of capital between the First and Third Worlds, and vice versa, as evidenced by the current international debt crisis.

21 Emmanuel's price formulas are not discussed here as they are not the main basis for criticism of his theory, but rather his assumptions and his failure to explain why capital does not flow to the low wage country.

22 Bettelheim, in his criticism of Emmanuel, also proposes that the principal reason for unequal exchange is unequal productivity. Appendix to Emmanuel 1972.

23 This refinement of Emmanuel's theory is termed the Anderssen-Braun modification by Edwards (1985) and argues that unequal exchange results not from the imperialism of free trade, but because there is no free trade, due to tariff barriers and subsidies in the rich world.

24 This is also very much in line with the dependista theorists.

25 Amin 1976, page 200

26 For an excellent presentation of the dependista school see Bodenheimer 1971.

27 Emmanuel 1972, page 267. 28 Kay 1975, page 123. 29 Kay 1975, page 124.

30 Emmanuel 1972, page 265.

31 Paul Baran points out the settler colony's advantage of having the capitalist mode of production dropped into a vacuum with none of the impediments of pre-capitalist mode. Baran 1973.

32 Frank 1972, page 58/9. 33 Emmanuel 1972, page 268.

34 Emmanuel 1972, page 267. 35 See Edwards 1985, page 81.

1.3 Regional Integration:

The paramount advantage of regional integration is the realisation of the larger economies of scale for the effective utilisation of national resources and next is in fact the availability of a much larger resource base, but in order to realise the larger regional market, necessary for the establishment of new or larger industries, goods must be able to move relatively freely throughout the integrated region. This implies that an essential aspect of regional integration would be trade, but over the last three decades in independent Africa intra-regional trade has not expanded¹ and has in fact, in some cases, declined, due to the economic crises of many African countries including a collapse in export earnings and forex to buy goods from their neighbours.

Pre-colonial Africa had extensive intra-African trade along numerous trade routes stretching across the continent² and, in southern Africa, several of the ancient empires are thought to have been based primarily or partly on trade, such as the Munhumutapa empire of Zimbabwe and the Maravi empire of Malawi. More recently, the crisis of the eighties has seen the rapid rise in the informal trade in Africa, with the partial re-establishment of pre-colonial trade³. In the post-colonial period many African states imposed various forms of trade barriers to protect themselves from cheap manufactures from their metropolises of certain goods that they sought to produce⁴, but at the same time they restricted intra-African trade, which has subsequently been taken up by the informal sector.

“For many Africans the benefits of greater economic integration are already visible in daily life through this informal exchange that keeps prices down ..., supplies products across borders that would otherwise be unavailable, provides opportunities for employment in neighbouring countries... Informal trade also involves profiteering made possible by official barriers and discrepancies in incentives among countries”⁵

The strong protectionism of many Pacific Rim countries, such as Japan, South Korea and Taiwan, in their early period of industrialisation, is often cited as an example of successful protection of infant industries which later, when well-established, competed successfully on the world market⁶. But, according to the World Bank, their protectionism from outside competition was complemented with policies to promote greater efficiency by internal domestic competition⁷, by having several companies produce the same product. But the domestic markets of most African countries are so small that they cannot accommodate competing industries, which then have no incentive to increase efficiency and hence never reach a position where they are able to compete on the world market. Regional integration consisting of a free trade area with regional currency convertibility, but with protective barriers to competition from the world market, would have a regional market that was large enough to accommodate regional competitive industries that would, with the growth of the internal market and increasing efficiency, finally be able to export competitively onto the world market. However, this would mainly apply for goods from Department II (consumer goods) rather than Department I (capital goods) where the main advantage of the larger regional market would be to allow for the establishment of a large single plant, where no national market could justify the minimum scale of production.

Clive Thomas points out, however, that sometimes too much emphasis is placed on the necessity for medium to large scale operations⁸. Small scale resource-based industries might be feasible due to the abundant and high grade local resources which could lower input (raw materials) unit costs and because the plant would be situated on or near raw materials in which case the small scale operation might benefit from lower transportation costs. It may be feasible to start up with smaller plants, then, as the domestic and export market expands, increase the plant size, but this concept should be built into the

plant design at the outset so that it can be scaled up, rather than the original (small) plant having to be scrapped when demand finally exceeds capacity, though a modular design such as this is not always technically possible or economically feasible⁹. Thomas also points out that rather than seeking the “optimum” scale of operation to maximise profit, the “structural imperatives of transforming the economic system”¹⁰ should determine the critical minimum levels. The larger regional SADCC market is more likely to satisfy these minimum levels than any one member state and thus, overall, regional integration will allow more of these minimum scale plants to be feasible. Thomas was proposing a minimum strategy that might work within the confines of the small market of a single nation state, which is not in contradiction to expanding that market, through regional integration, to cater for even more cost efficient industries.

The economic crisis of the SADCC region is also part of the global crisis of third world countries in general and Africa in particular. From the Lagos Plan of Action of 1980 and with the Special UN Session on Africa in 1986, and including several World Bank¹¹, EEC¹², UNECA¹³ and other studies, the economic failure of most African states, reflected by their falling GDP per capita and increasing numbers of people below the poverty datum line, has been recognised and all these assessments, whatever their other prescriptive differences, include regional cooperation and integration as being one of the possible methods of getting out of the current cycle of deterioration. The Lagos Plan of Action in particular proposes a regional (sub-continental) step-wise integration starting with a free trade area then progressing to a customs union and finally to an economic community.

There have been many attempts over the last three decades at economic integration in Africa. Most have failed and none have been a great success. Trade among sub-Saharan countries only amounts to 6% of their total official trade¹⁴. One of the oldest still functioning regional organisations is the C.E.A.O.¹⁵ formed in 1973 under the Treaty of Abidjan and includes Ivory Coast, Niger, Burkina Faso, Mali, Mauritania, and Senegal and operates essentially as a preferential trade area, but after eighteen years of existence only ten percent of their trade is intra-regional¹⁶ even though, unlike the other preferential trade areas, they have a common convertible currency, the CFA franc. There have also been several well-known failures such as the East African Community (EAC¹⁷) and the Central African Federation (CAF¹⁸), though both of these were originally imposed under the colonial power, Britain, and not created by independent states¹⁹.

Large differences in economic development between members generally makes any regional integration initiative more difficult²⁰, but it has also been argued that the existence of a regional leader can aid integration such as the role of Nigeria in ECOWAS and the Ivory Coast and Senegal in CEAO²¹. However, the most promising example of African regional integration, the East African Community, which had a common currency, regional infrastructure (posts and tele communications, rail, road, air), harmonised economic policies, common institutions and labour mobility, fell apart principally due to the dominance of one partner, Kenya²², but also because of radically differing political positions²³. Zimbabwe's role in SADCC and South Africa's in the Southern African Customs Union (SACU), clearly pose similar problems.

Differing political positions based on differing ideologies generally lead to different strategies²⁴. This, according to many theorists, represents an important constraint to regional integration²⁵. The diametrically opposed political objectives of the Southern Rhodesian (Zimbabwe) settlers, on the one hand, and the nationalists of Northern Rhodesia (Zambia) and Nyasaland (Malawi), on the other, in the Central African Federation (CAF) was without doubt the principal reason for its final dissolution in 1963, though the economic objectives, in terms of self-sustaining industrial development, of the

nationalists and the settlers, had much in common. Nevertheless the dominant position of Southern Rhodesia, in terms of political representation and use of federal revenues, was generally resented and the term *bambazonke*²⁶ is still understood across the ex-CAF countries²⁷. The widely divergent ideologies of the SADCC members is clearly a major obstacle to greater regional integration.

A major problem with the trade liberalisation types of regional integration is that economically weaker members, with smaller industries, tend to suffer from competition from the bigger industries of the more advanced members. This has generally been recognised, and measures have sometimes been introduced to compensate the weaker members such as the CEAO's Fund for Cooperation Compensation and Development which not only compensates for revenue losses but also finances development projects in the less developed member countries, but nevertheless the grouping has not been able to move beyond a preferential trade area²⁸. The eastern and southern African Preferential Trade Area (PTA), to which all SADCC members belong, except Botswana, has not created any compensatory mechanisms²⁹.

Another significant aspect that limits regional cooperation is nationalism³⁰, though it is sometimes seen as a symptom of other factors rather than a cause. The new nationalism of the young states of Africa often has the positive role of nation building, but can also engender popular opposition to the subsumption of certain aspects of national sovereignty, such as tariffs and duties, to a regional body in the interests of regional coordination. This is particularly true of the new national elites in independent Africa who see regional integration as posing a threat to their nationally based interests. Ultimately, many aspects of the nation state are in opposition to the rational and orderly development of the regional economy for the mass of the population. The ideological side of regional integration must therefore be actively confronted by ensuring that the populations of the member countries not only experience the advantages of regional integration but also understand that they exist because of integration.

Another factor cited as contributing to failure of regional integration schemes is that the regional institutional structures are not given the necessary power and resources to carry out their mandates³¹, though strong independent regional bureaucracies have also been a cause of contention in regional bodies as they have a tendency to develop an independent existence of their own and lose touch with the realities of their own member states. External relationships such as aid donors and multinational investments operating on a bilateral basis with members are also cited as having a negative impact on regional integration³².

Jens Haarlov, in his study on the SADCC³³, identifies two main types of regional economic integration: the macro or globalist approach and the micro or project approach. He further sub-divides the former into the market integration approach and the development integration or "dirigist" approach³⁴ and provides an "ideal model" for the market integration approach which, similar to the Lagos Plan of Action, proceeds from:

- 1) a free trade area, to
- 2) a customs union, to
- 3) a common market, to
- 4) an economic union or community and, finally,
- 5) a political union.

In the southern African context, the PTA would be trying to achieve the first with the elimination of tariffs and quotas, the SACU would be somewhere between a customs union (common external tariff) and a common market (free flow labour and capital) and the Republic of South Africa, consisting of the 1910 union of the Transvaal Republic, the Orange Free State, the Cape Colony and the Natal Colony, would be an example of the fourth and fifth, complete political and economic union. The market

integration approach thus offers a linear process progressing from 1) to 5). A major consequence of free market forces operating in this approach is the “polarisation” effect where growth tends to occur in the already more advanced areas so that, initially, the more developed members will reap more of the benefits of regional integration as happened with Kenya in the EAC, Southern Rhodesia (Zimbabwe) in the CAF and South Africa in the SACU. Later, with increasing costs in the developed areas there will in theory be a movement of investment to the cheaper, less developed, areas (the spread effect). Because of this, initial, disadvantage for the less developed areas, compensatory and corrective mechanisms may be instituted in many of the regional integration exercises still in the first and second stages.

The development integration (dirigist) approach requires close political cooperation from the outset, while it is only necessary in the final stages of the market integration model. “Conscious intervention by the regional partners to promote cooperation and interdependence is the main characteristic of this model”³⁵ and it will require the creation of regional institutions to coordinate the regional interventions, most of which would be to correct for the biases of the free market integration approach and to this extent this approach is but a modified form of it. The regional tariffs would be used to compensate the less developed partners for lost customs revenue (as in SACU and CEAO) and regional development funds would be necessary to direct investment to the less developed members (as in CEAO and the Central American Bank for Economic Integration). The success of this approach rests mainly with the more developed members in their commitment to compensate to poorer members.

The micro or project approach does not involve market integration but rather situations where two or more states cooperate on specific projects from which all will benefit at a national level. An obvious candidate for this type of project would be shared infrastructure such as road, rail, telecommunications and energy connections and shared facilities such as ports, rivers, hydroelectric schemes (such as Kariba), research stations and training facilities. Harmonised currency and tariff regimes are not necessary for this type of cooperation though they would certainly facilitate it. The project approach could also include regional production facilities where demand in each individual country was too low to justify a plant but the market in two or more countries was enough to make the project feasible. But in this case a multilateral agreement would be necessary to guarantee that the countries would purchase the product from the regional facility and not import, possibly cheaper, products from outside the region.

The Southern African Development Coordination Conference (SADCC) so far falls within this project type of approach. According to some observers³⁶ it has avoided the market integration approach due to the experiences of each member country with other trade-based regional organisations that were dominated by the strongest member, namely the EAC for Tanzania, the CAF for Zambia, Malawi and Zimbabwe, the SACU for Botswana, Lesotho and Swaziland and the Lusophone Community for Angola and Mozambique. The SADCC has instead adopted an incremental, step-wise project-oriented, regional cooperation approach and its relative success has in part been due to its focus on concrete projects that benefit two or more members, based on a sectoral approach where each government takes responsibility for a specific area, rather than the creation of a costly and elaborate secretariat. But, since 1986, there have been numerous SADCC statements affirming that the organisation is moving away from infrastructure towards the productive sectors and the stimulation of intra-regional trade³⁷. A recent World Bank report³⁸ on sub-Saharan Africa notes that the apparent failure of regional integration based on market integration has led to the consideration of an alternative approach:

“...that emphasises broadening the regional production base... This would give priority to regional investment in heavy industries (such as chemicals, iron and steel) and transport and communication infrastructure. The supply of goods is perceived as the main constraint to the increase of trade among African countries.”³⁹

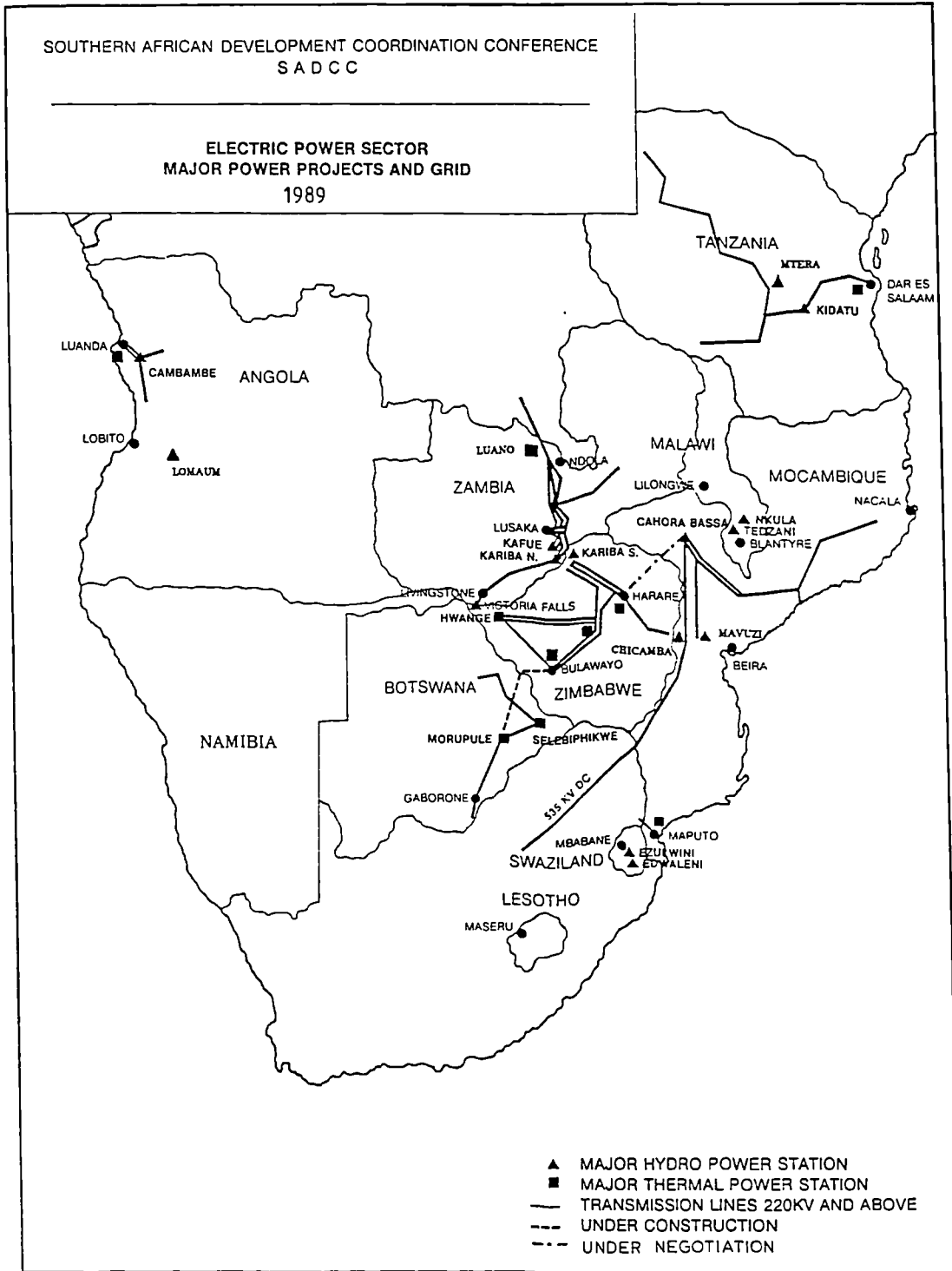
The report concludes with the World Bank view that this approach still fails to address the basic issues retarding trade such as the non-competitiveness of regional manufactured products in comparison with the world market, the high and complicated cost of trading, the chronic shortages of forex to pay for trade, the lack of credit to finance trade, the lack of complementarity of tradable goods and the range of tariff and non-tariff barriers to trade. But the failure of intra-regional trade to grow is due to the existence of trade barriers and the lack of forex and trade mechanisms rather than the lack of competitiveness and complementarity of local products. The lack of competitiveness is still to be proved, within a degree of infant industry protection, and the lack of complementarity is only a reflection of the past colonial raw material export specialisation forced upon Africa rather than the potential for intra-regional trade, particularly in manufactured goods based on the diverse regional mineral resources.

Thus far the discussion of regional integration in Africa has not taken into account the specific dynamic of the southern African region with the dominant presence of South Africa. Clearly any theory of integration must take into consideration the fact that most of the SADCC states are heavily dependent on this regional power or are strongly affected by its actions. Arne Tostenson in his early study of the SADCC⁴⁰ gives great emphasis to the South African dimension and notes that following the dependencia theory, the region's states are often seen as mere appendages of the Republic of South Africa which is not entirely true. Instead he uses the concept of asymmetric inter-dependence, between the RSA and the SADCC states. Following Keohane & Nye⁴¹ he introduces the concept of “sensitivity”: this is a form of dependency in that it is defined as the degree to which action by the dominant partner is felt by the dependent one. He also introduces concept of “vulnerability”: this is the extent to which one of the partners will continue to suffer even after measures (policies) have been taken to counter the original action. In other words the immediate effect of the action is sensitivity and the long-term effect is vulnerability. Vulnerability is also the actor's capability to adapt to changing circumstances. This in turn is dependent on several factors including the actor's physical resources, human resources, internal class forces and alliances, and, external alliances and affiliations. A policy of self-reliance is an obvious strategy to reduce vulnerability, but the “balkanisation” of Africa has created states too small to be viably self-reliant. Some states therefore attempted joining together to increase their (collective) viability but came up against their different vertical economic integration to their old colonial masters (what Tostenson terms a “feudal interaction structure”). He therefore sees regional integration (and the SADCC) as ultimately an attempt to reduce vulnerability, via collective self-reliance and the breaking of the “feudal interaction structure” with South Africa.

Footnotes to Chapter 1.3

- 1 African intra-regional trade as a proportion of total trade is the same as it was 20 years ago, at 5%. World Bank 1990b, page 7.
- 2 Page 1978. 3 World Bank 1989b, page 158.
- 4 However, even during the colonial period duties were often the largest source of government revenue.
- 5 World Bank 1989b, page 158.
- 6 See for example, World Bank 1989b and Stoneman 1986, page 104.
- 7 World Bank 1989b, Chapter 7. 8 Thomas 1974.
- 9 For instance, it is difficult to design a bauxite calcining (alumina) plant that could later be scaled up, but due to the modular nature of alumina refining (aluminium electrolytic cells) aluminium plants can easily be scaled up.
- 10 Thomas 1974, page 211. 11 World Bank 1984 and 1989b.
- 12 EEC, The European Community and Africa (Brussels 1984)
- 13 United Nations Economic Commission for Africa, who were the main movers behind the Lagos Plan of Action in 1980, and proposed an alternative strategy to the World Bank's "structural adjustment programmes", that of regional collective self-reliance. UNECA 1989, page 13.
- 14 World Bank 1989b.
- 15 La Communauté économique de l'Afrique de l'ouest (West African Economic Community)
- 16 Robson 1985 and World Bank 1989b, page 149. 17 Tanzania, Uganda and Kenya.
- 18 Zambia, Malawi and Zimbabwe.
- 19 These two regional groupings, EAC and CAF, are of particular importance to the SADCC as four of its members were part of them. Their functioning and demise has been analysed by many authors such as Creighton 1960 (CAF), Ravenhill 1979 (EAC), Green 1980 (EAC), Mugomba 1978 (EAC) and many others.
- 20 Okolo 1985, Robson 1985. 21 World Bank 1989b, page 150.
- 22 Shaw 1977, Ravenhill 1979.
- 23 Green 1978, Mugomba 1978. 24 Ostergaard 1989, Haarlov 1986, Cownie 1984.
- 25 Thompson 1986, Okolo 1985
- 26 Meaning everything goes to Salisbury (Harare), capital of Zimbabwe.
- 27 Unfortunately the term has resurfaced in the SADCC with reference to Zimbabwe's trade domination.
- 28 Robson 1985, World Bank 1989b.
- 29 The PTA consists of all SADCC states except Botswana (Namibia will join in August 1990), plus Burundi, Comoros, Djibuti, Kenya, Ethiopia, Mauritius, Rwanda, Somalia and Uganda.
- 30 Cownie 1984. 31 Cownie 1984. 32 Cownie 1984. 33 Haarlov 1988.
- 34 Haarlov 1988, Chapter 2, page 18. 35 Haarlov 1988, page 21.
- 36 Haarlov 1988, World Bank 1989b, Tostenson 1982, Ostergaard 1989 and Cownie 1984.
- 37 See, for example, "SADCC Annual Progress Report 1985 - 1986", page 9.
- 38 World Bank 1989b. 39 World Bank 1989b, page 151.
- 40 Tostenson 1982. 41 Keohane & Nye 1977.
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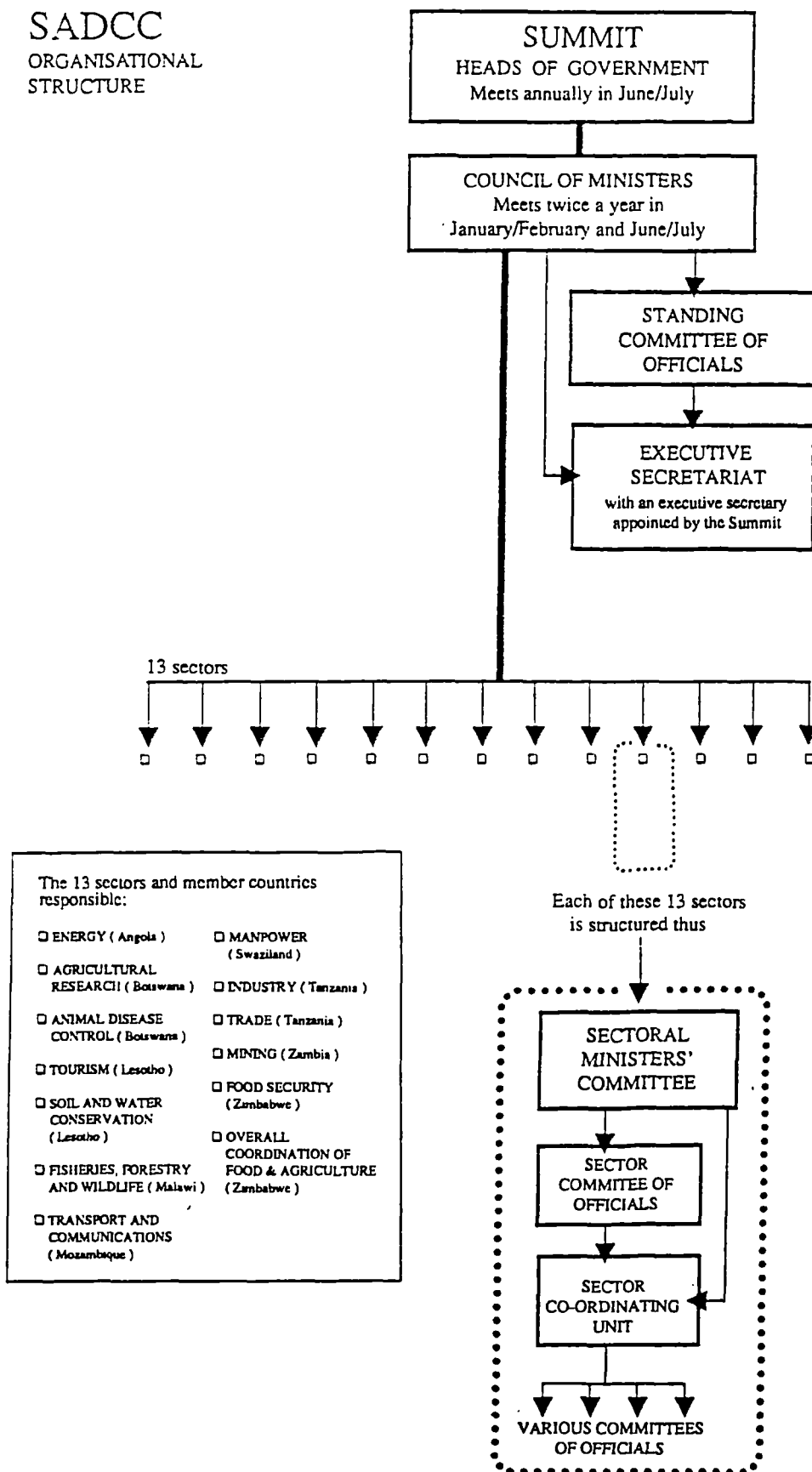
Fig. 3



Source : SADCC Energy Sector 1990

Fig. 4

SADCC
ORGANISATIONAL
STRUCTURE



Chapter 2: The SADCC

Until 1975 the southern African region was dominated by the settler and colonial states of South Africa (which also occupied Namibia), Rhodesia and the two Portuguese colonies of Mozambique and Angola. The three ex-High Commission Territories of Lesotho, Swaziland and Botswana were all tiny economically compared to the settler/colonial block (their total population was about two million) and in addition, their trade was totally tied into the South African economy through the SACU (Southern African Customs Union). In April 1974, due to the economic pressure on Portugal brought about by its colonial wars, the fascist regime of Caetano in Lisbon was overthrown by the armed forces movement (MFA) which was followed by the independence of Mozambique and Angola in 1975, though not before a South African invasion of Angola, in August 1975, had been defeated with the help of Cuban troops. The liberation of Zimbabwe in 1980 made possible the formation of a regional organisation of independent southern African states. With the formation of the SADCC in 1980 the geopolitical situation of the region had been irrevocably changed.

Since the formation of the SADCC, in 1980, the regional population has increased by roughly 30% from sixty to nearly eighty million people with an annual increase of roughly 3% (excluding Namibia which only joined in 1990). Overall population density has increased over the same period from 12 to around 16 persons per km². Within the region the density, in 1988, ranged from Malawi at 66 persons/km² to Botswana at 2 persons/km².

2.1 SADCC, GROSS DOMESTIC PRODUCT¹, 1980-88

(GUSD)	1980	1981	1982	1983	1984	1985	1986	1987	1988	GDP/c ²	% ³
Angola	3.6	4.1	3.6	4.2	5.6	5.6	5.8	6.6	7.2	761	246%
Botswana	.9	.9	1.0	1.2	1.2	1.1	1.3	1.6	1.8	1472	475%
Lesotho	.4	.4	.3	.4	.3	.3	.3	.4	.4	248	80%
Malawi	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.3	1.4	187	60%
Mozambique	2.2	2.1	2.2	2.1	2.3	3.4	4.1	1.5	1.2	84	27%
Namibia	2.0	1.7	1.7	1.7	1.4	1.2	1.3	1.5	1.9	1492	481%
Swaziland	.6	.7	.5	.5	.5	.3	.5	.5	.6	807	260%
Tanzania	4.6	5.3	5.5	4.9	4.7	5.8	3.5	3.1	2.8	117	38%
Zambia	3.9	4.0	3.9	3.3	2.7	2.6	3.1	2.0	2.6	344	111%
Zimbabwe	5.5	6.2	6.8	6.2	4.9	4.4	4.6	4.8	5.1	576	186%
SADCC	24.9	26.6	26.7	25.7	24.8	25.8	25.8	23.3	25.1	310	100%
GDP/cap:	420	431	419	390	364	365	354	310	324		
% Change		3%	-3%	-7%	-7%	0%	-3%	-12%	5%		

¹GDP at market prices, ²GDP/capita, ³% SADCC average for 1987.
Source: IMR SADCC Databank, 1990.

Gross Domestic Product (GDP) at market prices is presented in US dollars from 1980 through to 1988. It is calculated by converting the GDP in local currency to USD at the average exchange rate for that year. As several SADCC states have been forced to drastically devalue their currencies due to the economic dislocation brought about by the Global Economic Crisis, the yearly change in GDP in USD does not always accurately reflect the real value of their GDP in any one year, but the overall picture of economic stagnation is still valid. Regional GDP in 1988, expressed in current USD, is lower than in 1981. The average GDP per capita has fallen from 420 USD in 1980 to 324 USD in 1988. The variation between states is also considerable, ranging from 1,492 USD/cap in Botswana (481% of the SADCC average) to 84 USD/cap in Mozambique (27% of the SADCC average).

Regional exports totalled 8.9 GUSD in 1988, dominated by Angola (mainly oil, 27% of the total), Botswana (mainly diamonds, 17% of the total) and a wide variety of commodities from Zimbabwe (18% of the total). Imports totalled 8.0 GUSD, principally manufactured goods, giving an overall, SADCC, positive visible trade balance of 0.9 GUSD due to the large surpluses from Angola, Botswana and Zambia. Mozambique, Tanzania and Lesotho, on the other hand, registered large deficits.

2.2 SADCC VISIBLE TRADE 1988

1988	Forex EXPORTS		% SADCC Export	IMPORTS		% SADCC Import	Trade Balance MUSD
	Rate \USD	fob MUSD		cif MUSD			
Angola	30.0	2,402	27%	667	8%	1734	
Botswana	1.8	1,479	17%	1,097	14%	382	
Lesotho	2.3	60	1%	464	6%	(404)	
Malawi	2.6	297	3%	422	5%	(125)	
Mozambique	528.6	103	1%	706	9%	(603)	
Namibia	2.3	940	11%	861	11%	80	
Swaziland	2.3	438	5%	430	5%	8	
Tanzania	99.3	386	4%	1,187	15%	(801)	
Zambia	8.2	1,190	13%	839	10%	351	
Zimbabwe	1.8	1,589	18%	1,350	17%	239	
SADCC:		8,885	100%	8,023	100%	861	

Source: IMR SADCC Databank, 1990.

Total regional long and medium term external debt was just over 25 GUSD in 1988, the same as regional GDP, up three-fold from 29% in 1980. This staggering increase in the regional debt burden was a direct result of the Global Crisis and the collapse of real export earnings. The worst affected states are Mozambique, Zambia and Tanzania. Only Botswana, Zimbabwe and Namibia have managed to keep their debt under control. In 1980 the regional debt was less than regional exports (104%), but by 1988 it was nearly three times the total SADCC exports (284%).

2.3 SADCC EXTERNAL DEBT, 1980-88

(GUSD)	1980	1981	1982	1983	1984	1985	1986	1987	1988
Angola	.62	1.43	2.07	2.11	2.28	2.45	2.46	3.80	4.20
Botswana	.15	.16	.21	.18	.18	.33	.39	.51	.50
Lesotho	.06	.08	.12	.13	.14	.17	.18	.24	.28
Malawi	.65	.69	.70	.72	.73	.99	1.00	1.16	1.35
Mozambique	.27	.23	.33	1.17	1.22	3.04	3.52	4.35	4.41
Namibia	.20e	.20e	.30e	.30e	.30e	.30e	.30e	.30e	.32
Swaziland	.17	.16	.17	.18	.17	.18	.22	.27	.27
Tanzania		2.20	2.40	2.60	2.50	2.90	3.70	4.10	4.73
Zambia	2.38	2.47	2.63	2.64	2.78	3.21	3.78	4.35	6.50
Zimbabwe	.70	.79	1.22	1.50	1.52	1.53	1.76	2.04	2.66
Total SADCC	7.2	8.4	10.2	11.5	11.8	15.1	17.3	21.1	25.2
% Change/annum:		17%	21%	13%	3%	28%	15%	22%	19%
Debt/GDP:	29%	32%	38%	45%	48%	59%	67%	91%	100%
Debt/Export	88%	113%	155%	183%	189%	243%	262%	261%	284%

Data converted from local currencies at average exchange rates. Source: IMR SADCC Databank 1990.

Southern Africa has experienced the worst economic crisis since the Second World War from the onset of the Global Crisis in the early eighties. This is due to the fact that their economies are also vertically linked to the economies of developed countries, in that they are suppliers of primary commodities, principally minerals and agricultural products, and purchasers of manufactured goods, the most important of which are capital goods, particularly for the production of their primary commodities and their infant manufacturing sector. Due to this vertical linkage, their economies experienced more severe dislocation with the collapse of real prices of their primary commodities in the early and mid-eighties. During 1988 and 1989 prices rallied somewhat, particularly for minerals.

The first significant collaboration of the independent states of the region was the formation of a loose grouping called the "Frontline States" (FLS) principally to coordinate efforts in the struggle to liberate Zimbabwe. This grouping was made up of Botswana (led by the late Sir Seretse Khama), Tanzania (under Julius Nyerere), Zambia (Kenneth Kaunda), Mozambique (the late Samora Machel) and Angola (the late Agostinho Neto). The independence of Mozambique brought about a greatly increased area from which the Zimbabwean nationalists could infiltrate their country and consequently, the war against the rebel Smith regime escalated rapidly. Early in 1980 the Smith regime capitulated to majority rule with the Lancaster House Agreement and Zimbabwe became independent. The independence of Zimbabwe was vital for the formation of the SADCC due to its location in the centre of the grouping with the most important rail routes going through it (see map) and its relatively large and self-sufficient economy. At the same time in the late seventies an EEC funded Southern African Aid Coordination Conference (SAACC) was launched in London and was supported by several leaders of the FLS. The two initiatives came together in the first proto-SADCC meeting in Arusha (Tanzania) in July 1979.

The origins of the SADCC have been the subject of a debate between those who support the EEC promoted origin and those who see a FLS origin. The two both had a bearing, but the EEC-based initiative would probably have failed without the regional commitment already forged under the FLS¹. However, the EEC origin thesis has been taken further by some observers who have proposed that the whole SADCC project could be seen as exchanging dependence on South Africa for dependence on the West², a view which will prove increasingly difficult to deny if SADCC fails to move beyond rehabilitating the infrastructure which facilitates the export of primary commodities to the West.

The SADCC initiative was formally established in April 1980 at the Lusaka Summit in Zambia. The SADCC initially comprised nine southern African states namely, Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia and Zimbabwe. The formal tenth anniversary of the SADCC was celebrated in 1990 with the admission of its tenth member state, Namibia, finally free of South African occupation. At the Arusha meeting agreement was reached on the basic objectives of the organisation which were later adopted as the "The Lusaka Declaration" of 1st April, 1980. The document, "Southern Africa: Towards Economic Liberation"³, outlines the fundamental aims of the SADCC. Four principal development objectives are set out:

- 1) The reduction of economic dependence, particularly, but not only, on the Republic of South Africa.
- 2) The forging of links to create a genuine and equitable regional integration.
- 3) The mobilisation of resources to promote the implementation of national, interstate and regional policies.
- 4) Concerted action of secure international co-operation within the framework of the strategy for economic liberation.

The apparent contradiction between the first (reduction of economic dependence) and the last (securing of aid) has been a major problem for the SADCC from its inception, as the bulk of the financing of SADCC projects has come from donor funds⁴. This dependence indirectly affects SADCC's

policy in that the donors in effect have a veto over projects that they will not fund. Also, projects are sometimes tailored to fit the donor's tastes or even more directly, the donors have sometime proposed (in broad terms) projects that they would be willing to fund⁵.

“If projects are selected because they are fundable and not because they will contribute significantly to the infrastructural or economic base of the region, SADCC loses some of its autonomy and runs the larger risk of alienating member states - thereby damaging the cohesion of the potential subsystem.”⁶

Western donors have on several occasions used their funding for political ends such as the EEC's insistence on all states signing the Lome' convention that included a clause on the status of West Berlin (the “Berlin Clause”) and the USA trying to exclude Mozambique and Angola from projects funded by it. In 1985 the SADCC officially decided not to accept “discriminatory” aid⁷. In addition, because of the SADCC's success in attracting donor funding essentially national projects are often put on the SADCC shopping list⁸ and sometimes already operating facilities are given a regional dimension by becoming SADCC facilities with donor funding in scarce forex⁹.

The formation of the SADCC in 1980 should also be seen in the light of South Africa's bid for regional hegemony with the launching of the CONSAS concept¹⁰. The Constellation of Southern African States (CONSAS) was envisaged by the Apartheid regime as a means of increasing its control over the region through economic dominance and curtailing the activities of the African National Congress (ANC), the principal South African liberation movement, in neighbouring territories. In addition they also hoped that CONSAS would give credibility to the South African “bantustans” as it was envisaged that the independent ones would be full members of CONSAS. With the formation of the SADCC, CONSAS imploded into itself as all that remained of it was South Africa and its bantustans. Not even the SACU (South African Customs Union) states could be enticed away from the SADCC. The South African Development Bank of Southern Africa (Debsa), is a surviving remnant of CONSAS idea. It now funds projects in South Africa's bantustans, but was set up as the carrot to lure the independent states of the region into the CONSAS fold¹¹. However, Balefi Tsie has pointed out that not all of the SADCC's projects are in opposition to the aims of CONSAS, in fact some aspects of the rehabilitation of the regional infrastructure system are complementary.

“SADCC and CONSAS are not necessarily mutually exclusive or mortal enemies as some have assumed.”¹²

“...the struggle between CONSAS and SADCC is not about continued underdevelopment versus autonomous development. It is about which form of capitalist accumulation can in the long run, best safeguard the material interests of the dominant classes from revolutionary forces.”¹³

The SADCC was created in the broad interests of the sum of the ruling elites in each of its constituent states. The broad consensus is their rejection of white supremacist domination. In this context the USA's apparently contradictory policy towards the SADCC, of funding both the rehabilitation and the destruction of the transport system, makes some sense in that they wished to weaken the socialist members, strengthen the capitalist members and thereby move the overall, sum, objectives of the grouping towards re-integration in the capitalist world economy, rather than a genuine independent development trajectory.

In general the SADCC has avoided the problems of earlier regional bodies by not creating a large and costly bureaucracy. The SADCC secretariat, located in Gaborone, is a small outfit comprising but a handful of full-time employees. Moreover, since its formation, the SADCC has created various sectoral

coordinating units, each the responsibility of one of the member countries, such as the SATCC¹⁴ in Maputo, the Industry Unit in Dar es Salaam, the Energy Unit in Luanda and the Mining Sector Coordinating Unit in Lusaka. The relative initial success of the SADCC has been attributed to its pragmatic nature, its avoidance of supranational institutions, its step-wise approach to regional integration and its avoidance of a free trade form of integration¹⁵. In 1984 Cownie proposed that several of these not only were the cause of its success but would "provide the key to the organisation's longevity"¹⁶. Six years later many observers are beginning to realise that many of these factors could in fact be responsible for the lack of progress since the mid-eighties, particularly the SADCC's total failure in the productive sectors, as opposed to its success in infrastructure, but this will be dealt with under the analysis of the SADCC programmes.

In its early years the SADCC identified a number of strategic areas within which activities for economic development could beneficially be undertaken on a regional basis and the particular government to whom sectoral responsibility was allocated, as listed below, became the prime mover for SADCC programmes in that sector, including the establishment of consultative machinery with other governments and the procurement of appropriate technical expertise. The first priority of the SADCC was the rehabilitation of the war-ravaged transport and communications sector, particularly the regional railway network and the ports, and to this end the Southern African Transport and Communications Commission (SATCC) was created, with its headquarters in Maputo, to coordinate the regional programmes. The independence of Zimbabwe was vital for the freeing of the regional rail system due to its geographic position (see map).

2.4 SADCC SECTORAL DIVISION

<u>Country</u>	<u>Responsibility</u>
Angola	Energy
Botswana	Agricultural research, Livestock production and animal disease control.
Lesotho	Land utilisation, Soil and water conservation and Tourism
Malawi	Wildlife, Forestry and Fisheries
Mozambique	Transport and communications
Swaziland	Manpower development
Tanzania	Industry, Trade
Zambia	Mining
Zimbabwe	Food security, Overall coordination for Agriculture.

A summit meeting is held annually and is attended by heads of state and government or their representatives. A Council of Ministers, with representatives at ministerial level, is held at least twice a year. In addition, special meetings are held to coordinate regional policy in a particular field by, for example, the Ministers of Mines, the Ministers of Transport and Communications, etc...

2.5 SADCC PROJECT FINANCING (MUSD) 1989.

<u>Sector</u>	<u>Projects Total</u>		<u>%</u>	<u>%Foreign</u>	<u>%Secured</u>
Transport & Comm.	201	5097	80.7%	90%	45%
Agriculture & Food*	119	670	10.6%	84%	54%
Energy	80	427	6.8%	96%	32%
Mining	39	70	1.1%	88%	58%
Manpower Development	29	26	.4%	100%	35%
Industry & Trade	14	14	.2%	99%	22%
Tourism	8	10	.2%	98%	18%
TOTAL	490	6313	100%	90%	45%

* including fisheries, wildlife and conservation.

Source: SADCC Annual Progress Report 1988-89.

From the beginning SADCC's priority has been the rehabilitation of the regional infrastructure and the transport and communications sector is still the only one that has been accorded the status of a permanent commission (SATCC). In 1989 this sector comprised 81% of total SADCC project financing of 6.3 billion USD of which 45% had been secured. The critical importance of physical infrastructure in Southern Africa cannot be overemphasised as it is a pivotal aspect of the regional dependence on the RSA as, for several states (Botswana, Lesotho, Swaziland, Zimbabwe, Zambia and Malawi) some of the transportation infrastructure runs through the RSA, though with the exception of Botswana and Lesotho this dependence has been induced principally through South African sponsored destabilisation. It is important to remember that the colonial system, say at the end of the Central African Federation, was not particularly dependent on South African ports. Zambia (Northern Rhodesia) used Lobito Bay in Angola, Zimbabwe (Southern Rhodesia) used Beira and Maputo¹⁷ in Mozambique and Malawi (Nyasaland) used Beira and later Nacala, when the line was linked, with South African finance, in the early seventies. Therefore, the first task of the SADCC in the eighties was not to create new transport links, but to get the old colonial system operational again (i.e. return to 1963!). Much progress has been made, particularly with the Mozambican ports ("corridors"), but a major artery, the Benguela Line (Lobito corridor) remains closed¹⁸, though the rehabilitation of the Tazara line to Dar es Salaam has more or less compensated for this loss for Zambia.

Not surprisingly, infrastructural projects have taken up more of the value of all SADCC projects than any other sector as it is clearly in the interests of the inland members to have outlets to the sea and for the coastal members to have their international ports, rail and road connections rehabilitated and to receive the income from transit fees. The same way telecommunications and energy inter-linkages benefit each country and therefore fare well within the SADCC system of consensus decision making. Although the rehabilitation of the infrastructure is to increase intra-regional trade, the bulk of the goods that move along these routes are exports to the developed world and imports from them¹⁹, i.e. the traditional colonial trade system, and it is therefore not difficult to understand why the old colonial masters, as now represented by the EEC²⁰, have been so generous in their support of the SADCC's infrastructural projects that facilitate the flow of SADCC's minerals and agricultural products to them and the flow of their manufactures and capital goods to the SADCC.

Thus far SADCC's success has been in areas where there is a minimum of conflicting national interest such as infrastructure and research institutions that benefit most members. The next phase should be in regional productive facilities taking advantage of the regional market, but this is much more difficult to achieve given the problems of intra-regional trade (soft currencies, tariffs, credit, bureaucracy, etc...) and in fact after ten years of existence the SADCC has initiated virtually no productive facilities for the regional market. However, this impasse was first recognised by the Secretariat in 1985 and the 1985/6 "Annual Progress Report" went as far as commenting that:

"The development of the regions physical infrastructure will be meaningless unless it is underpinned by increased flows of goods and services.... SADCC is now embarking on a new phase of cooperation ... to increase the production of goods and services in the region and to stimulate intra-regional trade."²¹
 "...in this regard consideration is being given to the establishment of a Regional Export Credit Facility and national Export Refinancing Revolving Funds"²²

Following this the 1987 Consultative Conference theme in Gaborone was "SADCC: Investment in Production" and the SADCC document of same title stated that:

“The mounting crisis in South Africa makes it imperative for the SADCC states to strive urgently for greater self-sufficiency in production and trade within the region. The natural resources, manpower, and infra-structure are here, the markets exist. The political will and commitment are strong. The SADCC countries seek partnership with international sources of technological know-how and investment capital to translate these into the production of goods and services.”²³

The same document goes on to point out that the region is rich in agricultural, mineral and energy resources and has a potential regional market that is “available to support major investments”²⁴ in production. The call for investment in production is however ambiguous in that it does not clearly differentiate between investment in the traditional area of production of primary commodities for the international market or for investment in manufacturing industries for the regional market. The impression is that both are being promoted, but on the former no mechanism for the realisation of the regional market are given²⁵ and, not surprisingly, no SADCC sponsored regional production facilities exist.

Some authors have claimed that from the outset SADCC rejected “common market” integration, for planned regional integration²⁶, which seeks to decrease all barriers and obstacles to the free movement of commodities, capital and manpower, to coordinate economic and monetary policies and to build a common policy to the rest of the world. The 1986 SADCC Macro-Economic survey²⁷ claims that the earlier attempts at regional integration, based on a free trade area or common market, all failed as they tended to benefit the stronger member at the expense of the weaker members and thus the SADCC has based itself on the planned regional coordination of production. But considering that there have been several alternative views, particularly regarding the necessity of trade integration, it is possible that this view is perhaps but part of an ongoing debate within the SADCC. Without the relative free flow of goods between member states it would be extremely difficult to take advantage of the regional economies of scale, without complicated and cumbersome arrangements whereby each state agreed to purchase a certain proportion of the output of a regional facility. This would mean that every regional facility would need a separate regional agreement and every subsequent upgrade or change in output of that facility would need a new agreement. In 1989 the SADCC Industry Sector in fact proposed a scheme whereby member states would be asked to guarantee purchases from regional production facilities²⁸, but this has not as yet been taken up at the level of the whole of the SADCC.

The failure of the second phase of “investment in production” has been recognised and the theme document for the 1990 Consultative Conference affirms that the “challenges of coordinating regional productive activities and intra-regional, as well as extra-regional trade may require new institutions with appropriate expertise and a minimum of authority to initiate, direct and implement action”²⁹. In this regard a series of measures, including the harmonisation of industrial policies, the erection of common external tariffs and the establishment of a regional export credit fund are under consideration. These areas clearly overlap with the PTA, and it can be argued that the existence of the PTA could have in fact been the reason why the SADCC did not move into the crucial area of trade earlier, but the realisation that it is essential for any regional integration in production, seems to finally be there.

A major constraint to regional integration is the political-economic differences between the SADCC member states. They may be grouped into two broad categories: economies with some form of planning and/or extensive state intervention and broad socialist/egalitarian objectives which include Angola, Mozambique, Tanzania, Zimbabwe and, to some extent, Zambia³⁰; and capitalist economies with a more or less free market approach which are Botswana, Malawi, Lesotho and Swaziland (and Namibia). But it should be noted that almost all the SADCC states seek to avoid or temper the excesses of white settler domination and to glean more from their dependent role within the global capitalist economy

of being a supplier of primary commodities and markets for raw materials. Or put in another way, all would like to retain as much of the surplus generated in their countries as possible, whether for the use by a local elite or by the majority of the population. This at least provides a minimum basis for regional cooperation.

“...SADCC is a class compromise between its various member states and therefore its relations with South Africa and international capital at large are bound to be conditioned by this compromise.”³¹

On the political level, there are varying degrees of collaboration with the South African regime with Malawi and Swaziland on the one extreme and Angola and Tanzania on the other. The former two, particularly Malawi, have been involved in the destabilisation of a neighbouring member state, Mozambique, though it appears that both have ceased to provide transit for the South Africans or the MNR. This is in some respects one of the most important political victories for the SADCC: That support for the destabilisation of one country by another has ceased and that the extremely explosive situation between Mozambique and Malawi in 1985/6 (at the height of Malawi's support for the MNR) was effectively diffused.

As the SADCC moves towards greater regional integration, the increasing problem of the economic dominance of Zimbabwe, especially in manufacturing, will have to be faced, particularly as measures to increase intra-regional trade are effected. Intra-regional trade only accounts for less than 5% of total trade and has not shown any major increase since the formation of the SADCC. In addition, Zimbabwe is partner to, as importer or exporter, 80% of total intra-regional trade³². Zimbabwe also accounts for about half of the regional manufacturing value-added (MVA) of 2.9 GUSD in 1986/7³³. The breaking down of intra-regional trade barriers is likely initially to benefit Zimbabwe's stronger economy unless corrective and/or compensatory measures are instituted. Zimbabwe's trade dominance is already resented and it has been reported that both Botswana and Malawi are encouraging their importers to source elsewhere because of restrictions to the import of their goods into Zimbabwe. Malawi used to have a bilateral trade agreement with Zimbabwe which allowed the unrestricted import and export of certain goods, but this fell away after they both joined the PTA which only caters for the reduction of tariff barriers³⁴. This is one of the reasons why Botswana has declined to join the PTA: That they fear that their exports to Zimbabwe will be less under the PTA system than under the bilateral trade agreement³⁵. However, in an attempt to compensate for their dominance the Zimbabweans have instituted a specific PTA foreign currency allocation of about 40 MZD³⁶ per annum to encourage their importers to source goods from other PTA countries³⁷. No other PTA member has such a facility. In 1988 Zimbabwe accounted for over a quarter of all trade through the PTA Clearing House³⁸ followed by Kenya (21%) and Zambia (19%)³⁹.

In conclusion it appears that Douglas Anglin's reservations on the bold new SADCC experiment, expressed in 1983, have unfortunately proved to be much closer to today's reality than the postulations of authors that the SADCC method of promoting regional self-reliance and integration could be done without trade integration⁴⁰. Anglin concludes that:

“Despite all the rhetoric characterising it as a unique, pioneering experiment that is distinctively African, SADCC has resolved the knotty problems associated with any integration scheme by, in essence, running away from them”⁴¹

But, SADCC itself has in the last few years come to realise the limitations of the project approach without trade to the realisation of the regional market and all except Botswana have joined the PTA.

Further progress towards the integration and development of the region will therefore most probably come from a combination of the two: Within the PTA framework the SADCC can promote trade⁴² and regional integration through a range of instruments such as credit facilities, specific forex allocations by members for imports from the SADCC, compensatory mechanisms, cross-border investment facilities⁴³ and bilateral agreements between member countries. Several of these are now under consideration⁴⁴. Only once the regional market can be penetrated will the SADCC be able to make progress in its second phase of projects for regional production and industrialisation. It should however be remembered that the project approach served the region relatively well for the rehabilitation of the regional infrastructure, which is essential for the realisation of the regional market and the exploitation of the region's natural wealth for local, regional, self-sustaining industrialisation.

“SADCC has survived its infancy during the height of the international recession, a three-year drought, military sabotage against its projects, and a full-scale war in two of the nine members. ... The members remain enthusiastic about pursuing the various interests within the SADCC. The road, however, from its present functional coordination to complementarity of production in order to transform production forces, is a long one”⁴⁵

A recent paper by UNECA⁴⁶ offers an alternative African framework to the World Bank's structural adjustment programmes and increasing primary products exports for revitalising the African economies which includes as an important dimension regional collective self reliance. The report claims that regional integration must first focus on physical and institutional infrastructures which will facilitate the development of regional productive facilities and intra-regional trade. The SADCC has made substantial headway in the first area, but it remains to be seen if it will be able to move to regional trade integration and the establishment of regional industries.

The SADCC minerals sector and the coordination of the SADCC mining sector is dealt with separately below under “Mining in the SADCC” and “The SADCC Mining Coordinating Unit”.

Footnotes to Chapter 2

1 See Anglin 1983, Tostenson 1982, Leys 1982, Barron Boyd 1985, Ostergaard 1989b.

2 Tsie 1989 and Goodison 1987. 3 SADCC 1980.

4 In 1989 90% of SADCC's project portfolio required foreign funding.

5 In 1989 the World Bank indicated that they would be willing to fund a project on investment in small and medium scale mining in the SADCC region and such a project was duly formulated, and tabled and approved at the 1989 Mining Ministers Meeting in Gaborone without the initiative having come from any of the member delegations.

6 Barron Boyd 1985, page 55. 7 Barron Boyd 1985.

8 This is particularly apparent in the mining sector discussed below.

9 Such as the “regional” geochronology facility at the University of Zimbabwe which receives EEC aid.

10 The CONSAS notion was launched in November 1979 in a speech by the then South African Prime Minister, Piet Botha, at the Carlton Centre in Johannesburg. For further material on the CONSAS see Geldenhuys & Venter 1979, Thomas 1980 and Tostensen 1982.

11 Recent reports have indicated that Debsa is being re-projected in its original role as a regional funding facility and might receive a major capital injection (rumoured at 1 GUSD) for this purpose from the foreign donor community (SAPES workshop, Harare, September 1990). 12 Tsie 1989, page 2.

- 13 Tsie 1989, page 26.
- 14 Southern African Transport and Communications Commission.
- 15 Tostenson 1982, Thompson 1986, Ostergaard 1989, Haarlov 1988.
- 16 Cownie 1984.
- 17 The Limpopo line from Zimbabwe to Maputo was constructed during Federation specifically as an alternative to the Botswana-South Africa route and it is currently being rehabilitated by the SADCC.
- 18 Though, nowadays, more due to USA sponsored sabotage than South Africa.
- 19 Less than 5% of the SADCC's total trade is intra-regional. Ostergaard 1989a.
- 20 The EEC and EEC countries account for 17% of total SADCC project funding, second though to the Nordic countries (24%), who have almost no colonial link with the region. Ostergaard 1989b, page 139.
- 21 SADCC Annual Progress Report 1985 -1986, page 9.
- 22 SADCC Annual Progress Report 1985 -1986, page 10.
- 23 SADCC 1987, page 2. 24 SADCC 1987, page 17.
- 25 In 1990 the SADCC executive secretary, Simba Makoni, stated that for intra-regional trade the "SADCC would use the Preferential Trade Area apparatus to facilitate the movement of goods and make payments, rather than duplicate since all but one of the SADCC countries were also PTA members" (The Herald, Harare, 09/07/90). It would thus appear that the secretariat has dropped the 1985/6 idea of the SADCC setting up mechanisms to facilitate intra regional trade.
- 26 Ostergaard 1989a. 27 SADCC 1986.
- 28 Ostergaard 1990, states that "the distribution of production capacities is to be balanced and backed by commitments to purchase". page 61.
- 29 SADCC 1990.
- 30 Zambia has extensive state intervention, almost no planning and vague "humanist" objectives.
- 31 Tsie 1989, page 11. 32 Chr. Michelsen Institute 1986.
- 33 Ostergaard 1989c, page 77.
- 34 The reason why the Malawi-Zimbabwe trade agreement fell away when they joined the PTA, while the SACU countries (Swaziland. & Lesotho) were allowed to keep their accord with South Africa has been attributed to the fact that in the early days of the PTA its provisions were strictly kept to, but lately the organisation has not forced new members to give up existing trade agreements within the region. In this way Namibia will join the PTA in August 1990, but will not have to give up its special trade relationship with the RSA.
- 35 Conversation with SADCC trade consultants, Mr S. Gray of the Merchant Bank of Central Africa and Mr K. Atkinson of IMANI Development (Pvt) Ltd. Another reason for Botswana not joining the PTA is that they fear that it would affect their SACU relationship.
- 36 about 20 MUS\$
- 37 Personal communication with Mr S. Gray of the Merchant Bank of Central Africa.
- 38 19% of imports and 34% of exports. PTA 1989.
- 39 But for the six months ending April 1989, Zimbabwe had fallen to 23.8% and Kenya had risen to 23.2, and both had large positive balances (39 and 38 million UAPTAs respectively). PTA 1989.
- 40 Tostenson 1982, Haarlov 1988, Cownie 1984. 41 Anglin 1983, page 704.
- 42 In 1988 the SADCC states in the PTA (not Angola, Mozambique and Botswana) accounted for 63% of PTA trade through the clearing house even though the facility was virtually unused by both the SACU members (Lesotho and Swaziland).
- 43 In 1989 a study on cross border investment mechanisms was completed for the SADCC secretariat by the Merchant Bank of Central Africa.
- 44 See for instance Tom Ostergaard's article, "SADCC's Brave New Strategy", in SADCC-NGO Newsletter, January 1990, page 5.
- 45 Thompson 1986, page 100. 46 UNECA 1989, page 13.
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Chapter 3: Mining in the World Economy

In this section an attempt will be made firstly to characterise the mining with regard to other economic sectors and, secondly, to characterise Third World minerals countries with regard to other Third World economies and the extraction of rent from mining.

The mining sector has certain specific characteristics that make it different from other economic sectors and thus make the economics of the mineral sector somewhat peculiar. The first and foremost of these is that the mining industry is based on exhaustible, depleting resources. This means that any mining operation has a definable life determined by its reserve base, at a given extraction cost and technology and a given price for its mineral/s, and the capital outlay must be recovered (amortised) over this life. Because of this some states allow the resource to be amortised through tax reduction mechanisms such as depletion allowances¹. A corollary of the depleting resource characteristic is that a specific non-renewable resource, that usually belongs to the nation, is being consumed for which the state, on behalf of the nation, often demands special compensation² in the form of royalties³.

The second characteristic is that, unlike manufacturing, mining must be carried out where the mineral resource is located, often in isolated and inaccessible areas. The potential investor cannot take advantage of incentives such as low land costs and/or low power costs when locating a mine to produce a specific mineral. This characteristic means that infrastructural costs for new mines are generally much higher than for new investments in other sectors of the economy, due to the fact that rail, road and power links have to be put in, housing and community services must be built and a water supply system must be installed⁴. These social costs are typically greater than the cost of the actual mine and mineral processing plant and this results in the mine requiring an extremely high profitability to defray the huge, unproductive, capital outlay on infrastructure. Because of this, the state will often indirectly subsidise a new mining venture by taking on the financial responsibility for part of the infrastructural costs, or by providing concessionary financing to the mining company for these. This is done by the state not only for the national benefits accruing from the mine itself, such as forex, revenue, employment and having the mineral available for downstream processing, but also because, once the infrastructure is in place, other economic activities may become viable in the area⁵.

The third mining specific aspect is that risk finance must be invested in often wide-ranging mineral exploration projects for the deposit to be “discovered” and delineated, usually by an extensive drilling campaign, at the end of which it may be found to be uneconomic. Because of this, exploration expenditure is usually allowed against tax from the future operation if it goes into production. There is usually a long lead time required for exploration, appraisal and infrastructure construction to bring any mineral property into production, typically around eight years from exploration to the hoisting of the first pay ore. This means that substantial capital or credit is required to see the mining company through the lead time with no returns, which favours the large trans-national mining companies (TNC's) with large financial reserves and with access to credit⁶.

Due to minerals deposits having a finite life, it has usually been assumed that with depletion there will be an increasing degree of scarcity of minerals which should, according to the economics of supply and demand, progressively push the price of minerals up in real terms as lower and lower grade ores have to be mined⁷. However,

“An examination of 100 years of minerals prices in the United States up to 1970⁸ reveals a relative decline, both for the period as a whole and for most subperiods. This is contrary to the hypothesis of increasing relative scarcity”⁹.

This is the fourth characteristic, that of declining real prices, which the mining sector shares with agriculture, as this is a general characteristic of primary commodities. The origins of this aspect were discussed earlier where it was argued, along the lines of Kay¹⁰, that the present predicament of mining in the Third World can be traced back to its early association with a primitive form of capital (merchant capital) which created the current situation of underdevelopment and low wages which, following the arguments of Prebisch-Singer¹¹ and Emmanuel¹², resulted in their two forms of Unequal Exchange.

Because of this characteristic (falling real unit value) mining operations worldwide have to constantly reduce their operating costs to remain profitable, unless they are exploiting exceptionally rich (high grade) deposits. The way in which they have done this often varies depending upon whether the operations are in the First or the Third World. In the First World they either increase their productivity with greater mechanisation or, due to concurrent rising labour costs, they close down. In the Third World, such as the SADCC region, falling mineral prices are generally compensated for by falling wages¹³ which in turn can lower the world market price further. A totally different strategy that has been, at times, effective in reversing the deteriorating real price of oil, tin, nickel and diamonds, is the formation of producer cartels, either through the mining TNCs (diamonds and nickel) or through the producer states (tin and oil). Unfortunately the only cartel to survive the recession of the eighties effectively has been the De Beers' Central Selling Organisation (CSO) which dominates global diamond marketing¹⁴. Mineral cartels are therefore currently not an important feature of the world mining sector.

Mineral production from the Third World accounts for about one half of the value of world mineral production¹⁵ for both non-fuel and fuel minerals and appears to be increasing¹⁶ as the First World mines are exhausted or become uneconomic due to falling real prices. When developing countries are grouped together by GDP per capita, the value of mineral output per square kilometre displays a strong correlation with GDP/capita leading to the conclusion that the low level of mineral exploitation in the "low-income" developing countries is due to a lack of investment rather than a lack of resources¹⁷.

In Third World mineral economies the contribution of the mining sector to overall GDP tends to be higher than for industrial economies. In the former it is typically in the 8% to 40% range¹⁸, while for developed countries with high mineral exports, such as Australia and Canada, it is less than 7%¹⁹. In terms of employment generation, mining in Third World countries employs very few people, typically less than half the sector's percentage contribution to GDP reflecting the more capital intensive nature of mining compared to agriculture in the Third World.

The possession of mineral resources is generally believed to aid development as they provide the possibility for the state to collect substantial rent to invest in the development of the rest of the economy, provide forex for the import of capital goods to develop other sectors and could provide the raw materials for mineral-based industrialisation. But several studies that have attempted to characterise Third World mineral economies²⁰ have concluded that they are in fact worse off than non-mineral (agricultural) economies in many respects. In a study of twenty-eight mineral economies including 15 petroleum exporters, Nankani²¹ concluded that they suffer from lower marginal savings, higher export receipts and revenue (fiscal) instability, higher unemployment and wage dualism, and poor export diversification performance. Using discriminant analysis on 69 developing countries including 24 mineral economies, Looney and Knouse confirmed, in a general way, Nankani's conclusions, but noted that since the global recession external "debt variables²² rather than such standard candidates as export instability or the share of the government sector in GNP are now a critical ingredient in the profile of mineral rich countries"²³. Like Nankani, they also conclude that mineral economies develop a

“syndrome” that includes an incentive structure that is biased against agriculture and export diversification, promotes a high wage differential between mining and agriculture and a high level of national consumption (low savings).

“As the mineral wealth is exhausted, the economy finds itself unable to support its population, and its earlier living standards; in the long run, stagnation and poverty become increasingly likely. Clearly, the recently stepped up levels of external debt contracted by these countries, together with the decline in most mineral (and oil) prices have made the development prospects of mineral economies even bleaker than forecast several years ago”²⁴.

A major problem of Third World mineral economies is that they tend to have relative high wages in the mining sector which provokes an exodus from the agricultural (peasant) sector, even when mining cannot provide sufficient jobs, which stunts the rate of growth in agriculture²⁵. Philip Daniels sees this effect as an extension of the so-called “Dutch Disease”²⁶ where

“A mineral boom in a developing country can be viewed as a special case of a mechanism by which urban bias is installed. The “Dutch Disease” brings about very rapid urban expansion because wages and employment opportunities in urban services expand far faster than the returns to rural production”²⁷.

Another aspect of Third World mineral economies is that their mining sector tends to be dominated by a few large trans-national mining companies (TNCs) which, according to several authors²⁸, affects the retention of mineral “rent” in that “the rent element, if not tapped, tends to migrate out of the mineral economy because of the dominant role of FMCs (foreign mining companies) in the industry and the high proportion of mining output that is exported”²⁹.

The question of rent maximisation is crucial to mineral economies given the weakness of production and consumption linkages and, more importantly, the aspect that, for mining, rents rather than low wages are the main mechanism for surplus extraction. Thus, in order to maximise the integration of the mining sector, the state must emphasise mineral taxation and participation in the mining industry. Nwoke³⁰ describes mining rent as the extra value over and above average profits that would classically accrue to the landowner, in this case the Third World mineral “landlord” government, but due to the lack of a competitive world capitalist system (monopoly capital), it goes mainly to the capitalist, in this case the mining TNC, in the form of superprofits. Nwoke’s analysis recognises two types of rent, absolute (monopoly) rent and differential (comparative advantage) rent, neither of which, in today’s Third World circumstances, are captured by the “landlord”. The depleting (wasting) nature of mining should increase the scarcity of minerals and increase the amount of absolute (monopoly) rent extractable, but due to their weak position in the global economy and their diversity, mineral producing nations have failed to realise this potential. Where there is some absolute rent is usually when the TNC’s are able to set a producer price and it is then evidently taken by them and not the “landlord”. The differential rent is usually shared between the landlord government, the TNC and the TNC’s governments (insofar as the metropolitan governments get a cut from the final declared profits of their mining TNC’s).

Nankani on the other hand distinguishes five types of rent in the minerals industry³¹:

1) Scarcity rent- this increases as mineral resources are consumed and is therefore related to the rate of extraction of a mineral relative to the known exploitable reserves (thus, for example, it is high for petroleum and low for limestone).

- 2) Differential rents- these are the same as described by Nwoke and are due to differences in the grade, extractability, location, etc..., i.e. the comparative advantages of one deposit over the average characteristics of deposits of that mineral worldwide.
- 3) Monopolistic rents- these are the same as absolute rents and can occur through the oligopolistic nature of global mining (dominated by relatively few TNCs) or through producer cartels.
- 4) Quasi-rents- these are higher in the mining industry due to its relative capital intensity and, related, high level of managerial and technical know-how of the TNCs³².
- 5) Windfall rents- these are due to sudden demand increases (or supply drops) which supply cannot cater for due to low short-run supply elasticity for mining (long lead times to bring new capacity on stream).

For all of the above, rent is the surplus over and above the minimum return necessary to induce investment³³, but as Nwoke correctly points out, due to some successes by Third World governments in retaining more of the surpluses from mining, the TNC's now look for higher rates of return to compensate for the "uncertainty" (risk) of Third World investment, thereby reducing the rent available for expropriation by the Third World government. It has generally proved to be impossible for governments to retain all of the rents mainly due to the difficulty in distinguishing rent from supply price and because the TNC's perception of supply price includes risks³⁴. This battle for rent, between the Third World government and the mining TNC has led to ever increasing sophistication in obtaining fiscal revenues by the former and ever increasing sophistication in methods of transferring surplus out of the country by the latter. In this regard the Third World has often copied many of the fiscal instruments first introduced by the mineral producing developed countries such as Australia, Canada, the USA and South Africa³⁵.

Due to their failure to capture rent through fiscal instruments, in the 1960's many developing countries came to the conclusion that the only way to retain all of the rent and to guarantee the localisation of the foreign dominated minerals sector was to directly own the mining operations³⁶. The first step in this was the principle that all minerals belonged to the state as part of the national patrimony, which was also taken up by the United Nations³⁷ and The Lagos Plan of Action, and provided the basic rationale for the state's greater control of the, foreign owned, mining industry³⁸ and attempts to extract rent in the form of royalties. However, front-end³⁹ royalties "...can be harsh on marginal projects..."⁴⁰ as they add to the operational cost and are therefore sometimes applied on a value basis using an indexed price system (as is done in Angola for oil, where if the international price rises above an indexed value, all revenues above that value accrue to the state).

After revising the laws, the next step was for the government to obtain part of the equity in the mining company, and in this regard there was a wave of nationalisations of foreign mining companies in the late sixties and early seventies in countries such as Zambia, Chile and Peru. The mining TNCs also came to accept that the ore body could be considered as part of the state's equity in a joint mining venture, much like land is valued in an agricultural venture and, in Botswana, Anglo American Corporation accepted that 50% of the equity of the joint diamond mining company, Debswana, would be the nation's ownership of the diamond pipes⁴¹ (but, because of the diamond cartel, CSO, monopoly rents are extremely high and De Beers still makes an average 35%, return on capital for its half of the profit). However the Third World states soon realised that ownership did not result in control as the mines were still controlled by the TNC's through their management and technical expertise, and that the TNCs were thus able to circumvent the alienation of rent by getting surplus out of the country by other means, such as transfer pricing (over and under invoicing of inputs and production). Several countries, such as Chile and Zambia, therefore attempted to convert ownership into control by taking over the management of their mining companies, with varying degrees of success. There is an apparent paradox in this strategy

in that if the government does not have the capacity to effectively monitor the TNCs for the extraction of rent by fiscal and legislative methods, then it is also unlikely to have the capacity to effectively run the company if nationalised.

However, despite these advances, Faysal Yachir, in his recent study on mining in Africa, concludes that “the colonial pattern of mining has survived independence in most African countries”, that “the value of the ore is still wasted, as it is sold on the international market at very low prices which include neither mines’ rent nor depletion allowance; labour is still underpaid and exploited” and that the “local states’ participation in mining exploitation capital does not correspond to any real power or influence, as the management of the mines and investment decisions are largely the responsibility of foreign capital”⁴².

With the onset of the world recession in the second half of the seventies, industrial output in the developed countries dropped causing a fall in demand for most minerals which in turn resulted in a collapse in their price. This situation also resulted in a surplus of mineral resources relative to demand which put the mining TNCs in a strong position vis a vis Third World governments when negotiating mining agreements which has resulted in less favourable agreements than were possible in the boom years of high demand. This led Marian Radetzki to observe in the early eighties that “...the fast growth of the state-owned share is now over. The tentative conclusion is that in the 1980s and 1990s the expansion of state enterprise in Western World mineral industries will not be much different from the overall growth of the mineral sector”⁴³. Given the slowdown in the growth of the mineral sector in the eighties and the privatisation policies of many governments, Radetzki’s assessment today looks optimistic. In general, in an effort to attract capital to develop export minerals to relieve acute balance of payments difficulties during the recession most Third World governments revised mining legislation in favour of the foreign mining TNCs.

However, it should be recognised that a mining TNC operating at a global level has several advantages over any single Third World government. Some of these are: the TNC can spread mineral price collapse risk over several minerals in different countries, while the Third World government can only exploit the minerals that it happens to have⁴⁴ and, because of the spread, the TNC can rationalise its operations during recession by closing or putting on care and maintenance unprofitable mines, while the Third World state cannot rationalise its only foreign exchange earner when it becomes unprofitable, though strong producer cartels could conceivably pay high cost producers to close, or cut back production, during falls in demand. The TNC has easier access to risk finance and can usually write off exploration expenditure against tax, both in the Third World and at home, while it would not make sense for the Third World government to write off its exploration outlay against tax that accrues to itself anyway. The TNC also has easier access to technology which is located in its home area and often developed in-house. Also, while it is cost effective for a TNC to develop new technology for a mineral that it processes in many operations in several countries, it is not always cost effective for a small Third World government to develop technology for one or two mines only that are within its national borders. A TNC which mines the same mineral in several countries is more likely to have a larger market share of that mineral than any individual country, allowing it to develop advanced marketing procedures and, possibly, to set producer prices. Finally, if Third World governments were to develop their own mineral resources it would require a massive mobilisation of local capital that may well be better invested in other sectors of the economy given the instability of mining for export.

Almost all of the above advantages of a mining TNC over any single Third World government, relate to economies of scale and diversity, but if a group of Third World countries were to join together for mineral resource exploitation they would be able to take advantage of their greater collective economies

of scale, through their greater variety minerals, greater production of any one mineral, greater capital resources, greater technological base, greater manpower resources, etc... The SADCC region has resources of virtually every mineral necessary for industrial development and for some minerals they have numerous mines and would thus collectively be in a position to exploit their regional economies of scale and effectively develop their mineral resources for regional industrial development: This is in fact the main contention of this study. Another way in which Third World mineral producers could overcome their individual weakness in the world market would be to join together with other producers of the same mineral to jointly finance research and development in the mining and processing of the minerals, the downstream uses of the mineral, market research and the regulation of supply of the mineral (cartels) to stabilise the price. This has been attempted without too much success for minerals such as tin, copper and bauxite.

An important difference between the role of the mining sector in the First World and the Third World is that in the First World, such as the USA,

“...economic growth is aided if the prices of minerals are falling relative to the prices of other goods, and hindered if they are rising”⁴⁵.

In other words, within an industrialised economy, the minerals sector subsidises the manufacturing sector through the declining price of mineral raw materials. But in a Third World economy, where only the first, extractive, phase is undertaken, the subsidy is in effect to the industrialised nations that it exports to. Thus economic growth in the First World is aided by ever cheaper minerals from the Third World, which receives none of the benefits of the growth in terms of employment, revenue, etc... All that it gets are a few paltry crumbs in the form of “aid” from the First World. However, if the Third World minerals were integrated into the rest of their economies, then the mining sector would subsidise their own industrialisation.

Footnotes to Chapter 3

1 As in Zimbabwe (see chapter below).

2 Mike Faber refers to this as “an appropriate charge for the alienation of the ore body”. (Brown & Faber, 1977, page 30)

3 This relates to the concept of mineral “rent” treated by Nwoke (1988), Nankani (1979) and Brown & Faber (1977) discussed below.

4 This is particularly true for new mines in the Third World where the existing infrastructure is usually rudimentary. This aspect relates directly to the theoretical chapter where we discussed unequal development and unequal exchange in that although the First World has higher labour costs, a new venture will have much lower initial capital costs due to the lower infrastructural costs. However, investment in Third World minerals continues because they ultimately have the resources (which aren’t in competition with First World operations).

5 This is part of the “backwash” effect and has been particularly important in Zimbabwe where the rail/road and power grid was extended to mining areas which later often became thriving agricultural centres that continued after the gold mines were exhausted. This has given Zimbabwe arguably the best internal infrastructure in the region (see chapter on Zimbabwe for map).

- 6 An innovative method of overcoming this for credit-short Third World countries is the UN Revolving Fund for Natural Resource Exploration (UNRFNRE), discussed below in the chapter on "Regional Strategies".
- 7 see Myers & Barnett 1985.
- 8 After 1970 the decline continued, except for the two brief oil crises of the seventies, and are presented at the beginning of the chapter on "Unequal Development and Unequal Exchange" (above).
- 9 Myers & Barnett 1985, page 17. 10 Kay 1975.
- 11 Prebisch 1950 and Singer 1950. 12 Emmanuel 1972.
- 13 This is particularly true for Zambia, see chapter below.
- 14 Also, partly, oil (OPEC). See Jourdan 1984 for a discussion of the advantages of the ITC, in the context of SADCC mining, shortly before the collapse of the tin price (in 1985).
- 15 Johnson & Pintz 1985.
- 16 The increase is however generally concentrated in "middle-income" developing economies rather than the "low-income" economies, whose share appears to be decreasing.
- 17 Johnson & Pintz 1985, page 22.
- 18 The overall contribution of mining to the regional SADCC GDP is about 10%.
- 19 USBM 1989.
- 20 Nankani defines "mineral economies" as those for which mining contributes >10% of GDP and 40% of exports (Nankani 1979, page 2), which would define the regional SADCC economy as being "mineral" (about 10% of GDP and 60% of exports) and would include Angola, Botswana, Zambia, Zimbabwe and Namibia.
- 21 Nankani 1979, page 97.
- 22 Such as external public debt, debt as a % of GDP, debt as a % of exports and gross inflow public external debt as a % of exports. Looney & Knouse 1987, page 59.
- 23 Looney & Knouse 1987, page 67. 24 Looney & Knouse 1987, page 67.
- 25 Johnson & Pintz 1985, page 24. See also the chapter on Zambia below.
- 26 This refers to the rapid expansion of natural gas production in the 1970s with a contraction of other traded-goods sectors and an expansion of services. Philip Daniels 1985. 27 Daniels 1985. 28 Nwoke 1987, Nankani 1979. 29 Nankani 1979, page ii.
- 30 Nwoke 1987. 31 Nankani 1979, page 87.
- 32 Quasi-rents are those which with time disappear. As capital is immobile in the short-run, and the mining industry is highly capital intensive, there would be some quasi-rent for capital.
- 33 Nankani defines rent "as the surplus earned by a particular factor of production over and above the minimum earnings necessary to induce it to do its work" (Nankani 1979, page 88), while Nwoke defines rent as the excess surplus received above "average" profits (Nwoke 1987, page 8).
- 34 Nankani 1979, page 88. 35 Johnson and Pintz 1985, page 25.
- 36 Nwoke claims that the only way for Third World governments to capture all of the rent is for them to "retain full control over exploration and development and, therefore, receiving 100 percent of the benefits..." (Nwoke 1987, page 208). He calls this "authentic economic uhuru from metropolitan mining MNCs" (page 209).
- 37 Several UN General Assembly resolutions have affirmed "...full permanent sovereignty of every state over its natural resources" (UN General Assembly Resolutions 3201 (S-VI) and 3202 (S0VI) of 1974 cited in Johnson and Pintz 1985).
- 38 see Brown & Faber 1977 for a discussion, at that time, of the increasing state participation in mining in African Commonwealth countries.
- 39 Front-end royalties are applied on turnover, no matter what the price of the product or profitability of the operation.
- 40 Walrond and Kumar 1986, page 113.
- 41 However, this high state equity is unusual (the TNCs will typically agree to 15% to 25%, as for Botswana RST) and was due to the exceptionally high return on capital for Debswana (69% for 1982-88, leaving De Beers with a respectable 35% return).
- 42 Yachir 1988, page 89. 43 Radetzki 1983, cited in Johnson & Pintz 1985.
- 44 For example if Zambia had been able to develop significant minerals other than copper it would have suffered less from the collapse of copper prices. In this way Zimbabwe's spread of mineral exports has cushioned it somewhat from price falls.
- 45 Myers and Barnett 1985, page 16, referring to the mining industry in the USA.
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Chapter 4: Mining in the SADCC

There have only been a few studies that have focussed specifically on mining in the SADCC region¹, one of which is a chapter by Kalyala and Mudenda in the book "SADCC: Prospects for Disengagement and Development in Southern Africa"², but which unfortunately is substantially based, particularly in terms of data, on an earlier published study³. The Kalyala and Mudenda study correctly points out that the SADCC region is rich in mineral resources and that: "Despite this impressive record of mineral wealth the Southern African subcontinent still remains one of the least developed areas in the world"⁴, which is the central problem of this thesis. However, Kalyala and Mudenda see this failure to develop as resulting from the dominance, since the colonial era, of TNC's, particularly South African TNCs, in the region's economies, particularly the mining sector, rather than the overall constraints on the Third World described under the section on unequal development and unequal exchange. It is also argued in their study that the TNCs are a symptom of the "balkanisation" of Africa in that in any one small country it is difficult to mobilise the huge financial resources for mineral exploration and mining, develop an adequate pool of technical and managerial personnel, to finance research and development, and to spread mineral price instability risks over several minerals. It is further argued that regional integration offers economies of scale sufficient for mineral development without major TNC involvement.

The minerals sector of the SADCC region is almost entirely vertically integrated into the capitalist world economy and as such is particularly susceptible to global crises. Almost none of the mineral production is consumed within the region. Modern large scale exploitation of minerals was first undertaken by the companies of colonial powers to supply their domestic industries with raw materials and this situation remains essentially the same today. Due to this lack of integration into the local economies, the mining sector has suffered more than most from the falls in international commodity prices since 1980, except for precious metals and minerals (gold and diamonds). By 1986, the real unit value of most minerals was less than half the 1980 figure and in many cases mining operations were making severe losses or had been forced to close. This situation improved slightly in 1987, and 1988, but fell again in 1989/90 and overall real values were still below those of 1980.

The contribution of the minerals sector to regional GDP is second only to that of agriculture and in 1988 was 19%, up 58% on the 1980 figure (12%). The total value of the contribution of the mining sector to GDP is dominated by oil in Angola which, in 1988, alone accounted for 43% of the regional mining GDP. Regional mining GDP excluding oil increased from 9% in 1980 to 11% in 1988. In addition, unfortunately there is no common definition for the mining sector in the SADCC: some countries include the whole process from mining, to mineral processing, to smelting, to refining; others class refining under manufacturing (Zambia); yet others class the refining of some minerals as mining and others as manufacturing (Zimbabwe); and in one all mining is classified under industry (Angola). There is also a common tendency to put the extraction and processing of construction materials such as limestone (cement), sand, stone and gypsum, under the building (construction) industry. This means that in general, the contribution of the minerals sector (including smelting and refining) is understated⁵. Four countries, Angola, Botswana, Zambia and Zimbabwe, accounted for 99% of the regional mining GDP in 1988. The size of the mining sector in terms of GDP varies considerably from state to state, from around 40% for Angola and Botswana (and Namibia), to virtually nothing for Lesotho, Malawi, Mozambique, Swaziland and Tanzania.

4.1 SADCC GDP MINING, 1980 & 1988

	1980	%	1980	1988	%	1988
(MUSD)	M.GDP ¹	SADCC %	GDP ²	M.GDP ¹	SADCC %	GDP ²
Angola						
Oil	1029	31%	28%	2081	43%	29%
Minerals	174	5%	5%	143	3%	2%
Total	1203	36%	33%	2225	46%	31%
Botswana	274	8%	29%	783	16%	44%
Lesotho	27	1%	7%	0	0%	0%
Malawi	7	0%	1%	4	0%	0%
Mozambique	11	0%	1%	2	0%	0%
Namibia	680	20%	34%	1052	22%	56%
Swaziland	19	1%	3%	11	0%	2%
Tanzania	40	1%	1%	14	0%	1%
Zambia	621	19%	16%	354	7%	14%
Zimbabwe	452	14%	8%	349	7%	7%
Total SADCC:	3335	100%	13%	4796	100%	19%
Total ex-oil	2306		9%	2714		11%

% Change 80-88, total: 42%; ex-oil: 17%

¹contribution to GDP by the mining sector.

²% contribution to GDP by the mining sector.

Source: IMR SADCC Database 1990.

The principal role of the SADCC minerals sector is that of a foreign exchange earner and in this regard it generates more than any other sector. The region derives over sixty percent of its foreign exchange from mineral exports worth, in 1988, 5.7 GUSD. Over the last decade minerals have on average constituted 64% of total export receipts, including oil exports, and 40% excluding oil. In 1988 the principal mineral exporters were, by value, Angola 37%, Botswana 25%, Zambia 15%, Zimbabwe 11% and Namibia 11% of total SADCC mineral exports. Thus these five states constituted 99% of all the mineral exports of the region.

4.2 SADCC MINERAL EXPORTS, 1980-87

(GUSD)	1980	1981	1982	1983	1984	1985	1986	1987	1988	% ¹
Angola	1713	1710	1398	1721	1930	2152	1228	2119	2119	37%
Botswana	429	255	307	489	526	615	713	1430	1430	25%
Lesotho	32	21	14	1	0	1	1	1	1	0%
Malawi	0	0	0	0	0	0	0	0	0	0%
Mozambique	13	12	6	2	2	1	3	1	1	0%
Namibia	1127	707	703	649	571	581	718	643	676	11%
Swaziland	25	28	16	18	16	15	19	21	21	0%
Tanzania	37	65	42	39	32	22	11	9	9	0%
Zambia	1250	1039	981	800	618	495	678	839	839	15%
Zimbabwe	680	494	535	475	448	437	557	624	624	11%
SADCC:	5306	4330	4003	4195	4142	4318	3928	5686	5719	100%
% Exports:	65%	58%	61%	67%	66%	69%	60%	70%	64%	(64) ²
excl. Oil ³ :	3832	2634	2617	2483	2307	2239	2710	3606	3780	
% Exports:	47%	35%	40%	39%	37%	36%	41%	45%	43%	(40) ²

¹% SADCC mineral exports in 1988. ²average for 1980-88

³excluding oil exports. Source: IMR SADCC Databank, 1990.

Mineral dependence varies dramatically from state to state, from virtually nothing for Malawi to 90% of exports and 49% of GDP for Botswana. This country, together with Zambia and Angola are virtual mono-mineral economies with one mineral accounting for from 60% to 95% of total export receipts. Four countries have almost non-existent minerals sectors, namely, Malawi, Lesotho, Mozambique and Tanzania, while Zimbabwe has the most "balanced" minerals sector, in terms of diversity and local offtake, and Swaziland has a small but important mining industry.

The total regional mining labour force stood at around 171 thousand workers in 1986 (excluding oil) with the highest being for Zambia at 57 thousand and Zimbabwe at 55 thousand. These two countries alone constituted 66% of the total SADCC mining labour force. Mining is not a significant regional employer and in 1986 employment in the minerals sector, excluding oil, was only 5% of overall regional formal employment, with the highest being for Zambia where it was 16%. Regional mineral output per miner, excluding hydrocarbons, averaged 18.9 thousand USD. Mining in Botswana, Namibia and Zambia is large scale and relatively capital intensive giving a high value of production per miner. The total value of mineral production in Zimbabwe is less than one-third that of Zambia, yet it gives employment to roughly the same number of workers. This is due both to the existence of a large small-scale (labour intensive) mining industry in Zimbabwe and is also due to the fact that the processing of several minerals in Zimbabwe (such as chromite, iron ore, coal and apatite) is classified under manufacturing, meaning that value recorded by government is for the ore rather than the processed mineral/metal.

4.3 SADCC LABOUR FORCE, MINING LABOUR, 1986 (excl. oil)

	Labour Force Unit:	Min. Prod. ¹ MUSD	Mining Labour k	% SADCC	% lab ²	MP/ miner ³ kUSD	Miners RSA ⁴ k	Remit- tances ⁵ MUSD
Angola	670	10	17.5	10%	3%	.6	.0	.0
Botswana	130	671	9.5	6%	7%	71.0	21.0	25.9
Lesotho	50	1	1.0	1%	2%	.9	121.5	125.9
Malawi	428	5	.6	0%	0%	8.4	20	18.1
Mozambique	200	6	4.0	2%	2%	1.5	58.8	49.5
Namibia	188	718	14.0	8%	7%	51.3	0	0
Swaziland	92	18	2.4	1%	3%	7.2	14.9	6.9
Tanzania	749	15	8.9	5%	1%	1.6	0	0
Zambia	361	1,390	58.8	34%	16%	23.6	0	0
Zimbabwe	1,094	418	54.5	32%	5%	7.7	0	0
Total (avg):	3,961	3,251	171	100%	5%	18.9	236	226

¹mineral production, ²mining sector labour as a % of total formal labour force, ³mineral production per miner, ⁴migrant miners on South African mines, ⁵remittances of the migrant miners. na: not available, nap: not applicable, source: IMR SADCC Databank, 1989

In 1986 there were officially around 236 thousand workers from the SADCC states working on the mines of South Africa, constituting about 45% of that country's total mining labour force. Hence there are 32% more SADCC citizens on the mines of the RSA than on the mines of SADCC. The highest in the SADCC is Lesotho (121,500) where the migrant labour force is several times greater than the domestic formal labour force. The remittances of the 238,000 migrants totalled 226 MUSD in 1985, representing about one thousand USD per worker and in 1990 the average wage on the South African mines was R729/month (about 270 USD)⁶. Total remittances from the RSA were 5% of total regional export receipts in 1986.

This cheap migrant labour force was an essential factor in the rapid development of the South African mining industry. The mining companies did not even have to pay ^{the} minimum for the reproduction of labour as the migrant's family continued to be sustained in a partially destroyed pre-capitalist mode of production⁷. In many of the areas that the migrants were drawn from, such as Malawi, Lesotho and Mozambique, the absence of able-bodied men caused a decline in agricultural production which in turn sometimes forced more men to leave to seek cash incomes. However, it should be noted that the number of SADCC migrants on the South African mines, high as it is, is much reduced on the numbers in the late sixties and early seventies when there were close to 400 thousand⁸. In addition, since the seventies the South African mines have only been recruiting experienced miners (no new recruits) as the technical level demanded by greater mechanisation has increased.

During colonialism by far the majority of the labour on the mines of the region was migrant, particularly in the two Rhodesias⁹, except for the ex-Portuguese colonies¹⁰, but after independence in both Zambia and Zimbabwe the mine labour force became predominantly permanent. The region is still dependent on expatriate professional and managerial staff in the mining sector, though the numbers have dropped considerably over the last decade, in Zambia from 9.9% of mining labour in 1980 to 1.6% in 1988 and in Botswana from 9.7% to 6.1% over the same period¹¹. In Angola, almost all technical and managerial staff in the oil industry are expatriates, though a large number of Angolans are currently under training, and in Zimbabwe the situation is complicated in that the number of expatriates is extremely low but the proportion from the "white" community is extremely high.

Five countries accounted for almost all (99%) of the value of the region's mineral production of 5.1 GUSD in 1988. These are Angola (42%, oil and diamonds), Zambia (18%, copper & cobalt), Botswana (16%, diamonds & copper/nickel), Namibia (13%, diamonds and uranium) and Zimbabwe (10%, various minerals). In current US dollars the value of regional mineral output has fallen 10% since 1980. Excluding oil production, regional output fell 26% over the same period. Regional mineral production per capita was 66 USD in 1988, down 32% on 1980 and average output per capita from 1980 to 1988 was 72 USD for all minerals and 45 USD excluding the value of hydrocarbon production.

4.4 SADCC, MINERAL PRODUCTION (MP), 1980-88.

(MUSD)	1980	1981	1982	1983	1984	1985	1986	1987	1988	% ¹
Angola	1915	1943	1590	1900	2094	2228	1267	2168	2168	42%
Botswana	409	328	451	562	739	542	671	820	820	16%
Lesotho	32	20	14	1	0	1	1	1	1	0%
Malawi	11	9	7	8	8	6	5	6	6	0%
Mozambique	22	27	21	13	9	5	6	3	3	0%
Namibia	1127	707	703	649	571	581	718	643	676	13%
Swaziland	26	28	17	22	15	13	18	19	19	0%
Tanzania	45	25	23	22	21	21	15	13	13	0%
Zambia	1495	1105	928	1000	851	991	1390	944	944	18%
Zimbabwe	658	549	501	464	418	392	418	489	489	10%
SADCC:	5739	4741	4254	4640	4725	4779	4509	5106	5138	100%
MP/cap:	97	77	67	71	69	68	62	68	66	(72) ²
Excl.Oil:	4063	2937	2783	2833	2690	2583	3252	2976	3009	
'MP/cap:	69	48	44	43	39	37	45	40	39	(45) ²

¹% of SADCC total in 1987, ²average for 1980-88.

IMR SADCC Databank 1990.

Mineral production for the SADCC ranked by value in 1988 is displayed in the table below. In that year oil from Angola was worth 2.5 GUSD, followed by copper, 1.1 GUSD, and diamonds, 1.0 GUSD. Together these three minerals made up over eighty percent of the total value of regional output. In terms of world output, the only minerals in the region with a significant share of global production are diamonds (21%) and cobalt (16%) though the proportions are higher when considered against "western" output only or against world trade rather than production. The possibility of the regional grouping exerting influence on the international price is therefore low. However, production data does not reflect the regional mineral resource base. The SADCC has significant resources, in global terms, of chromite (17%), the platinum group metals (18%), gold, titanium, tantalum, iron ore, coal and uranium.

4.5 SADCC: PRODUCTION OF PRINCIPAL MINERALS 1970-1988 (excluding Namibia)

Mineral	1970	1975	1980	1985	1986	1987	1988	%	%World	MUSD	Producer ³	
Units=kt								Change	1987 ¹	1988 ²	1988	%
Oil Mt	5.1	8.8	6.8	11.6	14.1	18.0	24.6	385%	.7%	2490	Ang 100%	
Diamond ⁴	3.7	5.1	5.8	14.1	13.6	14.3	16.4	344%	16.1%	1120	Bot 93%	
Copper	714.	695.	652.	522.	502.	521.	463.	-35%	6.0%	1019	Zam 91%	
Nickel	8.6	15.6	30.5	29.4	28.7	26.9	34.0	295%	4.3%	326	Bot 66%	
Fe-Chrome	163	182	211	195	219	218	225	38%	7.2%	235	Zim 100%	
Gold t	14.0	11.5	11.8	15.1	15.0	15.5	15.4	10%	1.0%	217	Zim 97%	
Steel	349	467	689	643	603	537	600	72%	.1%	100	Zim 99%	
Coal	4619	4972	4674	4173	4608	6131	6422	39%	.1%	74	Zim 79%	
Cobalt	2.05	1.95	3.65	4.73	4.58	4.71	5.45	166%	15.5%	73	Zam 92%	
Asbestos	221	299	284	199	187	219	209	-5%	5.3%	61	Zim 89%	
Chromite	504	876	553	526	553	570	561	11%	5.3%	25	Zim 100%	
Zinc	53.5	46.9	32.7	22.9	22.5	21.0	20.2	-62%	.3%	24	Zam 100%	
Silver t	54.7	38.6	53.4	43.7	52.9	55.2	51.2	-6%	.4%	17	Zam 57%	
Iron Ore	9456	9090	1621	1100	1125	1328	1021	-89%	.1%	14	Zim 100%	
Tin	1.14	1.00	1.02	1.21	1.08	1.04	.86	-25%	.6%	6	Zim 99%	
Lead	27.3	19.1	10.0	8.9	6.7	8.0	6.4	-77%	.2%	4	Zam 99%	

¹SADCC output as a % of World production in 1987, ²value of SADCC output in 1988 in MUSD, ³principal SADCC producer & % of SADCC production (volume), ⁴million carats. Source: IMR SADCC Databank 1989.

A wide variety of other minerals are mined in the region, such as phosphates (Zimbabwe and Tanzania), pyrites (Zambia and Zimbabwe), lithium minerals (Zimbabwe), tantalum (Zimbabwe and Mozambique), gemstones, ornamental stone, limestone and clays. In addition small quantities of selenium, antimony and arsenic are produced as a byproduct of other mineral processing. With the admission of Namibia in 1990, the regional diamond, copper, gold, zinc, lead, silver and tin will increase, and the region will also become a major uranium producer. For most of the region's minerals, great advances have been made over the last few decades in local downstream beneficiation. Today almost no concentrate or alloy leaves the region. Most minerals are processed (refined) to their pure form before export onto the world markets which retains value in the region. All of the half-a-million tonnes of copper produced is refined before export, as is most of the gold. About half of the nickel production leaves the region in the form of matte while the other half is refined. Almost all of the region's tin, cobalt, zinc and lead are refined before export. A miniscule amount of the region's large gem-grade diamond production is cut in the region, though there are plans to increase cutting facilities. None of the asbestos produced in the SADCC (Zimbabwe and Swaziland) is further transformed before export, but the weaving of asbestos fibres is under consideration in Zimbabwe.

By far the majority of mining in the SADCC region is to supply mineral raw materials for the further transformation in the economies of the OECD countries. Less than 10% of the total value of regional mineral production is consumed within the region. For most of the important minerals the percentage of local/regional consumption is between 0% and 10% of production with the notable exceptions of coal and coke, steel, zinc and lead. Several industrial and fertiliser minerals such as phosphates, pyrites, limestone/cement, bauxite, clays, glass sands and salt are entirely produced for local consumption, within the region.

Historically, colonial penetration of the region was intricately linked to minerals and mining companies. Two of the countries, Zambia and Zimbabwe, were actually conquered and ruled for a time by Cecil John Rhodes' British South African Company (BSAC). The development of most of the other states was also deeply affected by mining, whether for mineral exploitation, mineral transport routes (Angola and Mozambique) or the supply of labour to the sub-continent's mines (Lesotho, Mozambique and Malawi). In this sense the only SADCC state that has not been strongly affected by the regional exploitation of minerals is Tanzania¹², but since the construction of the Tazara railroad in the early seventies, it also has hosted a vital mineral export route.

“Consequently, the economies of the countries of the region, be they mineral-rich or not, were subordinated to the interests of South African based mining capital. In those countries where the mining industry was not developed, it was the cheap labour that mining exploited, while in the mineral-rich countries it was the minerals and cheap labour that monopoly was after.”¹³

The successor to the BSAC is today by far the most important transnational mining house in the region: the Anglo American - De Beers mining consortium of South Africa. These two companies effectively operate as one organisation, each having the major shareholding in the other¹⁴ and Anglo often provides management and technical services for De Beers' operations¹⁵. They control most of the region's nickel production (BNC¹⁶ and RST¹⁷), diamond production (Debswana¹⁸), about a third of the ferro-chrome output (Zimalloys¹⁹) and 27% of ZCCM²⁰ in Zambia which produces 91% of the region's copper and 92% of the cobalt.

In 1988 the value of major mineral output owned by AAC-DeBeers was approximately one billion USD, 32% of the total value of SADCC major mineral production, excluding oil. Turner Newall of the UK controls the bulk of the SADCC's asbestos output (AAM²¹) and Union Carbide of the USA controls the other two-thirds of ferro-chrome production (Zimasco²²). Other transnationals involved in the region are Rio Tinto Zinc and Lonrho of the UK (gold) and Amax of the USA (copper/nickel), but the latter company has been selling its assets in the region over the last decade. Anglo American also has extensive non-mining interests in the region, particularly in Zimbabwe and Zambia where it is involved in farming and industry. Lonrho's non-mining interests (farming, textiles, motor industry) in the region are larger than its mining concerns, particularly in Zimbabwe, Malawi, Mozambique and Zambia.

A significant proportion of mining in the region has some degree of state control. The Zambian state owns 60% of the parastatal copper/cobalt mining company ZCCM which also controls all of the region's lead and zinc production (Kabwe) and all petroleum production is partly owned by the Angolan parastatal Sonangol in partnership with oil transnationals, principally Gulf Oil of the USA, (Cabgoc²³) now owned by Chevron, Elf Aquitaine (French), Petrofina (Belgian) and Texaco (USA). The states of the region owned 45% of the value of the major minerals produced in 1988, excluding oil, slightly down on 1984²⁴. Including oil, the state share was 47%. State ownership by mineral varies

considerably, from zero in the case of chromite mining, to 79% for regional coal extraction. The extent of state/private control is not accurately reflected by the percentage ownership of the mining company, due to minority share holdings with virtually no control, on the one hand, and management contracts with low equity holdings, on the other²⁵. A regional breakdown of ownership by major mineral is given in the table, below, but it should be noted that minor values of numerous other minerals are mined in the SADCC, particularly in Zimbabwe. These include tin, tantalum, graphite, lithium, phosphate rock, manganese, iron ore, semi-precious stones and minerals for the construction and ceramic industries.

4.6 SADCC, MAJOR MINERALS, OWNERSHIP & OUTPUT, 1988
(excluding Namibia, kt and MUSD)

Mineral	Country	Company	%Pvt ¹	Pvt.Owners	%State	Output	MUSD ²	State
Copper	Zambia	ZCCM	40	AAC, RSTInt.	60	422	929	576
	Zimbabwe	MCM	45	public	55	16	35	12
	Zimbabwe	BNC	100	AAC	0	1	2	0
	Botswana	RST	85	AAC, Amax	15	24	53	4
				sub-total:		463	1019	58%
Cobalt	Zambia	ZCCM	40	AAC, RSTInt.	6	5.03	67	42
	Botswana	RST	85	AAC, Amax	15	.30	4	1
	Zimbabwe	BNC	100	AAC	0	.13	2	0
				sub-total:		5.46	73	58%
Pb/Zn	Zambia	ZCCM	40	AAC, RSTInt	60	27	28	17
				sub-total:		27	28	62%
Nickel	Botswana	RST	85	AAC, Amax	15	23	216	32
	Zimbabwe	BNC	100	AAC, public	0	12	110	0
				sub-total:		34	326	10%
Fe-Chrome	Zimbabwe	Zimalloys	100	AAC, public	0	50	85	0
	Zimbabwe	Zimasco	100	Union Carb.	0	175	150	0
				sub-total:		225	235	0%
Gold	Zimbabwe	Various	99	Numerous	1	15.0 ³	211	2
	Tanzania	Various	50	Numerous	50	.2 ³	2	1
	Zambia	ZCCM	40	AAC, public	60	.3 ³	4	2
				sub-total:		15.4	217	3%
Diamonds	Botswana	Debswana	50	De Beers	50	15.23 ⁴	929	465
	Angola	Endiama	23	Soc.Gen.	77	1.04 ⁴	180	139
	Swaziland	Dokolway	100	Trans-Hex	0	.12 ⁴	7	0
	Tanzania	Mwadui	50	De Beers	50	.08 ⁴	6	3
				sub-total:		16.47	1019	59%
Coal	Zimbabwe	Wankie	20	AAC	80	5064	58	47
	Zambia	Maamba	0	nap	100	524	6	6
	Botswana	Morupule	93	AAC	na	613	7	0
	Malawi	Kaziwiziwi	0	Midcor	100	29	0	0
	Mozamb.	Moatize	0	nap	100	24	0	0
	Swazi.	Emaswati	48	Gencor, AAC	52	165	2	1
				sub-total:		6419	74	73%
Asbestos	Zimbabwe	AAM	100	Turner N.	0	187	54	0
	Swaziland	Havelock	100	TN & Gencor	0	23	9	0
				sub-total:		209	63	0%
GRAND TOTAL EXCLUDING OIL.....							3105	45%
Oil	Angola	Cabgoc	49	Chevron/Agip	51	16.0	1620	826
	Angola	Elf	49	Elf	51	5.5	557	284
	Angola	Fina	49	Petrofina	51	2.5	253	129
	Angola	Texaco	49	Texaco/Total	51	.6	61	31
				sub-total:		24.6	2490	51%
GRAND TOTAL:							5595	47%

¹ % private shareholding, ²% holding x value of output, ³carats, nap: not applicable. Sources: Jourdan 1987b, IMR SADCC Databank

The table considers ownership rather than control. The Angolan oil industry is evidently not controlled by Sonangol but the ownership gives the state a large share of the official revenues. There are well documented methods used by the TNC's to increase their proportion of the surplus, particularly via transfer pricing by purchasing from or selling to companies under their control²⁶. Several SADCC states have attempted to control the latter by taking over or monitoring the marketing of their minerals²⁷ and by monitoring foreign currency allocations for mining inputs²⁸. Two other methods of externalising profits common in the SADCC mining sector are through the payment of "management fees" to the mother company and through "consultancy" charges for services from the mother company²⁹.

The global crisis has had a profound effect on the viability of the region's major mining companies, except for the precious mineral/metal companies (diamonds and gold). The rapid decline in mineral prices from 1980 meant that by 1986 most of the major mining houses were in a state of severe crisis. These included Botswana RST (nickel/copper), with a crippling 714 MUSD debt, Bindura Nickel (BNC), Zimalloys, the Zambian copper giant, ZCCM, MCM³⁰ and African Associated Mines (asbestos). Due to relatively good diamond and gold prices, Debswana and the Zimbabwean gold mining companies were financially more stable.

In 1988 a selection of eight SADCC gold mining companies made official³¹ profits of 35 MUSD on total capital employed of 230 MUSD³² giving an overall return on capital of 15%. While six non-ferrous mining companies (Cu/Ni/Sn) made a profit of 118 MUSD on capital of 2.0 GUSD giving a return of only 6%. Return on capital for four ferrous mining and smelting companies was only 1%. Overall return on capital for a selection³³ of 24 SADCC mining companies was however a healthy 20%, but this was mainly due to an exceptional return by Debswana (79%) as the total return was only 6% with Debswana excluded. Profit as a proportion of sales (turnover) was 17% (6% excluding Debswana) and 42% of the total debt of 1.6 billion. For the period 1982 to 1988 this selection of 24 SADCC mining companies made an average total profit of 175 million deflated 1982 USD, from a loss of 211 MUSD in 1982 to a profit of 535 MUSD in 1988. Two companies, both Botswanan, accounted for a large share of the regional loss (Botswana RST, average -86 MUSD) and profit (Debswana, average 259 MUSD). Return on capital averaged only 6% for the period, was negative (-3.5%) excluding Debswana and zero excluding both Debswana and RST. However, the return improved from an overall loss in 1982 (-6.4%) to 20% in 1988.

In terms of different minerals, the highest return was for gold mining (average of 15%) while both base metal and ferrous made losses over the period (-4% and -18%), though excluding Botswana RST, base metal mining cut even on average and excluding Zisco, ferrous mining and smelting had a return of 7%. In terms of ownership fifteen mining TNCs achieved a return of 23% for the period or 36% excluding Botswana RST, but made an overall average loss of 5% excluding Debswana. However, nine state-owned mining companies had an average negative return on capital of 2%, but excluding ZCCM and Zisco, both major loss makers, the return was slightly positive (3%). It should also be borne in mind that in many instances the state took over mining companies precisely because they were loss-makers and on the verge of closing down³⁴. In deflated dollars the overall medium and long term debt of the selected 24 SADCC mining companies actually dropped from 1.41 billion USD in 1982 to 1.32 billion 1982 USD in 1988 due partly to the fact that the proportion of the debt in local currencies decreased significantly in USD terms due to widespread devaluations, but the overall debt to capital ratio increased from 43% to 49%. On average the huge RST Botswana debt accounted for 45% of the total mining company debt over the period.

4.7 SADCC MINING COMPANIES
SELECTED¹ FINANCIAL PROFILES, 1988 (MUSD⁷)

Company (USD)		Sales	Capital ²	Assets ³	Debt ⁴	Tax ⁵	Profit ⁶	P/c ⁸
Blanket	Au	10.5	10.4	8.3	.8	.6	1.7	16%
Cluff	Au	10.1	21.7	68.2	7.0	.0	5.2	24%
Corsyn	Au	28.6	22.5	15.4	.0	1.7	7.5	33%
Falcon	Au	21.6	26.9	25.9	2.9	.1	-1.4	-5%
Independence	Au	45.4	93.0	97.0	.0	.0	12.7	14%
Olympus	Au	4.0	2.1	2.6	.0	.1	1.4	66%
RTZim	Au	68.3	37.2	29.8	5.2	4.3	9.7	26%
Sabi	Au	7.5	15.9	12.2	12.2	.0	-1.3	-8%
sub-total, Gold:		196.0	229.7	259.3	28.1	6.9	35.4	15%
Bindura	Ni/Cu	139.2	124.5	67.5	.0	2.6	59.7	48%
Bots RST	Ni/Cu	231.9	177.7	158.7	897.6	12.8	-100.4	-56%
Kamativi	Sn	8.4	2.9	2.7	3.1	.0	-3.9	-133%
Lomagundi	Cu	7.7	7.0	6.7	2.1	.0	-1.6	-23%
Mhangura	Cu/Ag	39.5	19.9	21.8	7.2	.0	1.5	7%
ZCCM	Cu/Co	1740.4	1662.0	1385.4	554.0	85.5	163.0	10%
sub-total, non-Fe:		2167.1	1994.1	1642.8	1464.1	101.0	118.2	6%
Bimco	Fe	16.7	7.0	21.5	8.4	.0	.4	6%
Zimalloys	Fe-Cr	93.9	83.9	56.1	9.6	10.0	16.6	20%
Zimasco	Fe-Cr	153.7	68.5	31.4	.0	20.3	36.5	53%
Zisco	Fe/steel	111.0	83.2	111.0	66.6	.0	-55.5	-67%
sub-total, Ferrous:		375.4	242.7	219.9	84.5	30.3	-2.0	-1%
Dorowa	Phos	7.6	7.4	7.7	.6	.0	.2	2%
Bikita	Li/Ce	4.1	4.8	2.9	.0	.0	.4	9%
ZGGM	graphite	6.5	3.4	2.9	.0	.0	1.1	32%
S & M Mines	Asbestos	82.0	92.8	58.2	.0	.0	2.7	3%
Wankie	coal	70.4	104.8	94.8	32.2	.0	10.3	10%
Debswana	Diamonds	936.6	608.0	368.5	.0	320.7	480.9	79%
sub-total, Other:		1107.3	821.2	535.1	32.8	320.7	495.6	60%
TOTAL		3846	3288	2657	1610	459	647	20%
TOTAL ex-Debswana		2909	2680	2289	1610	138	166	6%

¹selection based on data availability only, ²capital employed, ³fixed assets, ⁴medium and long term debt, ⁵tax & royalties, ⁶final profit, ⁷converted from local currency at average exchange rate for calendar year, except for Zambia where the exchange rate on 31 March was used to conform with ZCCM accounting. ⁸ Profit/Capital
Source: Company Reports and IMR SADCC Databank 1990.

Although the mining industries of the region face similar problems, the legislative structure that the governments have set up to overcome them varies considerably from state to state, especially as regards their attitude to the mining trans-national corporations (TNC's). The colonial mining laws were by and large extremely favourable to the TNC's particularly with regard to mineral rights, repatriation of profits, labour rights and the training of indigenous personnel. A case in point is Zambia, where the state only acquired the national mineral rights from the BSAC on the eve of independence but even then, the most lucrative areas had already been ceded to two TNC's in perpetuity. The racial employment policies of the TNC's operating in Zambia were only abolished the year before independence (1963). In many areas the mining companies operated as a "state within a state", as aptly described by an Angolan scholar, often with sweeping powers over justice, welfare, education and other, normally public, areas³⁵.

4.8 SADCC MINING COMPANIES: PROFIT AND RETURN ON CAPITAL (deflated 1982 MUSD)

Type	1982	1983	1984	1985	1986	1987	1988	Average
PROFIT All Companies	-210.8	19.8	10.6	110.6	238.6	567.9	544.2	183.0
Gold	2.7	26.0	19.5	25.1	26.3	27.7	29.2	22.3
Base Metals	-239.7	-100.9	-163.4	-153.2	-73.0	39.4	97.5	-84.7
Ferrous	-53.2	-64.4	-38.7	-8.6	4.8	-19.3	9.0	-24.3
TNCs	-51.2	74.6	65.4	129.7	291.7	571.9	439.6	217.4
State Co.s	-159.7	-54.8	-54.9	-19.1	-53.1	-3.9	104.6	-34.4
PROFIT/CAPITAL All	-6.4%	0.7%	0.4%	3.8%	7.6%	19.5%	20.2%	-6.5
All ex-Debswana	-10.1%	-5.9%	-7.2%	-4.4%	-0.8%	2.5%	6.7%	-3.0
All ex-Debs & RST	-6.4%	-2.1%	-0.5%	1.4%	-0.7%	2.0%	11.3%	0.4
Gold	1.5%	17.7%	15.2%	19.9%	19.6%	19.0%	16.5%	15.0
Base Metals (BM)	-12.2%	-6.3%	-8.9%	-7.0%	-3.0%	2.1%	5.9%	-4.4
BM ex-Bots RST	-6.0%	-0.5%	-0.1%	-0.0%	-2.9%	1.4%	11.0%	-0.1
Ferrous	-15.7%	-26.9%	-20.4%	-5.1%	2.8%	-9.8%	-4.5%	-11.3
Ferrous ex-Zisco	1.4%	-2.1%	7.0%	9.1%	6.3%	11.9%	22.0%	7.1
TNCs	-3.5%	5.9%	6.3%	17.6%	37.9%	55.5%	38.6%	22.6
TNCs ex-Bots RST	6.2%	16.6%	27.5%	43.9%	43.4%	58.8%	52.6%	35.6
TNCs ex-Debswana	-12.2%	-9.3%	-17.0%	-20.0%	5.8%	11.9%	6.8%	-4.9
TNCs ex-Debs & RST	16.0%	15.3%	33.4%	38.0%	1.0%	-2.7%	16.8%	16.8
State Co.s	-8.8%	-3.8%	-3.2%	-0.9%	-2.2%	-0.2%	6.6%	-1.8
State ex-ZCCM	-13.0%	-17.0%	-22.6%	-6.0%	-1.4%	-22.0%	-14.2%	-13.4
State ex-ZCCM & Zisco	2.0%	1.9%	-1.9%	9.4%	7.3%	-0.6%	4.0%	3.2

Notes: Same as for previous table. Sources: Company Annual Reports and the Zimbabwe Registrar of Companies, 1983 to 1990.

Largely as a reaction to this perceived pro-TNC bias by the colonial administrations, on gaining independence many of the new governments introduced a new legislative regime which generally vested all mineral rights with the state, introduced heavier taxation, compulsory training of locals, extensive mining safety regulations and diminished repatriation of profits. From greater legislative control, the new regimes turned to acquiring increased state participation in the local subsidiaries of the mining TNC's as the commodities "boom" continued into the early seventies, in order to gain direct control of their mining industries and to retain as much of the surplus value as possible within the country concerned. The ex-Portuguese colonies (Angola and Mozambique), which only gained independence in 1975, from the outset embarked on a policy of state control of their mining industries, but this was also in part as a result of the settler exodus from these countries and the resultant abandonment of mining operations.

The major effect of the strict legislative regime and the increasing state participation in mining industry ownership was to cause a rapid decline in new foreign investment in mineral exploration and mining. With the exception of diamonds in Botswana and oil in Angola, there has been no major foreign investment in the mining industries of the SADCC since the early seventies. With the onset of the Global Crisis and the resultant decline in base metal prices in the early eighties, the states of the region started to look to the development of new mineral resources as the value of their "traditional" minerals declined in real terms. In order to attract investors, especially for small and medium scale operations, the governments embarked on a new phase of mining and investment laws revision, in an attempt to make their countries more attractive to scarce foreign capital. In 1986 both Mozambique and Angola adopted new mining laws, Tanzania has introduced a new mining regime and Zambia is in the process of changing its legislation. Thus far there has not been much response from foreign investors, but this is also probably due to the low prices for most minerals except for precious minerals until the late eighties. Zimbabwe gained independence in 1980, as the world recession set in, but due to the fairly restrictive

laws of the former settler regime, especially as regards the repatriation of profits, no major mining legislation was enacted, except for the Minerals Marketing Act which created a state monopoly for the marketing of all minerals. State participation in mining has in general only been for “depressed” minerals, namely, copper, tin and iron ore. Due to the lack of new foreign investment since independence, in 1989 Zimbabwe introduced a new Investment Code that allows for a greater repatriation of after tax profits for venture capital³⁶, which was considered to be the main deterrent to new foreign investment.

From the Second World War to the early seventies there was massive TNC investment in mining in Africa, particularly in the SADCC. Large new production came on stream for copper (Zambia, Zimbabwe and Botswana), asbestos (Zimbabwe), chromite (Zimbabwe), iron ore (Swaziland and Angola) and nickel (Zimbabwe and Botswana). In fact, the bulk of the current mineral extraction capacity in the region was installed during this period.

“In contrast, during the past 15 years new investment (in mining in sub-Saharan Africa) has been modest, save in Botswana. As a result Africa has lost its market share in many metals and minerals, including copper, tin, chromite, and diamonds. Foreign investors have shown little interest in investments in Africa, and state mines have generally been limited at best to sustaining investments to replace depleted reserves”³⁷.

The lack of investment has been particularly severe in exploration. Although several SADCC States have good gold mining potential, particularly Zimbabwe and Tanzania, they have almost entirely missed out on the spectacular gold boom of the eighties. Investment went instead to developed countries like Australia, Canada and the USA which collectively increased their gold output from 98 tonnes in 1980 to 486 tonnes in 1988³⁸ and to Third World countries such as the Phillipines, Brazil and Chile who increased their production from 40 tonnes to 111 tonnes, while the SADCC region, with similar Archaean gold belts, only managed to increase from 11.5 to 15 tonnes, almost all in Zimbabwe, over the same period.

Mineral exploration expenditure as a percentage of the value of mineral production in 1987 was 6% in Canada, 13% in Australia and above 10% for several of the major mining TNCs, but in the SADCC Zimbabwe was only 2.5% and the other mineral countries were all less than 1%³⁹. This fall in investment in exploration is almost entirely due to a withdrawal by the mining TNCs, who have moved to more attractive investment areas elsewhere, which has not been compensated for by increased investment on the part of government. The point being made is that Third World governments clearly have a strong desire to retain as much of the rent from mining as possible, but while there are alternative mineral resources in zones that allow the TNCs to take more of the rent, new investment in exploration by them will go to those countries. Part of the surplus made by TNCs from their mining operations is used to fund exploration: the state must therefore either encourage local mining companies to invest more in exploration⁴⁰ or, if there are no suitable domestic mining companies, the state will have to invest in exploration itself. Given the size and mineral diversity of the SADCC, it would be feasible to have domestic regional mining companies large enough to undertake major exploration if the region was economically integrated. Even with the current formidable obstacles to cross border investment⁴¹ there has been some limited intra-regional investment in gold exploration⁴².

Footnotes to Chapter 4

- 1 The only ones are: Jourdan 1984, 1987b, 1988d, 1989f, Kalyala & Mudenda 1988 and Balkay 1984, 1985.
- 2 Amin et al 1988. Chapter 5: "The Effects of the World Economic Recession on the Mining Sector in the SADCC Region" by Kalyala and Mudenda.
- 3 Jourdan 1984: "The Effects of the World Crisis on Mining in the States of the SADCC".
- 4 Kalyala & Mudenda 1987, page 109.
- 5 In some cases, where the data is available, the contribution has been recalculated, particularly in the individual country chapters.
- 6 Leger & Nicol 1990. This is similar to Botswana and above Zimbabwe (about 170 USD/m), the two highest mine wage countries in the region.
- 7 Wolpe 1980.
- 8 In 1971 SADCC migrants constituted 77.6% of the South African gold and coal mine labour force of half a million and the total mining labour force was 724 thousand. SAIRR, 1973.
- 9 In 1965 60% of Zimbabwean mine labour was "alien" (Chamber of Mines of Rhodesia "Annual Reports for the years 1970, 1971, 1972, Salisbury/Harare 1974) and foreigners constituted 23% of the Zambian mine workforce from 1940 to 1964, but the majority of the Zambian workforce was internally migrant from within Zambia (Ohadike 1969).
- 10 Endiama in Angola and Moatize Colliery in Mozambique, both controlled by Societe General of Belgium. See country chapters for further detail.
- 11 See country chapters for annual proportions.
- 12 However, from 1940 to 1964 Tanzanians constituted 31% of the migrant miners on the Zambian Copperbelt, 7% of the total labour force (Onadike 1969).
- 13 Kalyala & Mudenda 1987, page 110. However, South African mining capital is not particularly involved in Angola (except, at times, for diamond marketing) or Mozambique (though agreements have been signed with ACC recently).
- 14 In 1990 Anglo directly held 32.7% of De Beers and De Beers directly held 37.8% of Anglo. Anglo American 1990.
- 15 As with Debswana in Botswana. See chapter on Botswana.
- 16 Bindura Nickel Corporation. 17 Botswana Roan Selection Trust
- 18 De Beers Botswana (Pvt) Limited. 19 Zimbabwe Alloys Limited.
- 20 Zambia Consolidated Copper Mines
- 21 African Associated Mines (Pvt) Limited which owns Shabanie and Mashaba Mines (Pvt) Ltd. in Zimbabwe.
- 22 Zimbabwe Mining and Smelting Company (Pvt) Limited.
- 23 Cabinda Gulf Oil Company. 24 In 1984 it was 46%, see Jourdan 1987b, page 17.
- 25 Examples would be the 45% public ownership of MCM in Zimbabwe which exerts no control and the 25% ownership by AAC of Botswana RST with considerable control.
- 26 See Stoneman 1986 on "Transfer pricing" in Seidman et al 1986.
- 27 Such as the MMCZ in Zimbabwe and Memaco in Zambia. However, a confidential study of one of these corporations estimated that over 10% of potential revenue was lost through either incompetence or corruption.
- 28 One, partially successful, method is to grant the allocation to independent mining suppliers rather than the mining company, but most of the suppliers are agents of the mining machinery TNCs who are also trying to externalise their profits, and if the allocation is given to the supplier the mining company cannot shop around for the best deal.
- 29 A novel method used by one TNC was to use funds that could not be expatriated to finance luxury safaris for personnel from the mother company.
- 30 Mhangura Copper Mines, owned by the parastatal ZMDC (Zimbabwe Mining Development Corporation).
- 31 Official, published profit figures are used as it would be almost impossible to calculate the unofficial return for TNCs through transfer pricing and other mechanisms.
- 32 It should be borne in mind that there are widely divergent definitions of "capital employed" in the region, not only between countries but within the same country between different companies. In one case, Cluff Minerals, the return went up substantially when it was discovered that they had included the value of proven reserves in their assets.

33 The selection is based on data availability only and excludes Namibia and the following medium scale mining companies: Williamson (diamonds, Tanzania), Maamba (coal, Zambia), Morupule (coal, Botswana), Emaswati (coal, Swaziland) and Havelock (Asbestos,

Swaziland), but the total value of mineral output of these companies was less than 30 MUSD in 1988, or less than 1% of the total sales of SADCC mining companies, excluding oil. The only large scale company excluded is Endiama (diamonds, Angola) which had sales of 180 MUSD in 1988. Numerous small companies are excluded, but their total value of production would be insignificant, except for the small gold mining concerns in Zimbabwe which produce about 40 MUSD annually.

34 For example, Kamativi Tin Mines and Mhangura and Lomagundi copper mines in Zimbabwe. See country chapter for details. 35 Dilolwa 1978.

36 New mining projects almost always get "venture capital" status.

37 World Bank 1989b, page 124.

38 BGS 1986 and 1989. From 1980-88 Australia increased from 17 to 157 tonnes (9.2x), Canada from 51 to 128 tonnes (2.5x) and the USA from 30 to 201 tonnes (6.7x).

39 Meiring 1990. 40 through, for example, tax incentives.

41 See "Cross Border Investment Facility: A Proposal for the SADCC Secretariat" (MBCA, 1989), for an excellent exposition of the problems associated with cross border investments in the SADCC.

42 By a Zimbabwean company in Tanzania.

Chapter 5: The SADCC Mining Coordination Unit

In 1981 Zimbabwe presented the SADCC Council of Ministers with a report on “Regional Cooperation in the Mining Industry”¹, which outlined the importance of mining in the regional economies, emphasised the importance of southern African minerals as raw materials for the industrialised countries and also put forward that:

“It is arguable that the SADCC’s relationship with the western world hinges on whether or not - and on what conditions - Europe and North America gains access to the minerals of the region”².

Another fundamental issue raised by the document and also by Kalyala³ is that, given that mineral resources are a wasting asset, attention should be given to their conservation for future resource-based industrialisation, and that this should be done at the regional, SADCC, level⁴. But the main focus of the document was to propose that mining become a new sector for regional coordination and to propose areas of possible regional cooperation such as:

- 1) mineral beneficiation,
- 2) manpower training,
- 3) minerals marketing,
- 4) mining financing and technology.

The responsibility for the coordination of the Mining Sector was delegated to Zambia at the same meeting of the Council of Ministers held in Blantyre, Malawi in November 1981, as it was, and continues to be, the country with the largest mining sector in the region⁵. A year later, at the Council of Ministers Meeting in Luanda in 1982, Zambia presented a “Report on Cooperation in the Utilisation of Mineral Resources for Development”⁶ which proposed the following potential areas of regional cooperation:

- 1) manpower and training,
- 2) mineral exploration,
- 3) metal fabrication and utilisation of local mineral products in manufacturing,
- 4) manufacture of mining machinery and spare parts,
- 5) establishing a chemical industry to produce input materials necessary in the beneficiation of minerals,
- 6) legislation covering taxation, mineral rights and labour utilisation,
- 7) financing mineral projects,
- 8) marketing.

Thereafter it took yet another year for the Zambian SADCC mining sector coordinator to draw up six study projects to be submitted for funding. These were on mining manpower and training, the establishment of mineral-based fabrication and foundry facilities, mining machinery manufacturing facilities, mining chemicals, cooperative marketing/production arrangements and the establishment of a regional geological databank⁷. Finally, in May 1984, the SADCC Council of Ministers meeting in Blantyre approved the mining sector programme covering nine studies and mandated Zambia to negotiate financing for them. The studies were:

- 1) regional skilled manpower survey,
- 2) small-scale mining processing and marketing,
- 3) geological and minerals inventory,
- 4) foundry, fabrication and machining facilities,
- 5) mining machinery manufacture and reconditioning,
- 6) mining chemicals and explosives,
- 7) sharing of mineral processing facilities,
- 8) iron and steel,
- 9) fertiliser minerals.

After that nothing happened until the mining coordinator was changed⁸ and a workshop was organised in January 1985 in Lusaka that for the first time brought together SADCC government mining and geology personnel, supported by the Commonwealth Secretariat's Commonwealth Fund for Technical Cooperation (CFTC), Industrial Development Unit (IDU), who also undertook to carry out studies number 4), 5) and 6) above. The proceedings of the workshop were compiled as a document on "Analysis of Mineral Resources Development and Opportunities in the SADCC Region"⁹ and concluded that:

"The ultimate objective of the (mining sector development) programme is to achieve coordinated investment and production in the SADCC region, through regionwide planning and promotion of both new projects and reactivation of existing capacity in mining, and mining linked activities."¹⁰

This is still the clearest policy statement for the SADCC mining sector¹¹ and, importantly, starts out with the aim of coordinated investment and production. Six years later there still was no evidence of any coordination through the SADCC Mining Coordinating Unit of either mining investment nor mineral production - only a seemingly endless stream of studies financed by the industrialised countries and, generally, carried out by their consulting companies. What went wrong?

The low priority given to the mining sector by the SADCC at its inauguration is explainable given the urgency of rehabilitating the infrastructure, particularly ports and railways. In that, in terms of value, minerals are by far the most important goods exported via the regional ports and railways, it can be argued that the overwhelming emphasis placed on its rehabilitation was primarily for the mining sector and that the success of this was and is the most important mining sector project, even though it did not come under the SADCC definition of this sector. The point being made is that via the reactivation of the regional infrastructure, the mining sector has benefited substantially from the SADCC initiative, probably more so than any other sector. But this success was in fact only recreating the colonial links between the region's minerals and the mineral consuming industries of the First World, which had been severely damaged by the liberation wars of the seventies and South African destabilisation in the eighties. In effect the situation has essentially returned to the mid-sixties, with the only difference being that the Benguela Railway has been replaced by the Tazara Railway for Zambia's minerals.

If the infrastructure recreated the colonial linkages, then it would rest with the SADCC Mining Sector to implement a regional minerals strategy to achieve SADCC's overall objective of the reduction of dependence through collective self-reliance. If so, the initial list of project areas, such as downstream transformation, mining inputs manufacture, minerals legislation and marketing, together with the above quoted commitment to coordinated investment and production, would meet these objectives. However, three of the most important areas specified in both the 1981 Zimbabwean document and the 1982 Zambian document (minerals marketing, mining legislation and mineral resources conservation) had strangely disappeared by the time concrete study projects for funding had been drawn up. This omission has been explained by the generally cautious policies of the SADCC and that these two areas were considered to be too contentious¹² given the widely differing mineral development strategies of the member states at the time, particularly as regards TNC investment and minerals marketing¹³. However, despite this, in 1989 a World Bank drafted and funded project on investment in small and medium scale mining was approved by the SADCC Council of Mining Ministers. Why a World Bank initiative was accepted rather than a regional one (in 1984) could merely be due to the fact that by 1989 almost all the countries in the region had changed their mining and investment laws and were trying to attract TNC investment, or, more surprisingly, a World Bank initiative was thought to be more credible than a regional one.

The reasons why coordination of the mining sector took so long to get underway and why so little has been achieved are twofold: Firstly, as pointed out in the chapter on the SADCC, the step-wise project approach of the SADCC without trade integration is extremely difficult to implement for productive projects beyond infrastructure and regional services¹⁴. In this regard it is not only mining that has failed, there are no SADCC production facilities in any sectors. But this still does not explain why the mining sector has achieved so little in the regional coordination of non-productive mining aspects such as regional research and training strategies or facilities and the rationalisation of mineral processing facilities. This brings us to the second reason, the weakness of the Mining Unit in Lusaka, which can be attributed to two concrete factors: The first is that, unlike Transport and Communications (Mozambique) or Energy (Angola), Zambia has not created a full time post for the mining sector coordinator: instead, the already overworked Chief Government Mining Engineer doubles up as the regional coordinator and does not have the time to execute this, secondary, function¹⁵ effectively. The second factor is that, in common with several other SADCC states, the massive devaluation of the local currency has provoked a high rate of inflation and government salaries have not been increased at the same rate. This has resulted in Zambian government functionaries receiving extremely low and uncompetitive salaries which in turn makes it difficult to attract qualified and experienced local personnel to the Mining Coordination Unit. This has in turn resulted in the coordination of the mining unit principally being carried out by seconded foreign personnel on competitive offshore salaries¹⁶.

The main functions of the Coordinating Unit include preparation of mining sector strategy, initiating, stimulating and identifying projects in close liaison with member states. The Unit is also responsible for mobilising technical, managerial and financial resources for project implementation. What actually happens is that member states, outside agencies (such as the World Bank and the EEC) and the Coordinating Unit propose projects that are then assessed for their regional character (in terms of the 1980 SADCC objectives) and then accepted or rejected at the Annual Council of Mining Ministers Meeting and then it is theoretically up to the Unit to seek funding for the project. In this way many essentially national projects find their way onto the SADCC mining shopping list for funding as they may theoretically¹⁷ reduce regional dependence on a mineral or mining input import and generally have more chance of attracting funding if they have a "regional" flavour¹⁸.

The SADCC Mining Programme consists of 54 projects at an estimated cost of 70 MUSD of which 35 MUSD (50%), mainly foreign, has been secured. Several regional studies have been completed on the local (regional) manufacture of mining machinery and spare parts, the local production of mining chemicals and explosives, a study on regional iron and steel production (jointly with the SADCC Industry Sector), a regional mining manpower survey, a study on small scale mining, a study on mining data management¹⁹, a report on fertilizer minerals, study on industrial minerals development, a market study for semi-finished copper products, a market survey of possible products from Sua Pan brines in Botswana, a feasibility study on the establishment of a refractory industry, a hydrogeological investigation of the SADCC region, a prefeasibility study on the establishment of an alumina/aluminium industry, a study on the processing of lime in the sub-region and a study on regional coal exploitation. In addition, a regional study on methods of promoting investment in small and medium scale mining will be carried out in 1990. Since 1987, the SADCC Mining Unit has been claiming that they are moving from the study stage to the investment implementation stage, but the studies continue and the first regional productive facility is still awaited.

The completed studies have resulted in a series of specific projects which were approved by the SADCC Meetings of Mining Ministers in 1987, 1988, 1989 and 1990, and the SADCC Mining Coordinating Unit is currently seeking funding for them (several have already secured funding). These can be grouped in the following broad categories:

a) Development of Industrial and Fertiliser Minerals: The Luzinada bentonite deposit (Mozambique), the Kindonocaxa phosphate deposit (Angola), the Sianyolo fluorspar deposit (Zambia), the Pugu kaolin deposit (Tanzania), vermiculite in Zimbabwe and Malawi, ceramic raw materials in Swaziland, the heavy mineral beach sands deposits of Malawi, Mozambique and Tanzania and an assessment of regional ornamental stone and gypsum deposits. These are all national projects which may or may not benefit another member, depending on whether they choose to import the product once available.

b) The Development of Strategic Regional Mineral Resources: Exploration for further lead/zinc reserves in Zambia to prolong the life of the Kabwe mine²⁰, exploration for bauxite reserves along the Zimbabwe-Mozambique border for the establishment of the region's first aluminium plant, increased output of tin from Kamativi (Zimbabwe)²¹, exploration of the Munali (Zambia) and Kabanga (Tanzania) nickel deposits²², the reassessment of the Angolan and Swazi iron ore resources (both used to be major producers) and the development of the coal resources of the Moatize basin²³ (Mozambique), the Livingstonia basin (Malawi), and the rehabilitation of the, already operating, Maamba Colliery. These are, once again, national projects that are deemed to be strategic to the region, but the regional dimension of the iron ore projects in Angola and Swaziland is difficult to fathom, as are the Malawian and Zambian coal projects and the Tanzanian nickel exploration project.

c) Development of Small Scale Mining: This includes projects on the small scale development of minerals such as coal, lime, gemstones and other selected minerals. Here again the regional dimension is non-existent or marginal except that a region-wide strategy is being developed and techniques and methods of small scale mining are being disseminated to member countries. An expatriate advisor on small scale mining took up post in 1989, to develop this sector in the region.

d) Strengthening of Mining Manpower Training: Included here are projects for the strengthening of university and technical college training, and in-company training at institutions in the region. This an area of critical importance to to regional development of the mining sector, but although the study was done in 1986 the recommendations have not been implemented except that an expatriate funded by the EEC will take up the post of SADCC Mining Sector Human Resources Development Officer in 1990. At an informal level, not through the Mining Unit, there have been several instances of mining personnel gaining on the job training on the mines, plants and research institutes of neighbouring states²⁴.

e) Reinforcing Mineral and Mining Knowledge in the Region: These projects include the setting up of national geological/mining databases and a regional one at the Unit in Lusaka, a regional geophysical and geochemical map compilation facility in Maputo, the implementation of a regional seismological network, a study of the regional Alkaline Complexes, a regional diamond exploration project and, an already operating, geochronology facility²⁵. This group of projects seeks to promote one of the few areas of regional cooperation that, like infrastructure, does not require trade integration, that of research and service facilities for the minerals sector. In 1985, on EEC prompting, a project was formulated for a regional facility to receive SPOT²⁶ images to aid geological mapping, but the project was quietly dropped when it became clear that the French government was installing the facility in South Africa. These images can also be used for military purposes and could aid South Africa in destabilising the region, but there has been no outcry or even comment from the SADCC Mining Unit. A similar facility, by McDonald Dettwiler, is now under consideration with possible Canadian aid.

f) Development of Import Substitution Industries for Mining Inputs: This includes the setting up of a regional mining inputs databank and the local manufacture of inputs such as refractory bricks, diamond

tools and rockdrills, wear resistant liners and rail track and fittings, electrodes, activated carbon and metallurgical coke. In this regard two expatriate technicians took up post in 1990 at the SADCC Mining Unit, one to establish a region-wide databank on mining equipment and spares manufacture and consumption and the other to look at mining equipment manufacture in the region.

g) Optimizing the Utilization of Existing Facilities: This could be done, for instance, by the sharing of mineral processing facilities, training institutes and marketing bodies. A study on the regional potential for the sharing of mineral beneficiation facilities was on the original shopping list of 1984, but got no takers. Instead an expatriate mining engineer was seconded to the Mining Unit in 1990 to carry out this project. A joint project with the ESAMRDC²⁷ on map compilation, under e) above, will augment an existing Mozambican state oil company facility. As opposed to the other areas of regional cooperation in mining that require the utilisation of the regional market for mining inputs or mineral-based products, this is one area that the SADCC step-wise non-trade approach could have worked for the creation of regional centres based on existing facilities for research and training and for mineral processing, but almost nothing has been achieved, in contrast to the Agricultural Sector which has several research facilities. In fact several regional initiatives have already taken place in this regard by mining companies, outside the ambit of the Coordinating Unit, the most notable being the project whereby about 13 kt of copper/nickel matte from the Selebi-Phikwe smelter in Botswana is being toll-refined by two companies in Zimbabwe (BNC and RTZ) thereby keeping more of the value-added in the region. Copper concentrates from the Mundonguara mine in Mozambique have been refined in Zimbabwe, at Alaska (MCM) and E.C. Meikle, a small Zimbabwean bauxite mining company, is currently exploiting Mozambican reserves on the other side of the border. But all of these initiatives received no help from the Mining Unit.

h) Regional Minerals Development Financing Facilities: This is essentially the creation of a regional funding facility for high risk venture capital for mineral resource delineation and appraisal currently under negotiation with the United Nations agency UNRFNRE²⁸.

From the above it is clear that the bulk of the SADCC mining programme consists of projects that are thinly disguised national projects that have found their way onto the SADCC shopping list because it was thought, by the national governments concerned, that they would have more chance of attracting funding. There are no production facilities in the SADCC mining sector set up to service the region, though the regional studies came up with several such facilities that would be viable given the regional market. This failure is principally due to the non-trade nature of the SADCC initiative. But, even in areas where most members would benefit without having to purchase a product, such as research facilities, information services, training facilities and financing mechanisms, the SADCC mining sector has made little headway due to the weakness of the coordinating unit; also, in part, presumably due to the low priority given by the Zambian Government to its SADCC sectoral responsibility in that it was not prepared to create a full time coordinator's post and only allocated adequate space (offices) for the Unit until 1990²⁹. However, with the recent strengthening of the Unit with four³⁰ expatriate professionals and one foreign funded SADCC national (minerals economist), progress will most probably be made in the field of regional mining service facilities, but this flies in the face of the SADCC's founding objective, that of the reduction of dependence through collective self-reliance. Collectively the SADCC has equally or more experienced and qualified people than the expatriates being brought in, but to attract high calibre personnel, posts with adequate remuneration must be created and funded. In addition, after their tour of duty, the expatriate professionals leave the region with all the experience and knowledge of the regional minerals sector gained while working at the Unit³¹.

The reason why the Zambian government has given such apparently low priority to its SADCC responsibilities is not clear. In 1987 it was put to the then Minister of Mines that more resources needed to be allocated to the Unit and he wholeheartedly agreed, but was transferred to another ministry before anything was done. This casual attitude by Zambia is even more paradoxical when it is considered that Zambia would be one of the principal beneficiaries of a regionally rationalised mining development strategy, in that it has the largest mining industry, a substantial mining inputs industry (equipment, spares and explosives) and mineral transformation industry (copper, lead, zinc and manganese)³². In conclusion, what has always been admired as a strength of the SADCC, the decentralised structure with country sectoral responsibility, has in the case of mining proved to be a weakness as there is no effective means for the Secretariat in Gaborone to keep tabs on the efficacy of the sectoral coordination units nor is there an adequate mechanism for the member countries to assess the units and to take remedial action.

A discussion of individual actual and potential regional projects is presented after the country studies under "Regional Strategies".

Footnotes to Chapter 5

1 SADCC 1981. 2 SADCC 1981, page 166.

3 Kayala & Mudenda 1988, page 126.

4 An example of why this needs to be done is Zambia where just as the regional economy had reached the level of consuming substantial quantities of lead and zinc, the only resource of the region ran out after supplying Europe with lead and zinc for 85 years, though with the admission of Namibia, the region once again has an operating lead/zinc source, at Rosh Pinah.

5 Under the SADCC delegation of sectoral coordination, oil was included under energy and delegated to Angola. In 1986, all SADCC energy projects dealing with coal were transferred to the mining sector.

6 SADCC 1982, Proceedings of the Council of Ministers Meeting, Annex P, page 127.

7 SADCC 1983, submission to the SADCC Council of Ministers Meeting, Maputo June 1983.

8 As the SADCC Mining Sector Coordinator is in fact the Chief Government Mining Engineer, when the latter is changed the Coordinator is automatically changed.

9 SADCC Mining Sector 1985. 10 SADCC Mining Sector 1985, page 163

11 Other than their constant reiteration that "The objective of SADCC regional cooperation for the Mining Sector derives from the principles and policies set out in the 1980 Lusaka Declaration and amplified in the Mineral Resources Development Strategy adopted by the SADCC Council of Ministers ... in Blantyre 1984 ...(and is)... fully consistent with the Lagos Plan of Action of 1980 ...(for)... minerals development: a) Establishment of sovereignty over natural resources, b) Development of mineral based industries, c) Development of indigenous skilled manpower capacity. SADCC Mining Sector "Five Year Strategy 1986-1990" 1985, page 4.

12 See Jourdan 1984, page 41.

13 See the country chapters below for descriptions of the mineral development policies of individual states.

14 In this regard the performance of the SADCC Industry Sector has been just as lackluster. see Ostergaard 1989a.

15 His primary function is his substantive post, that of Chief Government Mining Engineer.

16 From 1987 to 1989 the Unit had the services of an experienced mining engineer seconded by the government of France, who made a noticeable difference to the running and capacity of the Unit. Recently (1989/90) several more foreign technicians have been seconded to the Unit by the Nordic countries and West Germany.

17 Theoretically, because even though the development of a mineral or mineral

product that is imported by the region in any single member country will reduce regional dependence, it is quite possible that other members will continue to import that mineral or mineral product after the regional facility is up and running as the SADCC includes no form of trade integration.

18 In 1990 an aid bureaucrat (SIDA) commented that they preferred to fund regional projects because it made them feel that their money went further.

19 This study was done by the author after the study done by the original consultants, Bonifica Spa of Italy, was rejected. The study was completely redone for 4% of the original budget.

20 This project was approved when Kabwe was still the only zinc/lead producer in the region. Since then the entry of Namibia with the Rosh Pinah mine has reduced the strategic aspect of Kabwe.

21 This project could take on a regional aspect if it proves to be feasible to smelt tin concentrate from the Choma Tin Belt in Zambia at Kamativi.

22 The Munali project could take on a regional aspect if it is feasible to rail concentrate to the Bindura smelter (BNC, AAC) in Zimbabwe, which is short of feed and has considered the Munali deposit.

23 Coke from Moatize coal would be suitable to replace Zimbabwean imports from South Africa.

24 For example, the Institute of Mining Research in Zimbabwe has trained personnel from Malawi and Tanzania in coal chemistry and in 1985 and 1990 it ran the regional 10 week course on Mining Geology, funded by UNESCO.

25 This facility was set up at the University of Zimbabwe before the SADCC Mining Unit got underway and it was incorporated as a SADCC project to get EEC funding for researchers from the region to use the facility to date their rocks. It is the only geochronology facility in sub-Saharan Africa outside South Africa.

26 European Space Agency.

27 East and Southern African Mineral Resources Development Centre, in Dodoma and Dar es Salaam, Tanzania.

28 United Nations Revolving Fund for Natural Resources Exploration.

29 Another contributing factor to the weakness of the Unit is the Zambian government "musical chairs" whereby the Minister of Mines has been changed almost yearly and, more importantly, the Permanent Secretary has changed almost as frequently.

30 1 Frenchman, 1 Finn, 1 Swede, 1 German and 1 Nordic funded SADCC national.

31 From 1987 to 1989 a French mining engineer had a marked impact on the performance of the Unit. He is now one of the most knowledgeable people in the world on the SADCC minerals sector, and is living in France!

32 For further details see the country chapter on Zambia and the chapter on potential regional strategies.

Chapter 6: The South African Dimension

General

In addition to the problems associated with the Global Crisis, the SADCC has also experienced a sustained undeclared war of destabilisation from the Apartheid Regime of the Republic of South Africa (RSA), particularly during the two terms of Ronald Reagan's presidency of the USA. Bandit groups have been sponsored by both the USA and the RSA to destabilise the region. This has caused the virtual collapse of the Mozambican economy, partial collapse of the Angolan economy, and severe strain on the interior states of the region¹. A Unicef report² estimated that in the nine years from 1980 to 1988, South African destabilisation cost 1.3 million lives³, more than sixty billion US dollars in damage and destruction⁴ and the displacement of almost four million people including 1.5 million refugees⁵.

“Combined with the general difficulties facing the third world (South African destabilisation) means that the citizens of the SADCC states are losing ground; on average they are poorer and less healthy than they were in 1980. Destabilisation has cost over 1 mn lives since 1980. It has also frightened away many investors”⁶.

In 1979 the stature of the progressive members was at a peak, with Angola, Mozambique and Tanzania professing some form of socialist ideology. These states also contained all of the SADCC's coastline and hence ports, putting them in an apparently influential position vis a vis the states of the interior. By 1986 Mozambique and Angola were fighting for their lives and Tanzania was in dire economic straits. The balance in the SADCC had tipped to the more prosperous market economy interior states.

Due to the closure of the Beira and Maputo lines in 1976 during the Zimbabwean liberation war and the closure of the Benguela line during the second war of liberation in Angola, the states of the interior became even more dependent on the RSA for their external trade. Between 1976 and 1980 the only non-South African rail route to the coast was the long haul up the Tazara line to Dar es Salaam in Tanzania⁷. With the independence of Zimbabwe the routes to both Beira and Maputo reopened. South Africa almost immediately embarked on a strategy of attempting to ensure the continued closure of the Angolan and Mozambican routes in order to maintain its control over the external trade of the landlocked SADCC states. They did this both by direct sabotage by the South African Defence Force (SADF) and indirectly via surrogate rebels (MNR⁸ and UNITA⁹) whom they trained, supplied and ran. This rapid increase in aggression by the RSA against its neighbours also coincided with the election of Reagan in the USA and the subsequent policy of collaboration with the South African regime in “rolling back communism” via “constructive engagement” with that regime.

The withdrawal in 1988 of the South African army at Cuito Cuanavale in Angola due to advances by the combined Angolan and Cuban forces¹⁰ led to the ceasefire and the agreement by South Africa to withdraw from Namibia and to grant it independence (in 1990). It was also most probably the principal factor in the fall of prime minister Botha and the “securocrats”, the “mini-coup” by F.W. de Klerk and the “verligte”¹¹ faction of the ruling Nationalist Party and the new South African pragmatism or “pretoriastroika” resulting in the unbanning of the nationalist movements and the first genuine moves towards a democratic South Africa. It has also led to a cessation of official South African government support to UNITA and the MNR, though the latter appears to still be receiving unofficial support from the SADF and South African civilians¹², and UNITA is still strongly supported by the USA from bases in Zaire¹³.

In addition to transport, the region is also economically dependent on South Africa for trade, though this varies from state to state, from virtually nothing for Tanzania and Angola to over 90% of trade for Lesotho¹⁴. As a region, the SADCC relies on the South African market for only about 6% of their total exports, mainly because, like them, South Africa is also an exporter of primary commodities (mainly minerals). Very few minerals are exported to South Africa as it produces most of the SADCC minerals. Exceptions are magnesite (for refractories) from Zimbabwe and zinc from Zambia (and zinc concentrate and tin from Namibia). Most of the SADCC exports are destined for the developed countries and the NICs¹⁵. From 1980 to 1986 this export dependence on South Africa dropped marginally, by 11% with the highest proportion coming from Lesotho and Swaziland (both members of the SACU).

6.1 SADCC EXPORTS, TO RSA

(MUSD)	1980	1980	%	1986	1986	%
	Exports	RSA	RSA	Exports	RSA	RSA
Angola	1883	0	0%	1300	0	0%
Botswana	527	35	7%	870	49	6%
Lesotho	60	25	41%	22	19 ^e	86%
Malawi	281	9	3%	248	18	7%
Mozambique	281	31 ^e	11%	79	4	5%
Swaziland	371	107	29%	269	90 ^e	33%
Tanzania	574	0	0%	290	0	0%
Zambia	1298	7	1%	779	8 ^e	1%
Zimbabwe	1442	246 ^e	17%	1298	126	10%
SADCC:	6717	460	6.8%	5155	313	6.1%
% Change 1980-1986:						-11%
^e estimate	Source: IMR SADCC Databank 1990					

Dependence on South Africa for imports is five times higher than for exports, at roughly 30%, with the highest being for the three SACU states. The bulk of imports from South Africa are manufactured goods, with some capital goods, particularly mining machinery (to Botswana, Zambia and Zimbabwe). From 1980 to 1986 overall dependence for imports actually increased slightly, by 6%, but this was mainly due to an overall drop in exports caused by a fall in the value of Angolan oil exports in 1986. Thus, in terms of one of SADCC's founding strategies, the reduction of dependence on South Africa, not much progress has been made in the field of trade. One of the principal reasons is that, due to its transport advantage, South African goods are often much cheaper than goods from the West, and due to its larger economies of scale and the ability to provide credit, South African goods are often purchased in preference to a regional supplier (as with steel which could be sourced from Zimbabwe).

6.2 SADCC IMPORTS, FROM RSA

(MUSD)	1980 Exports	1980 RSA	% RSA	1986 Exports	1986 RSA	% RSA
Angola	1328	0	0%	524	0	0%
Botswana	725	630	87%	718	550	77%
Lesotho	430	417 ^e	97%	343	333 ^e	97%
Malawi	441	162	37%	257	75	29%
Mozambique	799	88	11%	542	56	10%
Swaziland	525	467	89%	304	274 ^e	90%
Tanzania	1245	0	0%	792	0	0%
Zambia	1112	173	16%	1067	198 ^e	19%
Zimbabwe	1284	354 ^e	28%	981	210	21%
SADCC:	7889	2291	29%	5528	1695	31%
% Change 1980-1986:				+6%		

^eestimate Source: IMR SADCC Databank 1990

The Effects of Destabilisation on Mining

The exported SADCC minerals that are produced mainly in the interior and have a unit value too low to be airfreighted, making them vulnerable to export route disruptions, are copper (500 to 600 kt/an), nickel (about 30 kt/an), ferrochrome (about 220 kt/an), steel (about 600 kt/an) and asbestos (200 kt/an). Coal is mainly consumed in the countries of production and in the region¹⁶, and about half of steel output is consumed in the region, which means that every year the interior states of the SADCC need to get roughly 1.3 million tonnes of various minerals to the coast to earn the foreign exchange vital to their economies. The main countries affected in this way are Zambia, Zimbabwe and Botswana.

The effects of destabilization on the minerals industries of the SADCC by the RSA and its surrogates can be considered at various levels:

1. The first and obvious loss is in the case of direct destruction of mining plant and equipment as has been done in Angola and Mozambique.
2. The second knock-on effect is in terms of the loss of mineral production in terms of forfeited foreign exchange earnings. This is quantifiable, but the resultant effect of the lost forex on import dependent sectors of the economy would be difficult to determine.
3. Thirdly, related to the second effect, is that the cessation of mining will cause losses and possible closures to the downstream domestic industries using mineral inputs. These losses are difficult to determine.
4. The fourth and widespread effect is that the destruction of transport routes forces minerals to be exported via more distant and more costly, generally South African, routes. The higher transport costs can be quantified, but the effect of the higher unit cost of the mineral at end market on the profitability and output of the mining operation would be difficult to accurately determine.
5. The last and most elusive effect is that of "lost opportunity". The regional instability brought about by South African destabilization results in otherwise viable mining prospects remaining unexploited. The poor security situation also causes a decline in foreign investment in the mining and other sectors

of the region. The effects of this lost capital inflow on the mining industry and on the economy in general would be virtually impossible to quantify.

There are also a myriad of smaller effects such as the loss of markets to domestic mining inputs manufacturers, the higher costs of imported inputs to the minerals industry, the loss of experienced mining personnel murdered in raids, etc... , all which would be extremely difficult to quantify given the lack of accurate data in the region. Most probably the greatest effect on the SADCC of destabilization, but which doesn't directly relate to the minerals sector, is the enormous amount of resources that the states under attack have had to divert from economic reconstruction to defence. The total figure for this wastage must run into tens of billions of US dollars, but the total losses including the diversion of scarce managerial and administrative cadres to defence, particularly in Angola and Mozambique, are unquantifiable.

The state that has suffered the most from destabilization is certainly Angola where South African aggression started with a full-scale invasion in 1975. The direct damage to the economy during this invasion and the scorched earth policy of the SADF during their retreat in early 1976 was estimated at 6.7 GUS\$ at that time¹⁷. Since then South Africa has been in and out of southern Angola constantly, in order to protect their surrogate rebel movement UNITA from Angolan offensives, in order to curb SWAPO¹⁸ and in order to keep Angolan resources tied down by the war, and further damage to 1987 has been estimated at over five billion US dollars¹⁹. Angola diverts about 40% of the national budget to defence against South African destabilization²⁰.

Second on the RSA's target list in terms of the intensity of aggression has been the People's Republic of Mozambique (PRM). From independence in 1975 to 1980 the destabilization of Mozambique was left up to the then Rhodesian regime of Ian Smith, who were receiving substantial military aid from the South Africans and South African aircraft were used in invasions/attacks on Mozambique. The cost of supporting the Zimbabwean struggle was estimated at 556 MUS\$ in 1986²¹. With the independence of Zimbabwe in 1980 the South Africans took over the show including the running of the rebel MNR "movement" which had been the creation of the Rhodesian security forces²². In 1984 the PRM was forced into the, now infamous, Nkomati Accord with the South Africans in which they undertook to neutralise the South African nationalist movement, the ANC, on their territory and the RSA would cease to run the MNR. But, up until 1989, the South Africans have continued to train and supply the MNR even though the PRM has kept to its side of the accord.

As with Angola, South African destabilization of Mozambique takes the form of direct action by SADF sabotage squads as well as via banditry by a surrogate movement (the MNR), but thus far the RSA has not resorted to full-scale invasions. Due to the pre-1975 integration of the Mozambican economy into the South African economy, it has also been subjected to economic sabotage by South Africa through the reduction of the trade through Mozambique and the reduction of the number of Mozambican migrant miners working on the South African mines.

The mineral producing states of the interior, Zambia, Zimbabwe, Swaziland and Botswana, have not suffered direct attacks on mines as have the coastal states of Angola and Mozambique, but due to the destruction of the transport routes by the RSA and/or surrogates, their exports are forced to leave via more distant South African ports (Richards Bay, Durban and Port Elizabeth). However, since 1986 the success of the Beira Corridor project has meant that the port of Beira has increasingly been used for Zimbabwe and Zambia's exports²³, though the Limpopo Corridor (to the port of Maputo via Chiqualaquala) is still under renovation.

Most of Botswana's mineral production is high value diamonds which are air-freighted, while the copper/nickel matte is exported to Zimbabwe to be toll-refined by Rio Tinto Zimbabwe and Bindura Nickel Corporation. Therefore Botswana's minerals industry has not been affected overtly by RSA destabilisation except that the extra expense in getting the toll-refined copper and nickel to more distant South African ports will be reflected in the price they receive for the matte from the Swiss purchasers (Centametal).

Swaziland's asbestos from Havelock mine has always been exported via the RSA so it cannot be said that Swaziland has suffered a RSA transport premium in this regard. However it could be argued that they have suffered an opportunity loss as the development of their coal resources is dependent on the reliable operation of the line to Maputo and the Matola bulk cargo terminal, neither of which are secure due to the security situation. In general the Swazi regime appears to be willing to collaborate with the RSA²⁴, and accordingly have not been directly destabilised.

Before the application of sanctions against the Rhodesian settler regime by Mozambique in 1976, the majority of Zimbabwe's exports were routed via the closest ports of Beira and Maputo. After the independence of Zimbabwe in 1980 an attempt was made to reopen these routes, but due to South African/MNR sabotage and attacks, by 1986 the Maputo (Chiqualaquala) line was completely out of action while the Beira line was operating at only one train per day. The tonnage handled by Beira port has increased threefold since 1986, from 0.5 Mt to 1.5 Mt, excluding petroleum products (1 Mt/an)²⁵. In 1988/9²⁶ 76% of Zimbabwean external rail trade was with South Africa (32%) or was via South Africa (44%), while 24% was via the Mozambican ports of Beira (15%) and Maputo (9%), either via Chiqualaquala (2%) or South Africa (7%)²⁷. In addition, 750 kt of goods were moved in transit to or from Zambia, Zaire, Malawi and Botswana²⁸.

A SADCC study at the end of 1985 estimated a total saving (all exports) for Zimbabwe of 187 MUS\$/an through the use of Mozambican instead of South African ports. Paradoxically the saving for Malawi would be even greater at 266 MUS\$, yet that country continued to do the RSA's bidding by supporting MNR banditry²⁹. The effect of the higher transport cost on the profitability and hence output of the Zimbabwean mining companies would be impossible to estimate; suffice it to note that, during the eighties, most of the non-gold companies were operating at low profit margins if not making losses. The effect of South African destabilization on the inflow of foreign capital into the mining industry can again not be calculated as it would be impossible to determine whether the lack of investment was due to the perceived regional security situation or to the general slowdown in mining investment world-wide since 1980.

As a mining economy situated in the centre of the region, Zambia has probably suffered the most from transport route disruptions. Pre-1975 Zambia's main routes were to Lobito (Benguela line), the Mozambican ports and the South African ports, but the latter two routes went through the then Rhodesia. Due to border closures by the Rhodesian regime, Zambia was at times forced to export its copper by air and more commonly, by road (to Dar es Salaam). In the late sixties, due to the instability of the southern route and increasing guerrilla activity on the Benguela line in Portuguese Angola, Zambia and Tanzania decided to construct a line from the Copperbelt to Dar es Salaam (the Tazara line) which was completed by The Peoples Republic of China in 1975.

Zambia exports between 450 and 550 kt of copper yearly, almost all to overseas markets. Smaller amounts of lead, zinc and cobalt are also exported (about 40 kt/an). Most of their mineral exports are sent via Dar es Salaam, but Zambia's cheapest route is via Lobito which has been out of action since the

South African invasion of Angola in 1975, due to sabotage by the SADF/UNITA. As Lobito has not been used for fifteen years there are no current rates for it but it is estimated that they would be about 50% of those for Dar es Salaam³⁰. Due to the depressed world market price for copper, the Zambian mining industry has been operating with little or no profit margin. The absence of this transport premium therefore may well have made a significant difference to its profitability resulting in an expansion of production, rather than a reduction as has been the case.

In conclusion, in terms of direct destruction of mining installations, this form of destabilization has only been experienced by Angola and Mozambique. Published figures for the value of this destruction are not available, but a rough estimate would be between 100 and 200 MUS\$. Forfeited mineral production for Mozambique and Angola due to output reductions would total about 6 billion US dollars³¹, a staggering amount when considered against the poverty of these two states. The extra transport costs resulting from the sabotage of the most economical export routes for Zimbabwe and Zambia are roughly 33 MUS\$/an or a total of 400 MUS\$³². In general, with the exception of precious minerals, the mining industries of the SADCC have been stagnating or declining since the start of the world recession, the added cost of South African aggression could therefore not have come at a worse time.

The SACU and the RMA (CMA)

The first customs union arrangement between Botswana (Bechuanaland), Lesotho (Basutoland), Swaziland (BLS countries) and South Africa dates from 1903³³ which was formalised in an agreement with the formation of the Union of South Africa in 1910 under which there was a free flow of goods within the common customs area and the participants received a fixed percentage of customs revenue of goods imported into the area as a whole (1.31% for the BLS countries). In 1969, following the independence of the BLS countries, the new Southern African Customs Union (SACU) agreement was negotiated in which South Africa is the custodian of the "common revenue pool" and revenue is shared by the following formula³⁴:

$$\text{Revenue (B, L or S)} = \frac{(i + v)}{(I + V)} * \text{CRP} * 1.42$$

Where i = imports (cif) into B, L or S,
 I = imports (cif) into SACU,
 v = value of dutiable goods in B, L or S,
 V = value of dutiable goods in SACU
 CRP = total SACU customs duties, import surcharges, excise duties and sales tax³⁵ (common revenue pool).

In that most of the common revenue pool comes from sales and excise duty (about 80%) the SACU is in this sense more of a "duties union" than a customs union. In 1976 the formula was amended to include a stabilisation factor to keep revenue at about 20% of the value of their $(i + v)$, by stipulating that their revenue should be greater than 17% and less than 23% of $(i + v)$. In the early eighties an amendment to change the stabilization factor limits to 19 and 25%, and to reduce the time lag in revenue payments, was turned down by the South African government³⁶, due, it has been suggested³⁷, to the BLS lack of recognition of South Africa's "independent" homelands.

The 42% (1.42) revenue bias in favour of the BLS countries is apparently there to compensate for several disadvantages of participating in the SACU³⁸. These are: the loss of fiscal control in setting their own customs rates, import surcharges and excise duties (this is done by South Africa), although the setting of GST³⁹ is up to the individual members; the inflationary effect of having to buy more expensive,

protected, South African products rather than shopping on the world market; the polarization effect (bambazonke effect) of industry being drawn to the more industrialised partner; the problems associated with the protection of infant industries from South African competition, although there is an eight-year new industry protection clause in the SACU agreement; the time lag in revenue payments which, with high inflation in South Africa, can substantially reduce the 1.42 factor; the bias towards inappropriate South African, high-income, consumer patterns, though the SACU allows members to set their own sales taxes, on for instance luxury goods; and, the political stigma of being part of an association with apartheid South Africa.

Namibia is not yet a signatory to the SACU agreement though it is in the Common Monetary Area (rand zone) and South Africa makes annual payments to the Namibian Central Revenue Fund in lieu of customs receipts (about 400 MRand in 1989, 27% of national revenue), but not according to the 1.42 SACU formula. It is expected that Namibia will formally join the SACU, as it has advantages over the current, ad hoc, arrangement.

Several studies have been carried out on the economic (rather than political) advantages/disadvantages of being in the SACU, and on average, they have not come up with a clear answer either way, except for the very real problem of the revenue payment lag which is in effect an interest free loan to South Africa. The main contentious area is the polarization effect, as being part of the larger market should also allow the BLS countries to set up industries to penetrate the large SACU market. Joe Hanlon has pointed to several spectacular cases where South Africa destroyed BLS initiatives⁴⁰ such as a car plant in Lesotho and a fertiliser/explosives plant in Swaziland, both for the South African market, but which would have been based on avoiding South African restrictions, a local content stipulation in the former and import duties in the latter⁴¹. However, Gavin Maasdorp has pointed out that in most of these cases the BLS states were using the lack of import barriers to threaten an existing industry in South Africa rather than the establishment of a new industry for the SACU market or a industry for their, local, market⁴². With regard to mining the SACU has led to substantial exploration in the BLS countries (and Namibia) by South African mining houses who have invested heavily in minerals development, particularly in Botswana. Due to the customs union and common currency area South African mining companies control almost all of the minerals sectors of the BLS and Namibia⁴³.

The major reason, however, why the BLS states have not been able to attract industry is that they cannot match the South African homelands decentralisation incentives⁴⁴. In fact several industries have left BLS countries and relocated in the homelands due to these, extremely generous, incentives. There are, however, some advantages to be had in this regard from the increasing sanctions against South Africa where some industries have relocated in the BLS to avoid criticism, particularly Swaziland⁴⁵ such as the Coca Cola syrup plant, which is now their major forex earner, but in terms of mining, most of the plans, such as the ferrochrome plant in Swaziland, have come to nothing.

A significant problem with the SACU is that it includes no mechanism for distributing industry among the member countries and...

“...the South African government’s homelands policy has dealt a death blow to whatever possibility there might have been of including a special article in the Agreement for the location of industry.”⁴⁶

Recently, with the independence of Namibia and the new government's decision to remain within the Common Monetary Area (CMA)⁴⁷, and the rapidly changing events in South Africa itself, particularly the partial collapse of the homelands policy, the unbanning of political movements and the talks between the ANC⁴⁸ and the Nationalist government under F. W. de Klerk; the possibility of a successful renegotiation of the Agreement to include a mechanism for a more equitable rationalisation of industry and to include the provisions requested in the early eighties (the correction of the revenue payment time lag and the increase of the stabilising factor), appears to be likely. In fact the time has come for serious consideration to be given to a post apartheid extension of the SACU to other countries in the region. This will be discussed at the end of this study.

The BLS states and Namibia used to all be members of the Rand Monetary Area (RMA) but in 1976 Botswana, with increasing forex earnings from diamonds and copper-nickel matte, withdrew and launched its own currency, the Pula. Both Swaziland and Lesotho have also established their own currencies, the Lilangeni (emalangeni) and the Loti (maloti) respectively, but these are pegged to the South African Rand. In 1986 the agreement was renegotiated and the name of the RMA was changed to the "Common Monetary Area" (CMA). There are several clear disadvantages of being in the CMA, the most obvious of which loss of control over their currencies and being subject to South African monetary policy, particularly its high and variable interest rates, its foreign exchange rate and the vagaries of the South African inflation rate⁴⁹. But, as pointed out by Joseph Hanlon, the BLS economies are so deeply linked to the South African economy through trade that they would have been subjected to these problems anyway⁵⁰ and he concludes that:

"Thus the merits and demerits of rand zone membership for Lesotho and Swaziland seem more finely balanced than those of the SACU membership."⁵¹

As with the SACU, the CMA will have to be reassessed in the light of Namibia's independence⁵² and the recent changes in South Africa itself, which will be taken up at the end of this study.

Footnotes to Chapter 6

1 On South African destabilisation see Hanlon 1986 and 1989, Johnson & Martin 1986 and 1989 and Thompson 1986.

2 Unicef "Children on the Front Line", New York, 1989, cited in Hanlon 1989.

3 1.5 million according to Johnson & Martin 1989, page 11.

4 compared to 15 GUSD in aid to the region over the same period. Hanlon 1989, page 19.

5 Johnson & Martin 1989, page 22. 6 Hanlon 1989, page 1.

7 Twice the cost per tonne as the old Lobito route. Personal communication with Mrs Lombe, shipping manager, Memaco, Zambia, 1986.

8 Mozambique National Resistance, also known as Renamo, Resistencia Nacional de Mocambique.

9 National Union for the Total Independence of Angola, led by "Dr" Jonas Savimbi.

10 This defeat was, in some ways, partly brought about by the arms boycott against South Africa which made it impossible to modernise their airforce so that they lost control of the air to the modern Soviet aircraft used by the Cubans and Angolans.

11 Meaning, literally, enlightened.

12 Mainly Portuguese-speaking whites who came from Mozambique and Angola.

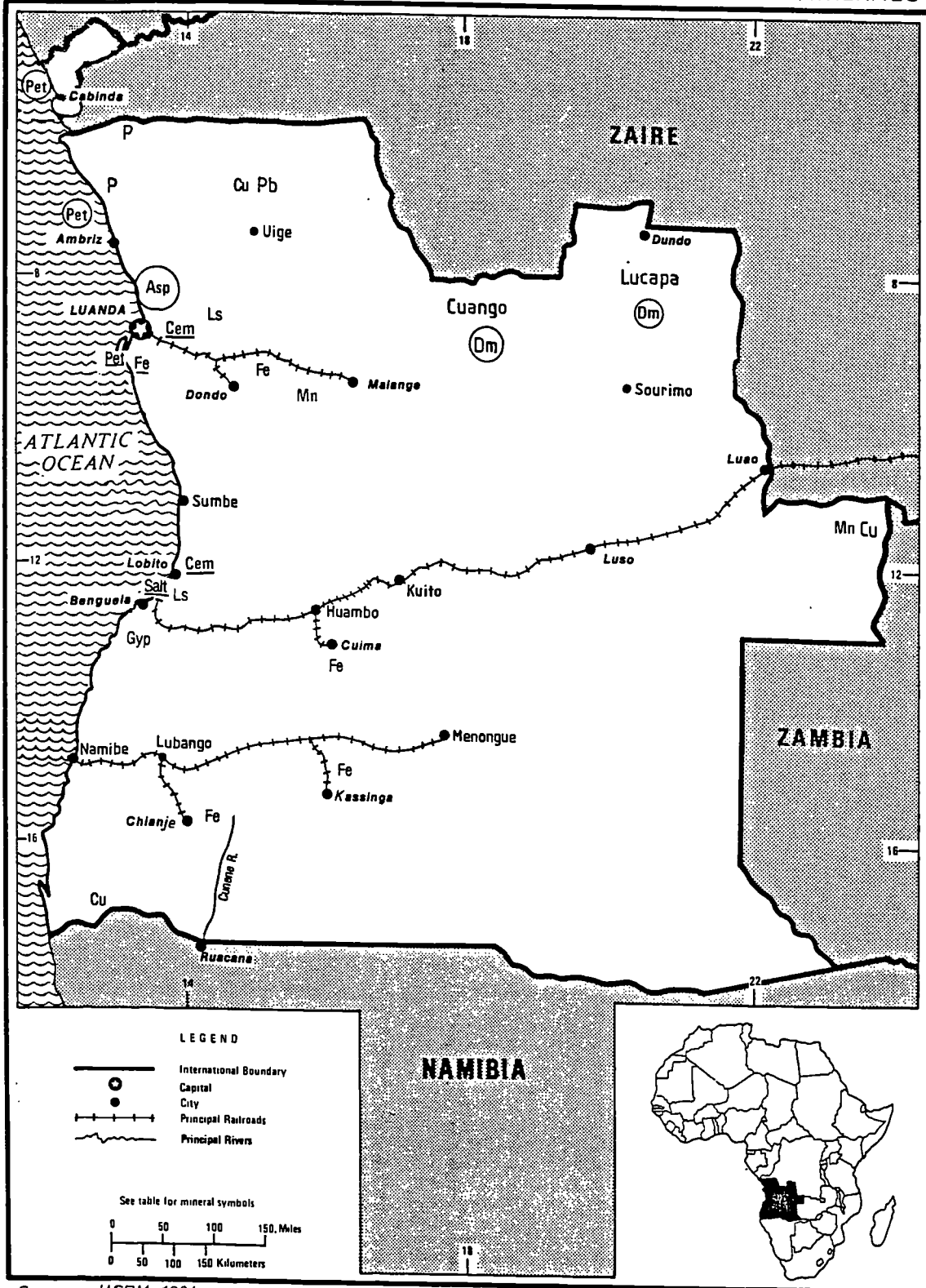
- 13 Zaire has aided the USA in the destabilisation of Angola since 1975 (see section on Angola, below).
- 14 Trade with South Africa over the last decade is presented in the country chapters for each SADCC member state.
- 15 Newly Industrialised Countries.
- 16 Moatize (Mozambique) coal used to be exported at the rate of 500 kt/an to overseas markets before the destruction of the railway connecting it to the port of Beira.
- 17 Bhagavan 1986. 18 The Namibian liberation movement.
- 19 Making a total of 12 GUSD. Johnson & Martin 1989, page 127. 20 Jourdan 1986h.
- 21 Comissao Nacional de Plano 1984. 22 see Jourdan 1986c.
- 23 Only Zimbabwe has been using Beira for -imports-. BCG, personal communication, 1990.
- 24 Swaziland signed a secret Nkomati type security agreement with South Africa in 1983. See Hanlon 1986.
- 25 Beira Corridor Group, personal communication, 1990. 26 July 88 to June 89.
- 27 National Railways of Zimbabwe, Monthly Traffic Movements July 1988 to June 1989.
- 28 For the same period the BCG has estimated that 1.15 Mt of minerals and metals were exported by rail from Zimbabwe, 0.32 Mt were exported and 0.24 Mt of copper was moved in transit.
- 29 SATCC 1986.
- 30 Personal communication with Memaco's Shipping Manager, Mrs Lombe, in 1986.
- 31 Calculated from Jourdan 1986f when it was estimated at 4.5 GUSD
- 32 Calculated from Jourdan 1986f when it was estimated at 252 MUSD.
- 33 Mbilima 1989.
- 34 See Cobbe 1980, Maasdorp 1982, Hanlon 1986, Mbilima 1989.
- 35 Of these excise duties made up the bulk (60%), while customs duties only accounted for 16 to 21% in the 1973-76 period (Cobbe 1980, page 330). Sales duty was later eliminated (Hanlon 1986, page 315).
- 36 Maasdorp 1982, page 104. 37 By Hanlon (1986) page 87.
- 38 See Maasdorp 1982 and Mbilima 1989.
- 39 General Sales Tax, or possibly in the future Value Added Tax (VAT).
- 40 Hanlon 1986, Chapter 9.
- 41 The SACU agreement allows the BLS states to import directly for their own market without the SACU duties/surcharges, so long as the goods do not move on to the SACU market. Raw and intermediate goods can be resold into the SACU market after transformation involving at least 25% local content.
- 42 Maasdorp 1982, page 93. 43 With the exception of Rossing (uranium) in Namibia.
- 44 These are substantial and include 95% of the wage bill for seven years and 80% of rent (for the buildings provided by the state) for ten years, 37% of interest on capital investment for ten years (Hanlon 1986, page 85) and exemption from labour legislation (minimum wages, safety, etc...).
- 45 A study on the southern African region published in 1989 concluded that "...international pressure on South Africa has had a beneficial effect on Swaziland's industrial sector... since 1985 there has been a rapid rate of new investment, much of it seeking to relocate from South Africa." (Maasdorp 1989, page 205/6).
- 46 Maasdorp 1982, pages 94/5. 47 But only for two years.
- 48 The African National Congress, the principal South African liberation movement.
- 49 Mbilima 1989 and Hanlon 1986.
- 50 Although the Botswana Pula is not in the CMA, it has also been rapidly devalued, albeit at a slightly slower rate than the Rand, to its strong trade links with South Africa.
- 51 Hanlon 1986, page 89.
- 52 The new government in Namibia has already announced that it plans to remain in the rand zone for at least two years.
-

ANGOLA

Fig. 5

AREA 1.3 million sq km

MINERALS



Source: USBM 1984

Chapter 7: The Minerals Sector of Angola

Background

Introduction

Portuguese navigators first landed on the shores of present day Angolan territory in the second half of the fifteenth century. Subsequently Luanda grew into a major trading post for goods from the interior, initially ivory, slaves and gold, and later, wild rubber, coffee and diamonds.

At the Berlin Conference of 1885 Portugal formally lost control of the lucrative Zaire estuary to Belgium and their zone of influence on the south-west coast of Africa was restricted to Angola and the Cabinda enclave, but it was not until the beginning of the twentieth century that the subjugation of the interior was completed and effective control over the colony was exerted.

Artisanal mining and smelting of ferrous and non-ferrous metals has been undertaken in Angola for the last two millennia, but it was not until the early part of this century that large scale mining commenced when the financial conglomerate, Societe Generale de Belgique, extended its operations from the then Belgian Congo (Zaire) to the diamond fields of north-eastern Angola, via a sister company, Companhia de Diamantes de Angola (Diamang).

It is not known when Angolans first started using bitumen and viscous crude oil as a fuel, but certainly for several millennia. With the arrival of the Portuguese their commercial exploitation was first considered and in 1767 49 barrels of crude were shipped to Lisbon, but it was not until the 1950's that large scale exploitation commenced¹.

Recent History

In 1956 a nationalist movement, the Peoples Movement for the Liberation of Angola (MPLA²), was formed in Luanda with a view to obtaining independence from Portugal. A second movement, the FNLA³, was formed from an older tribal organisation, the UPA, and from Angolan refugees in Zaire and in 1966 a third movement, UNITA⁴, was formed from a split in the FNLA. All three movements waged guerrilla warfare against the Portuguese colonial armies, with varying effectiveness⁵.

In 1963 the Portuguese opened up the Angolan economy to foreign investment in an attempt to gain support from the Western powers in their struggle against the nationalists. It was this policy that led to the massive expansion of the Kassinga iron ore mines with the injection of international capital (Krupp of the FRG and Hojgaard & Schultz of Denmark). Exports of iron ore rapidly increased from 0.63 Mt in 1966 to 6.3 Mt in 1970 (900%). Crude petroleum production also increased dramatically with the participation of American and European oil companies (Gulf Oil and Fina Petroleum), from 0.54 Mt in 1967 to 8.2 Mt in 1973 (1420%). By 1973 minerals made up almost half of the total exports of the country, double that of a decade earlier.

In 1974 the new Portuguese government resolved to give independence to its colonies, but the three Angolan movements failed to come to an agreement and civil war broke out. The conflict was entered by South Africa with an invasion in the south, launched from its occupied territory, Namibia, and Zairean troops in the north, both of which were countered with the arrival of Cuban troops at the invitation of the MPLA. By April 1976 the MPLA and their Cuban allies had thrown out the Zaireans, South Africans, FNLA and UNITA.

Both UNITA and FNLA resorted to guerrilla warfare against the MPLA government in Luanda and the South Africans continued an undeclared war of destabilisation including regular invasions of the south

of the country and widespread sabotage actions including an attempt on the Gulf Oil installations in Cabinda. In the north Zaire continued to support the FNLA until the Zairean guerrilla movement, the FNLC⁶, operating from Angola and Zambia, in 1978 almost caused the collapse of the US backed Mobuto regime with an invasion of the mineral rich Shaba (ex-Katanga) Province. The total disintegration of Mobuto's forces was only averted by the arrival of French and Belgian paratroopers at Kolwezi. After this Mobuto quickly signed a "friendship" treaty with the Angolan government, but reports of Zaire being used as a rear base by anti-government forces continue, even though Angola has disarmed and controlled the activities of the FNLC in its territory.

In the south both the South Africans and Americans backed UNITA with equipment, training, logistics and, when UNITA bases were threatened, South African forces were sent in to protect them. After the major South African military setback at Cuito Canavale in 1988, in 1989 the MPLA, Cuba and South Africa came to an agreement on the withdrawal of South African troops from Angola and Namibia and Cuban troops from Angola and for the independence of Namibia, which took place in April 1990. With the loss of its rear base in Namibia, UNITA is reported to be now operating from bases in Zaire. Whether or not the Angolan Government will again counter by supporting Zairean dissidents is still unknown. The American government has pledged continued support for UNITA.

The Economy

In 1975 90% of the roughly 360,000 Portuguese settlers fled the country, principally because of the war, depriving the new nation of almost all its skilled technical and managerial personnel. Due to 500 years of racist Portuguese education and employment policies there was only a handful of indigenous professionals on the eve of independence. Added to this was the enormous damage to the economy wrought by the invading South Africans in 1975 and early 1976, estimated at 6.7 GUS\$ at that time⁷.

The Angolan economy in 1973 was a typical Third World economy in the sense that it was vertically integrated into the economies of the developed capitalist economies by supplying ever cheaper raw materials to them and importing relatively more expensive finished goods from them. Local industry was tiny with almost all output destined for the small settler population. Therefore in 1976 the new socialist government was not only faced with the usual Third World problem of inheriting a satellite economy, but even this had been substantially destroyed by the second war of liberation and almost all skills had left the country. Added to this they also had to deal with a continuing undeclared war of destabilization by the RSA and USA and their surrogates (UNITA, FNLA and Zaire). From 1976 to 1981 South African damage to the economy was put at almost 1 GUS\$ and substantial damage has been wrought by them since then.

7.1 ANGOLA: GOVERNMENT EXPENDITURE

	1981	1982	1983	1984	1985	1986	1987	1988
Expenditure (GKz ¹)	91.7	72.0	67.6	82.3	90.5	86.2	87.4	95.5
Sector (%):								
Econ. Development	47.3	36.6	26.5	26.6	26.0	15.9	14.9	17.5
Social Services	15.1	20.8	21.9	21.0	20.8	24.9	26.8	21.0
Defence	16.3	20.8	34.5	35.8	38.0	37.9	41.9	46.0
Administration	2.9	19.0	13.6	11.5	10.7	12.5	12.4	11.8
Other	8.4	2.8	3.5	5.1	4.5	8.8	4.0	3.8
Total:	100	100	100	100	100	100	100	100

¹Kz: Kwanza, national currency (officially 30Kz=1USD)
Sources: Bhagavan 1986, INE, 1981/9.

The immediate concern of the new government was defence which accordingly received the largest part of the budget and a disproportionate share of skilled cadres. Logically the second concern was to finance the war, hence resources were channelled into the oil industry (Sonangol), the largest foreign exchange earner. By 1987 the oil extraction and refining industry accounted for 98% of exports as compared to 30% in 1973 and it constituted 43% of the GDP. As for the rest of the economy, large sections were nationalised in the wake of settler abandonment while other sectors virtually collapsed.

From 1981 to 1988 the allocation for defence almost trebled from 16% to 46% of the state budget, an expense that the battered economy could ill afford. Most of this increase was accounted for by a 73% drop in investment in "economic development" from 47% to 26% over the same period. With the decline of the manufacturing and agricultural sectors the Angolan economy has become increasingly dependent on the minerals sector, particularly the oil industry.

7.2 ANGOLA: BASIC ECONOMIC DATA (current GKz)

Year	GNP	Structure of GDP (%)			Forex Rate Kz/US\$	Foreign Trade		External Debt
		Agri- culture	Manufact & Mining	Oil Prod & Refine		Exports	Imports	
1980	108.51				29.92	56.33	39.72	18.42
1981	117.98				28.48	55.52	49.72	40.86
1982	120 e				30.21	48.74	26.52	
1983	125.34	11.7	7.6	26.3	30.21	54.52	20.51	
1984	139.64	9.6	8.3	29.6	30.00	60.82	21.37	68.37
1985	140.98	8.4	9.2	32.4	30.00	66.97	19.69	74.87
1986	175.23	17.9	6.5	37.7	30.00	39.05	18.59	100 e
1987	195.48	13.6	7.5	43.0	30.00	64.88	13.37	152 e

e = estimate.

Sources: MPA 1986, EIU 1986, INE 1989.

Due to the declining economic situation, in 1987 the Angolan government introduced a new economic regime, SEF (*Saniamento Economico E financeiro*), that allowed for private ownership in virtually all sectors except for banking and defence and allowed for generous conditions for foreign investment. This has not resulted in a rush of private takeovers or an inflow of foreign capital, partly due to the continuing war and partly due to the fact that the government has failed to bring the official exchange rate in line with reality. Investors are unlikely to want to invest in the production of products that then have to be sold at prices fixed in relation to the official Kwanza exchange rate (the parallel market rate is over thirty times the official one).

The Minerals Sector

Overview of the Minerals Sector

The minerals industry of Angola is, in terms of value, the largest in the SADCC, but this is almost entirely due to crude oil output. In 1987 Angola constituted 12% of the total SADCC population and 25% of the area, making it, after Botswana, the second least densely populated. Its GNP was 29% of the total, resulting in a GNP/capita 137% higher than the overall SADCC GDP of 298 USD, while it had 19% of the regional debt (58% of GDP).

In terms of minerals, Angola accounted for 57% of the total value of minerals produced in the region and the minerals industry contributed 45% of the country's GDP, equal to Botswana and more than double the SADCC average of 19%. Mineral exports were 98% of total national exports, 39% above the

regional average of 70% and the highest in the region. Due to its clear leadership in petroleum exploitation and refining Angola is the coordinating country for the SADCC Energy Sector which has its HQ in Luanda.

Mineral export dependence has increased from 22% in 1963, to 47% in 1973 and to 98% in 1987, more than a fourfold increase in 24 years. At the same time there has been an increasing dependence on one mineral, oil. In 1963 oil accounted for 13% of mineral exports, in 1973 64% and by 1987 oil and oil products constituted 95%.

7.3 ANGOLA: PRINCIPAL EXPORTS, 1963, 1973 & 1987 (current GKz)

Commodity	1963		% Total		1973		% Total		1987		%
	Vol.	Val.	Exports		Vol.	Val.	Exports		Vol.	Val.	Exports
Diamonds Mcts	1.29	0.77	16.2		2.11	2.00	10.4		0.85	1.63	2.5
Iron Ore Mt	0.66	0.14	2.9		6.33	1.21	6.3		-	-	
Oil, crude Mbbl	0.32	0.13	2.7		7.32	5.76	30.1		116.0		
LPG kbbl	-	-			-	-			2.24		
Oil Products									0.50		
									61.90	95.4	
Cement/clinker kt									36.6	0.04	-
Total Minerals(%):			21.8				46.8				98.0
coffee kt	136.44	1.89	40.0		213.41	5.08	26.5		16.13	1.00	1.5
sisal kt	62.98	0.58	12.2		53.40	0.47	2.4				
Fish kt	39.33	0.15	3.2		112.90	1.36	7.1		0.32	0.5	
Other		1.08	22.8			3.28	17.1		0.3	0.03	-
Total Exports(GKz):	4.74	100.0			19.15	100.0			64.87	100.0	

Sources: Dilolwa 1978, Ministerio do Plano 1986, INE 1989.

Due to the security situation the variety of minerals produced has shrunk dramatically, although the value has increased due to the relatively "bandit free" nature of off-shore oil production; however, in May 1985 South Africa did attempt to sabotage the installations in the Cabinda enclave. Diamond production has continued, but since 1980 output has halved mainly due to bandit activity in the north-east of the country. The only other significant mineral production is quarrying for construction materials such as limestone, gypsum and granite.

At the 1977 and 1980 MPLA Congresses fundamental mineral policy was formulated in which priority was given to petroleum, diamonds, iron ore, phosphates, ornamental stones, underground water and copper exploitation "...with a view to creating a balanced economy and conditions capable of generating the necessary surpluses for export".⁸ This concentration on relatively few minerals (relative to Angola's resources) was due to the dearth of skilled mining personnel available after the settler exodus of 1975 and the security situation.

The minerals industry comes under two separate ministries: The Ministry of Energy and Petroleum, which owns the state oil company, Sonangol, and the Ministry of Industry. The Mining Law of 1979 created, under the Ministry of Industry, the National Directorate for the Mining Industry with its research arm, the National Institute for Geology (Inageo, Geological Survey Dept.), and the National Department for Mines which controls several state mining companies (Endiama, Ferrangol, Roremina, Minaquartzo and Fosfang).

7.4 ANGOLA: MINERAL PRODUCTION (Volume)

	Unit	1973	1983	1984	1985	1986	1987	1988	1989	73-83	83-88
Diamonds	Mcts	2.12	1.03	.91	.72	.27	.87	1.04	1.32	-51%	1%
Fe, Iron Ore	kt	6052	0	0	0	15	0	0	0	-100%	nap
Fe, Steel	kt	35.7	3.0	4.4	4.1	7.0	1.0	2.0		-92%	-32%
Granite	m ³	1432	0	466	336	0	139	1923	nap	-	90%
Gypsum	kt	92.2	6.5	6.0	11.7	13.1	12.9	23.7		-93%	262%
Kaolin	kt	.67	.00	.00	.00	.00	.00	.00	.00	-100%	nap
Limestone	Mt	.90	.15	.13	.26	.29	.29	.53		-84%	262%
Limst, Cement	kt		125	145	131	282	210	322	298	nap	157%
Manganese	kt	6.2	.0	.0	.0	.0	.0	.0	.0	-100%	nap
Marble	m ³	1475	218	95	120	232	120	258	272	-85%	18%
Oil, Crude	Mt	8.0	8.9	10.2	11.6	14.1	18.0	24.6	24.4	11%	177%
Oil, LPG	Mt	.00		2.71	3.16	3.51	4.27	4.40		nap	nap
Oil, Prods.	Mt	.70	1.22	1.20	1.39	1.40	1.50	1.39		73%	14%
Phosphate	kt	.00	.00	.23	.00	.00	.00	.00	.00	nap	nap
Quartz	kt		.00	.02	.00	.00	.00	.00	.00	nap	nap
Salt	kt	96.7	7.9	34.0	50.0	47.0	65.0	55.0		-92%	596%

blank space = no data, nap = not applicable, Sources: INE 1986/9, SADCC Energy TAU 1989, Dilolwa 1978, Sonangol 1988.

From 1973 to 1983 the production of most minerals dropped significantly, due to the settler exodus and the war, except for crude oil production. However, since 1983 the production of several minerals has improved, partly due to the better security situation in the south of the country.

Legislation

Under the Angolan Constitution (Fundamental Law) all mineral resources "...are the property of the State, which shall determine the conditions of their exploitation..."⁹. The Petroleum Law of 1978 governs all hydrocarbon exploration and production in Angola and under it Sonangol is the sole concessionaire with the right to explore for and produce petroleum, but can enter into association with foreign partners to achieve this.

The association is for an agreed duration, divided into exploration, development and production periods. The law also has provisions for matters relating to conservation of resources and the environment, the utilisation of natural gas, the training and utilization of Angolan personnel and the participation in management of Sonangol in any association. Sonangol's share in any association operating in less than 150 m of water is set by the law at a minimum of 51%. There are two basic forms of association, namely, "production sharing agreements" and "joint ventures".

Joint Ventures: Under this form Sonangol is the part owner of the operation and its production share is proportional to its investment. This type of association was inherited from the colonial period and is the form for the Cabinda, Cabgoc, operation, in which Cabgoc is the technical operator for the venture. This is also the form for the onshore Congo and Kwanza operations.

Production Sharing Agreements: In this case the foreign operator acts as a contractor to Sonangol, is responsible for all of the investment and risk and receives a share of production in return. This form of association was initiated after the division of the continental shelf in 1978 into 13 Blocks. Under it there is also a "price cap" provision where there is a price cap for profit sharing, based on the UN cost inflation index. All profit in excess of this price cap goes to Sonangol¹⁰. In this way the capture of windfall and monopoly rents is guaranteed.

A revision of the Mining Law was enacted in 1987 (Lei 11/87) which brought it more in line with the Petroleum Law in that foreign participation (for production sharing) at the early stages of exploration and feasibility studies will be encouraged for projects that will be mainly export oriented. This is being done because, at the present time, the state does not have the capacity for an expansion in exploration activity. The types and responsibilities of the associations are as defined by The Law on Foreign Investments in which the repatriation of after tax profits is allowed up to a limit of 25% of invested capital.

The Petroleum Industry

Oil Production

Oil exploration by the "Canha & Formigal" company started in 1910 in the Congo and Kwanza basins and in 1915 the first well was sunk in the Kwanza basin. The basins are typical of the passive margin type, associated to continental drift. Most of the reserves (Cabinda) are of lower Cretaceous (Albian) and Upper Jurassic age. A significant salt layer divides the sequence from rift type to continental margin type and serves as the important cap rock for the petroliferous sediments below. The crude is basically a good quality light (about 36 degrees API, 0.8 SG) but can be extremely variable.

Production started in 1955 and in 1958 was 58 Mt from the Kwanza field. Production subsequently started up in the Cabinda and Congo basins. From 1968 to 1969 production jumped 224% from 0.75 Mt to 2.4 Mt and replaced coffee as the country's premier export. By 1973 production had increased 236% (relative to 1969) to 8,175 Mt, 90% from the Cabinda basin (off-shore), 7% from the Kwanza basin (on-shore) and 3% from the Congo basin (on-shore)¹¹.

7.5 ANGOLA: INDEXED VALUE OF CRUDE OIL EXPORTS (1975=100)

Year	US GNP deflator	1975= 100	Price (US\$)	Indexed (US\$)	Exports (Mbbl)	Indexed Value
1970	91.45	137.23	1.30	1.30	31.29	9.62
1971	96.00	130.73	1.70	1.62	34.80	13.33
1972	99.98	125.53	1.90	1.74	50.06	20.57
1973	105.68	118.75	2.70	2.34	53.68	29.66
1974	114.95	109.18	11.20	8.91	54.24	114.29
1975	125.50	100.00	10.90	7.94	53.24	100.00
1976	132.10	95.00	11.70	8.10	31.15	59.67
1977	140.03	89.62	12.80	8.36	55.50	109.71
1978	150.35	83.47	12.90	7.85	37.10	68.84
1979	163.40	76.81	18.60	10.41	42.90	105.61
1980	178.43	70.34	30.50	15.63	40.90	151.19
1981	195.60	64.16	35.60	16.64	38.14	150.12
1982	207.40	60.51	31.40	13.85	39.26	128.54
1983	215.30	58.29	27.80	11.81	54.85	153.16
1984	222.90	56.30	27.20	11.16	64.16	169.32
1985	230.00	54.57	25.90	10.30	72.82	177.34
1986	237.00	52.95	12.29	4.74	92.30	103.51
1987	246.00	51.02	15.45	5.74	116.00	157.55
1988	255.00	49.22	13.35	4.79	155.60	176.17

Sources: Sonangol 1986, Dilolwa 1978, BGS 1985, Douglas 1983, Council of Economic Advisors 1990.

Production from the latter two basins peaked in 1974 at 172 kbbl/day and has since been on the decline as the reserves are depleted, while both the reserves and production from the off-shore fields (Blocks 0, 2, and 3) has been on the increase. By 1986 both production and reserves were double that of a decade earlier and reserves are presently estimated to be good for twelve years at present production rates. From 1975 to 1985 the rate of reserves discovery was twice the extraction rate.

Production in 1988 was 24.6 Mt (452 kbbl/day), almost four times the 1980 figure and is still on the increase. Production costs are estimated to be about 5 USD/bbl, well below even the lowest world market price over the last ten years. In 1988 exports of oil and oil products were worth 61.9 GKw, 95.4% of total exports, a 40% increase on 1980 (44.1 MKz). The 1988 volume of oil exports was three times greater than 1975, but the real value of exports was only 76% greater due a fall in the real unit value of 40%, but the oil price picked up steadily in 1989¹².

Pre-independence, the main companies were: in Cabinda, Cabgoc (Cabinda Gulf Oil Company) owned by Gulf Oil of the USA; in Kwanza, Petrangol, 30% owned by the colonial state, but controlled by Petrofina of Belgium; and, in the Congo Basin, there were a variety of companies including Petrangol, Angol (Portuguese), Texaco (USA) and Total (French). In 1972 Cabgoc gave up its Cabinda onshore concession and in 1976, due to the USA's support for the Zairean/FNLA/mercenary and the RSA/UNITA/mercenary invasions of Angola and its refusal to recognise the MPLA government, production stopped for six months causing output to fall from 48.8 Mbbl (1975) to 28.6 Mbbl (1976). After the passing of the Petroleum Law in 1978, Sonangol acquired a 51% share of the association.

The state oil company, Sonangol (Sociedade Nacional de Combustiveis de Angola), was formed in 1976 and under the Petroleum Law of 1978 (law 13/78) Sonangol became the exclusive concessionaire for hydrocarbon exploration and production. It acquired the operations of Angol (Portuguese) and entered into a series of joint ventures and production sharing agreements with the oil transnationals. During 1977-78 Sonangol became a 51% participant in an off-shore Cabinda joint venture with Cabgoc (Gulf Oil, now owned by Chevron) in which production is shared at a 51:49 ratio. Sonangol also has joint venture operations in the Congo and Kwanza basins with Texaco (USA) and Petrofina (Belgium). By 1984 Sonangol "owned" approximately half of Angola's oil production through equity participation and production sharing.

Elf Aquitaine of France was a late-comer to the Angolan oil industry when a production sharing contract was signed in 1980 for offshore Block 3 west of Block 1, off the northern Angolan coast. The association was made up of Elf 50% (operator), Mobil 25%, Agip 15%, Ina Naftaplan 5% and Naftagas 5%. In 1984 Mitsubishi (Ajoco) bought Mobil's share¹³. From 1981 to 1988 over 300 km of wells were drilled and in the first year the Palanca field was discovered, followed by a series of further discoveries in 1982, 1985 and 1987. Production started in 1985 (8 Mbbl) and was 150 kbbl/day (about 7.4 Mt/an) in 1989.

In 1987 the Cabinda association became: Sonangol 51%, Cabgoc 39.2% and Agip (Italy) 9.8%. This was in part due to the fact that the USA continues to support the destabilisation of Angola and still refuses to recognise the Luanda government, provoking fears that Washington might force Gulf to withdraw. The inclusion of an alternative, non American, oil company (Agip, Italian state company) that could take over as operator was seen as a precaution in this regard. Until recently there were Cuban troops helping protect American oil companies from American supplied UNITA insurgents and South African sabotage squads.

In 1988 the company breakdown of Angolan oil production was:

7.6 ANGOLA: 1980 OIL PRODUCTION

Operator	Area	kbbbl/day	%
Cabgoc	Carbinda offshore	267.8	60%
Elf	Offshore block 3	110.6	25%
Fina	Onshore	35.6	8%
Texaco	Offshore block 2	32.6	7%
Total		446.6	100%

Source IEU 1989.

In 1978 the Angolan continental platform was divided into 14 exploration blocks (to a depth of roughly 200m) and Sonangol formulated production sharing and/or joint venture agreements for eight of these concessions with several oil companies. Sonangol also has joint ventures for companies which service the petroleum industry, an example of which is Petromar which builds off-shore oil installations, submarine pipelines and port facilities, at the port of Ambriz (north of Luanda).

Oil Refining

In 1958 a small refinery (2 kbbbl/day) was opened in Luanda by Petrangol and in 1972/3 it was substantially expanded to refine 30 kbbbl/day (1.5 Mt/an). It is a hydro-skimming refinery primarily for the production of gasoline, jet fuel and gas oil for the domestic market. At present the product mix of the refinery is not compatible with Angolan consumption and some petroleum products still have to be imported (142 kt in 1987, 78% jet fuel). The refinery was expanded in 1987 by a Portuguese contractor to handle 1.6 to 1.75 Mt/an, depending on the crude used. The current crude is from offshore (Block 3, Elf) which is much lighter (38.3 API) than the previous feed from onshore Soyo. In 1988 the refinery produced 1.4 Mt of oil products, of which 0.57 Mt were exported¹⁴. In 1986 there was a major investment of 9 MUSD to create an autonomous electricity generating capacity for the plant, in case of a power cutoff due to sabotage of the electricity supply, which can also supply parts of Luanda in case of emergency.

Natural Gas

In 1982 two feasibility studies for the establishment of an ammonia plant based on natural gas were undertaken by Arthur D. Little (UK) and the International Gas Development Corporation (USA) and in 1984 a regional (SADCC) fertilizer market survey was undertaken by Cramer and Warner (UK) funded by the Commonwealth Secretariat (CFTC). These studies resulted in a proposal for the construction of a plant to produce 1100 t/d of ammonia and 1800 t/d of urea, at a cost of roughly 500 MUSS. It is planned to locate the plant near Soyo in the extreme north-west of the country, close to Blocks 1, 2 and 3, the source of the gas. The gas reserves are considered good for the life of the plant (20 years).

Soyo is only 80 km north of the Kindonocaxa phosphate deposit and the possibility of establishing an integrated phosphate/urea fertilizer plant is under consideration. The production of PVC from propane in the gas of Blocks 3 and 4 is also being investigated as part of the ammonia project. At present, finance for the project is being sought from south-east Asian companies, specifically South Korea (consortium led by Daiwo Corp.), in which the backers would take the majority of production as the regional (SADCC) market represents only 10% of projected output.

Natural gas is also used for both gas lift and injection to boost crude oil production and for the production of LPG¹⁵ for export at the rate of 4 to 5 Mt/annum.

Asphalt

Angola also has reserves of asphaltic rocks in the Cabinda basin, the Congo basin (Gondo and Musserra) and the Kwanza basin (exploited in the past). In Angola the name “libolite” has been given to natural bitumen (tar) as a large deposit occurs at Libolo near Kwanza. Deposits of “libolite” are also found at Kilundo, Kirimbo and Porto Amboim. Between 1948 and 1973 roughly 810 kt (30 kt/an.) of asphaltic rock were produced with a bituminous content of 18 to 22%, principally for road surfacing¹⁶. Exploitation of this resource has ceased as the output of bitumen from the refinery covers local needs at present. The deposits were considered for refining into petroleum products in the mid-eighties but the cost was well above market prices for the products. In general, the tarred roads of the region are in an awful state of repair, often for the lack of forex to import bitumen, yet Angola has huge natural resources that could be exploited at almost no cost other than the cost of transport.

The Mining Industry

Diamonds

The first systematic prospecting for and exploitation of diamonds in Angola was by Companhia de Pesquisas Mineiras (Pema) in the northeast of the country (Lunda) in 1913. In 1920 this was taken over by Companhia de Diamantes de Angola (Diamang) which was owned by Societe General de Belgique (SGB) 18%, Portuguese financial concerns 16.4%, the Diamond Corporation (De Beers) 1.7% and the public (mainly Portuguese), 49%.

In 1922, Ernest Oppenheimer of Anglo American (South Africa) managed to secure the selling rights for all of Diamang’s production as part of his international bid to control the diamond market and thereby get control of De Beers, the largest producer. In 1929 Anglo American took over De Beers and Oppenheimer became Chairman and in 1934 the Diamond Producers Association was formed, dominated by De Beers, which to this day has a virtual monopoly over diamond marketing via the Diamond Trading Company and its Central Selling Organisation (CSO).

Until 1964 all of Angola’s official sales were to the CSO in the UK, but from that year a proportion of the most valuable diamonds went directly to the Sociedade Portuguesa de Lapidacao (Dialap), paid for in Portuguese escudos rather than UK pounds.

Diamang had exclusive exploitation rights over 81% of the country and maintained a “state within a state”¹⁷ particularly in Lunda district where it ran its own police force, administered justice, maintained a standing army of mercenaries and was responsible for agriculture, health, education, etc. Contrary to the migrant mining labour supply systems common in the rest of southern Africa, Diamang encouraged the formation of a permanent labour force which stood at 25 thousand in 1973.

In 1971 Diamang ceded most of its diamond exploration and mining rights (except for the Lunda and Kassanje areas) to Concorcio Mineiro de Angola (Condiam), a local prospecting arm of De Beers, 45% owned by De Beers, 45% by Diamang and 10% by the Angolan colonial state.

From 1950 to 1957 exports ran at between 700 and 800 kcts/annum, representing from 7 to 13% of total exports by value. From 1958 exports steadily increased to a peak of 2,503 kcts in 1970 (19% of total exports) before falling to 0.27 Mcarats in 1987, due to the security situation in the north-east where the diamond operations suffered several UNITA attacks in the 1980s. Production has since improved to

1.31 Mcarats in 1989. It should be borne in mind, however, that these figures are for "official" exports. A significant proportion of production has always been smuggled (up to 50%)¹⁸.

7.7 ANGOLA: DIAMOND PRODUCTION (Mcts) AND PERCENTAGE OF EXPORTS

	1970	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
Prod	2.5e	1.49	1.40	1.22	1.01	0.92	0.72	0.27	0.87	1.04	1.31
%Exp	19.2	12.7	11.9	11.5	5.6	4.7	3.3	0.8	2.5	na	na

na: not available, sources: Dilolwa 1978, INE 1989.

In 1973 60% of Diamang's output was gem grade and 40% industrial grade, a gem-to-industrial ratio that was only bettered by Namibia (CDM). In that year there were 45 open pit alluvial diamond workings in Angola. At present the grade of production is running at greater than 90% gem quality.

The state diamond company, Empresa Nacional de Diamantes de Angola (Endiama), was created after the passing of the Mining Law of 1979 and is responsible for diamond prospecting, mining, processing and marketing. The main mining areas are Lucapa, Cassanguidi, Andrada, Maludi, Cuanga and Calondo, in the centre-north and north-western part of the country. All the mines are open pit alluvial workings using heavy medium separation.

Until the end of 1985, an indirect subsidiary of De Beers, Mining and Technical Services (MATS) of the UK, was providing administrative, technical and marketing services to Endiama's mining subsidiary, Diamang, but the contract was not renewed. Since then Diamang was dissolved, in 1986, and Endiama has created three mining operations:

- 1) A joint venture with RST¹⁹ International (Cuango area)
- 2) A joint venture with SPE²⁰ of Portugal (Lucapa area)
- 3) Endiama on its own (Andrade and Lucapa area)

This system appears to have worked well in that production increased to 1,316 kcarats in 1989, but it is reported that Filipino workers have been imported to do much of the work. RST International comes from the Amax holding in Zambia Consolidated Copper Mines (ZCCM) which was bought out by a Greek entrepreneur, Sardanis, who was one of the directors nominated by the Zambian government on the board of Nchanga Copper Mines (RST) in the early seventies, after nationalisation. SPE, in which Sibeka has a holding, apparently has access to the Portuguese staff previously employed by Diamang.

Until 1986 official output was marketed through the CSO but since then Endiama has managed to secure higher prices²¹ through a contracts with UK (Industrial Diamond Corporation), Belgian (Steinmetz-Evans) and US (Lazare Kaplan) companies. This arrangement was put together with advice from Martyn Marriott of DCI²² who advised the Botswana government on its early, relatively favourable deal, with De Beers in the seventies. However it has been reported²³ that talks have been held with De Beers on the possibility of Endiama re-entering the CSO fold, but only if De Beers agrees to develop Angola's huge diamond kimberlite pipe potential. The main advantage of in situ pipe mining is that it is concentrated in one locality and therefore easier to defend than the scattered alluvial workings. The main disadvantage is the large initial capital outlay (about 500 M\$). There are 638 reported kimberlite pipes, 300 of which are thought to have economic grades, some of which are among the ten largest in the world. The possibility of using Soviet expertise to develop these pipes is also being pursued.

Angola's alluvial diamond mining potential is considered to be several orders greater than present output, worth well over 0.5 GUS\$/annum if developed. Reserves have been calculated at 90 Mcts but the potential is estimated at 350 Mcts (UNTCD, 1980). The main limitation to the expansion of this sector is the security situation in the north-east of the country.

Iron and Steel

The iron ore mining firm, Companhia Mineira de Lobito, started up in 1929 with Portuguese capital (Sousa Machado family), but only obtained its first major mining concessions in 1949. A second mining company, Sociedade Mineira de Lombije, owned by the same family, acquired a mining concession for Kassinga iron ore deposits in 1953 and was later integrated into the Companhia Mineira de Lobito (1968). The major capital injection came from Krupp (FRG), Jogaard & Schultz (Denmark) and a Portuguese company of 1.3 GKz to the Lombije company for the opening up of the Kassinga mines, for putting in the railway to the port of Namibe and for the construction of the ore terminal. In 1965 Krupp loaned the Lobito company 1.5 GKz for the purchase of locomotives and rolling stock to move the ore²⁴.

From 1969 to 1973 exports oscillated between 5 and 6.4 Mt. In 1973 6,330 kt were exported and 6,052 kt were mined. In that year 94% of production came from the opencast Kassinga mines of Jamba and Tchamutete with the rest coming from Mulanje district (Mounts Saia and Tumbi). The mines at Kwima (Huambo district) had been inactive for some time. The known high grade secondary haematite ores at Kassinga were virtually exhausted by 1973 and exploitation of the huge primary itabirite reserves was planned. These were to be pelletized at the rate of 6 Mt/annum of pellets. The Kassinga reserves occur in pre-Cambrian banded ironstones as secondary (high grade) haematite ores, residual and elluvial "pebble ores" and primary (low grade) itabirite ores²⁵.

With the South African invasion from the south in 1975 and their subsequent regular incursions into southern Angola, mining at Kassinga came to a standstill. In 1981 the state iron and manganese mining company, Empresa Nacional de Ferro (Ferrangol) was formed. Since its creation it has mainly been involved in the rehabilitation of the Kassinga operations, aided by Austromineral (Voest-Alpine, Austria) who have had a technical consultancy contract with Ferrangol. The reserves at Kassinga of detrital ore (40-45% Fe) have been reassessed at 100 Mt (cut off grade of 40%), while the reserves of lower grade (30-35% Fe) primary ores stand at greater than 1 Gt.

Mining of the detrital limonite-haematite-martite ore at the rate of 1.1 Mt/year of concentrate (72-74% Fe) has been planned for some time.

"However, mining is unlikely to start up again in the foreseeable future for two reasons: the railway to Namibe needs extensive rehabilitation and world market prospects are much worse than had been forecast..."²⁶

Angola has numerous other iron ore deposits (see map) the most important of which is the huge Kassala-Kitungo resource, in the Kwanza-Norte Province 150 km ESE of Luanda. Pre-independence this deposit was evaluated by the Companhia de Manganes de Angola, but was never exploited. The Kassala and Kitungo deposits are situated 7 km apart and contain an estimated 300 Mt of primary ore grading 30 to 35% Fe, mainly in the form of titanomagnetite in a country rock of norite. A project for the production of 2.5 Mt/year of pellets using a slurry pipeline to Luanda has been put on ice by Ferrangol, due to the high initial investment cost of roughly 500 MUS\$.

The state enterprise Siderurgia Nacional in Luanda is the only producer of steel in the country. It used to belong to the Champalimand (Portugal) group of companies and initially rolled rails from imported ingots. In 1972 a small 18 ton arc furnace was installed for the production of ingots. At present it is

smelting local scrap only as pellets are still not locally available. Production of ingots in 1974 was 28.8 kt of ingots from which 26.6 kt of rod were rolled (capacity 50 kt/an). By 1988 production had fallen to 2 kt of steel. A separate state company, FATA, imports steel sheet for the production of tube and angles.

The possibility of establishing a 1.0 Mt/an DRI²⁷ plant using natural gas to produce sponge iron as a feed for a 150 kt/an steel plant (EAF²⁸, expansion of Siderurgia Nacional) is under consideration by government²⁹. Angola imports about 40 kt/an of steel as raw or semi-manufactured items and a UNIDO study done in 1986 projected that the crude steel equivalent of steel-based imports would be 93 kt/an in 1995 (base case)³⁰.

Manganese

Manganese ore was produced at the Kiaponte and Kitota mines in Malanje Province until 1973 by the Companhia do Manganese de Angola. Over thirty years from 1943 to 1973 604 kt of ore were extracted³¹. The main occurrences are the Maiombe region (Cabinda), the Lucala region (Kiaponte and Kitota mines, Cuanza Norte and Malanje), Quicama (Bengo) and Capuia (Huambo). There are also many other occurrences. Reserves in the most important region (Lucala) are estimated at 5 Mt of high grade ore (55-56% Mn), but large areas have not been assessed³². Ferrangol is also responsible for manganese exploitation, but has no plans for the reactivation of the mines.

Phosphates

Angola has significant reserves of phosphates in the Cretaceous-Quaternary sediments north of Luanda and in Cabinda. A state company, Empresa Mineira de Fosfatos do Zaire (Fosfang), has been created to handle the exploitation of phosphates. The main resource is near the coast at Kindonacaxa, about 40 km north of the small port of N'zeto. The phosphates in this zone are of marine origin in the form of cropolites and reserves have only been determined for a small area of 18 km² where there are 7 Mt of phosphate rock grading 29.4% P₂O₅. Reserves for the whole zone are estimated to be greater than 200 Mt. In 1982 an experimental pilot processing plant was set up at Kindonacaxa to concentrate the phosphate rock by Fosfang in collaboration with Bulgargeomin (Bulgaria). The plant operated at a rate of 15 kt/annum for 1983 and 1984, then shut down due to problems in the distribution of the product to the agricultural users in the centre and south of the country. The project will recommence as soon as conditions allow.

The other major reserves are located in Cabinda Province and are different to those of Kindonacaxa. Energoprojekt of Yugoslavia has been assessing these deposits and prognostic reserves are estimated at roughly 200 Mt. One of the deposits, at Mongo-Tando, has 40 Mt of reserves grading 31.4% P₂O₅. The polymetallic deposits of Tetelo-Bembe-Uige have been considered for the production of sulphuric acid as a by-product from the processing of sulphide minerals for the manufacture of super-phosphates, as has the sulphur in natural gas.

Marble

Angola has several deposits of high quality marble, but only two quarries are in operation, due both to the shortage of skilled personnel and to the security situation. In 1973 1,457 m³ were quarried but the present output is only 20% of this at roughly 270 m³ per year for the domestic market.

The quarries are run by the state company, Roremina (Empresa Nacional de Rochas Ornamentais), which has its HQ in the south of the country at Lubango, in the region of the deposits. The quarrying of marble will be expanded as soon as conditions permit.

“Granite”

Roemina is also responsible for the exploitation of ornamental “granite” and it operates several quarries in the south of the country in the region of Chicuatite near Lubango. The black granite is a dark anorthosite and the Angolan product is internationally recognised. In 1973 output was just under 8,000 m³. Production in 1989 was 599 m³ of “black granite”, 526 m³ of “grey granite”, 798 m³ of “red granite” (total 1923). All production is exported to Europe via the port of Namibe. In 1980 it was estimated that with improvements in stone cutting techniques and marketing, production could be increased to up to 20,000 m³/annum worth roughly 12 MUS\$, as the Angolan product has a ready market³³.

Quartz

The state crystalline quartz quarrying company, Empresa Mineira de Quartzo (Minaquartzo), is located in the south of the country in Kwanza Sul Province. The high purity fusing quartz occurs in the Condo region where the Pocaria I orebody is mined and has reserves estimated at 0.9 Mt in three veinlike orebodies, but there are also several other unassessed veins³⁴. Due to its high quality the quartz competes favourably on the world market, but there has been no production since 1985 due to the security situation.

Cement

There are two cement plants in the country, in Luanda and Lobito. Cement production was 311.7 kt in 1968 and peaked at 767.6 kt in 1973. By 1988 production had decreased to 322 kt. The producing companies used to be Secil (Luanda) and Companhia de Cimentos de Angola (Lobito), but the latter company is not producing at the moment, while the former is now a mixed state enterprise called Cimangola (Empresa de Cimentos de Angola) in which the state has a majority shareholding and 31% is held by a group made up of F.L. Smidth & Co. and Hojgaard & Shultz of Denmark who have a management and service contract. The Lobito company is now completely state owned and is called Encime (Empresa Nacional de Cimento).

Copper

The copper deposits in Uige Province in the north used to be mined by Empresa do Cobre de Angola which was linked to a Portuguese monopoly (CUF, later became Simeira). The three main deposits are at Mavoio, Tetelo (1 km apart and about 120 km north of Uige) and Bembe. These are metasomatic type deposits occurring in the West Congo formation and the copper is found in limestones and calcareous shales or sandstones of the “Schisto-Calcaire” Series, generally associated to the Luango Fault Zone. It is estimated that the Mavoio and Bembe mines produced some 170 kt of copper between 1939 and 1963 when mining ceased.

Geological (inferred) ore reserves of the Tetelo-Bembe “zone” are estimated at 10 Mt at 2% Cu. Although copper is the main metal there are also associated elements such as vanadium, cobalt, barium, lead, zinc, gold and silver³⁵. The National Directorate for the Mining Industry is at present interested in setting up a joint venture for the exploitation of the polymetallic sulphide deposits of Uige Province, dependent on an improvement of the security situation.

The major other copper “zone” is the extension of the Zambian Copperbelt metallogenic province in Alto Zambeze in the extreme east of the country. Here inferred reserves are put at 10 Mt grading 1% Cu. Due to the extremely isolated location of these deposits, there are no plans for their development at present. There are also numerous other superficially known copper deposits in Angola, especially on the contact between the Cretaceous coastal sediments and the pre-Cambrian basement south of Lobito³⁶.

Gold

Gold occurs in numerous locations across the country generally in alluvial deposits. Up to 1965 about 560 kg of gold was produced in Angola from rudimentary small-scale mines, but all mining has since ceased. The main deposits are at Maiombe (Luali River, Cabinda), Lombige (Lombige River, Cuanza Norte), Gaudovira (Cunene River, Huila and Huambo), Chipindo (Cuengue River, Huila) and Cassinga (Colui River, Cunene)³⁷. The most favourable prospects are Chipindo (M'popo mine) and Lombige, both of which were exploited in the past. In addition to the alluvial recent and fossil placers, the gold also occurs in small but numerous quartz veins associated to "greenstones". Reserves at M'popo are estimated at 5 tonnes of gold grading 6-10 g/t³⁸.

Carbonatites

Angola has at least 14 carbonatite complexes. The two most important are Coola and Serra da Neve-Tchivira. These offer prospects for the future mining of nepheline, fluorite, niobium-tantalum, apatite and rare earths, but no work is being done on them at present. Fluorite reserves at Coola are estimated at 5 Mt grading 71% F₂Ca and at Tchivira 6 Mt at 27-61% F₂Ca.

Exploration

Angola has a presently unknown mineral potential as only 20% of the country has been geologically mapped at even 1:250,000 scale, let alone detailed surveys. There are undetermined reserves of chromite, platinum and nickel in the extreme south-west of the country, various alluvial gold deposits, several tungsten deposits in the centre of the country and numerous other mineral occurrences that lack systematic appraisal. The first step in the development of the Angolan mineral potential is to systematically survey the country. To this end the INAGEO has made some progress in training personnel both locally and overseas. The major obstacle to the expansion of exploration activity is still the low capacity of the Geological Survey Department (INAGEO) and the security situation. It is hoped that the former will be overcome by joint mineral exploration ventures with private capital.

Discussion

Until Salazar's "open-door" policy to Western investment in the sixties, the mineral sector of Angola consisted of a few, generally artisanal, mines except for diamond production in the north-east which had started on a large scale in the twenties. The huge mineral resources had hardly been touched by the Portuguese and the country was geologically unknown. This was principally due to Portugal being a neo-colony itself, particularly of Britain. It lacked the human resources and capital to develop its own resources, let alone the enormous resources of its "empire".

In a vain attempt to stem the rising tide of nationalism and the resulting guerilla wars in its colonies, Portugal opened up its "empire" to international capital. In the minerals sector this resulted in the rapid development in the sixties of Angola's oil and iron ore resources. From 1960 to 1974 diamonds, oil and iron ore increased from 93.6% of the total value of mineral production to 99.4% and, over the same period, mineral exports increased from 19.4% to 60.8% of the total value of exports and the total (current) value of minerals extracted increased from 0.65 MKz to 18.5 MKz.

The new investment policy also led to a flurry of prospecting activity, particularly from the South African-based mining colossus, Anglo American-De Beers through their subsidiaries such as Condiama³⁹ and JCI (Johannesburg Consolidated Investment Company), but, unfortunately, this did not lead to a concomitant expansion in systematic geological survey on the part of the colonial state. By 1974 only 20% of the country had been mapped at the large scale of 1:250,000. At the end of 1974 there were 20

companies with a total of 95 exclusive prospecting concessions including Diamang, Companhia Mineira do Lobito, Cabgoc, Petrangol, Empresa do Cobre de Angola and Condiama. At the end of the same year there were 1,631 claims on 226 mineral deposits⁴⁰.

With the invasions of 1975/6 and South Africa's undeclared war of destabilisation until 1989, almost all the small-scale artisanal workings stopped, resulting in a situation at present where there are only two major minerals produced, oil and diamonds.

Backward and forward linkages between the minerals sector and the rest of the economy have been, and continue to be, almost non-existent. In terms of forward linkages, virtually all mineral production is exported, or vertically integrated into the developed market economies. About 10% of oil production is refined locally before export and all diamond production is exported, legally or illicitly. The only sector with high linkages is the tiny mineral building materials sector comprising, sand, clay, limestone, gypsum, stone and marble. In terms of backward linkages, there have never been industries, other than fuel, supplying mining inputs. All machinery, explosives, chemicals, plant, etc... have had to be imported.

Planned projects for further processing such as the urea and PVC plant based on natural gas (Soyo), the phosphate fertilizer plant (Kindonacaxa), the expansions of the refinery (Luanda) and the cement plant (Luanda), and the proposed DRI sponge iron and EAF steel plant, will retain some value in the country as well as making available limited amounts as inputs to local industry and agriculture, but the large majority of production, particularly oil, will still have to be exported due to the limited size of the domestic market. Investment by Sonangol into enterprises constructing equipment for the oil industry (Petromar) has managed to keep some of the value inside the country though these companies are themselves highly dependent on imported inputs.

The essential prerequisite to the development of the economy and with it the country's mineral resources is the ending, or at least diminishing of the war. This would not only open up for exploration and exploitation minerals in presently dangerous zones, but would also release enormous financial and human resources from the war effort. Defence is the largest recipient of the national budget, of scarce foreign exchange and of human resources. The key aspect to the ending of the war is the ending of US aid to UNITA and the closing of their bases in Zaire. UNITA has been able to receive open assistance from the USA, since the repeal of the Clarke Amendment (which banned aid to UNITA in 1976) in 1985, and is reported to be receiving 50 to 100 MUSD per annum.

In terms of the SADCC, Angola has the largest mineral complementarity in the region as all the other states import oil and/or oil products. SADCC oil consumption is about 4 ktoe/an, less than 20% of Angolan production. The main obstacle to Angola supplying the SADCC is that there is no operating rail or existing pipeline link to the rest of the region meaning that the oil and oil products would have to be shipped around the Cape to Beira and Dar es Salaam, giving it no cost advantage over oil from the Gulf. In addition the SADCC refineries (Zambia and Tanzania) were not designed to take Angolan crude. However, if the region was economically integrated it might make sense to build a pipeline to the Zambian refinery in Ndola (Indeni) then distribute the products to the region's consumers by rail and road.

The other areas where Angolan minerals might cater for regional demand are fertilisers (nitrogen and phosphate) and steel. However, for both there are also projects in Tanzania (Kilamco and Liganga) and Mozambique (Pande and Honde) which may be more feasible. Angola could benefit from regional expertise in small to medium scale mining, particularly from Zimbabwe, and mining inputs (machinery,

explosives, chemicals) could be imported from Zambia and Zimbabwe, but this would require the rehabilitation of the Benguela line (Lobito Corridor).

In conclusion, Angola is exceptionally rich in known mineral resources, even though the bulk of the country remains unexplored, but the only minerals developed have been oil and diamonds. The country has become increasingly mineral dependent due to the collapse of other sectors of the economy (in turn due to thirty years of war), particularly the coffee industry. In addition to the war, the other aspect limiting development is the acute shortage of managerial and professional personnel, due to a total neglect of indigenous training during Portuguese colonialism.

Footnotes to Chapter 7

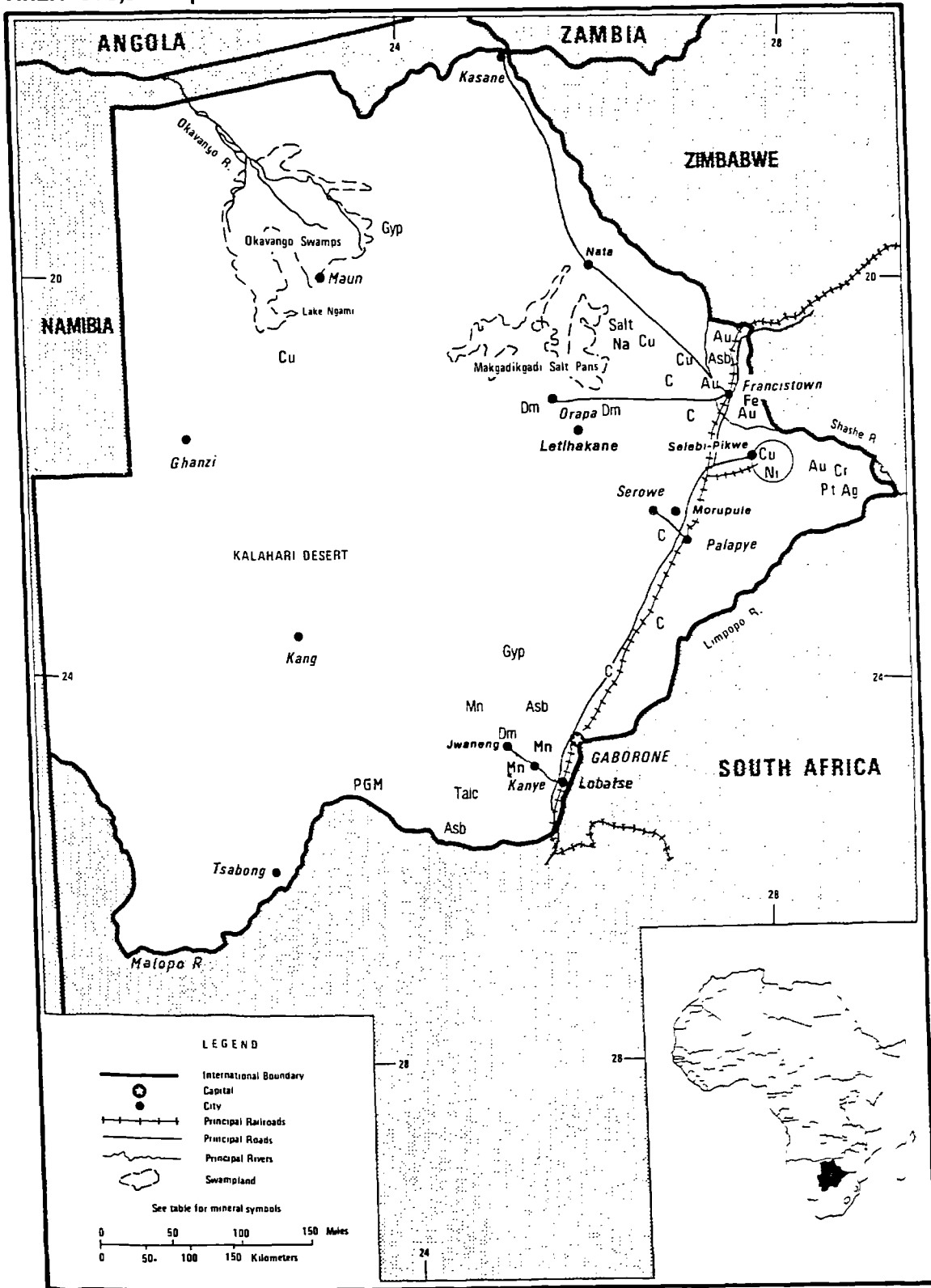
- 1 Rebelo 1988. 2 Movimento Popular de Libertacao de Angola.
 3 Frente Nacional de Libertacao de Angola.
 4 Uniao Nacional de Independencia Total de Angola
 5 Andrade & Ollivier 1975. 6 National Front for the Liberation of the Congo.
 7 Bhagavan 1986.
 8 SADCC 1985, page 44. 9 GPRA 1978. 10 Sonangol 1985. 11 Dilolwa 1978.
 12 The August 1990 Gulf crisis oil price of 30 USD/bbl, would imply export earnings of 5 GUSD/annum.
 13 Rebelo 1988. 14 Fina 1989. 15 Liquid petroleum gas.
 16 DPSGM 1965, Dilolwa 1978. 17 Dilolwa 1978, page 268.
 18 Dilolwa 1978. 19 ex Roan Selection Trust of Zambia.
 20 Sociedade Portuguesa de Empreendimentos
 21 The CSO takes about 12% of the value to finance the international advertising campaign and the diamond stockpile.
 22 Diamond Counsellor International
 23 EIU Angola Country Report, 2/1989, page 15 and Africa Analysis No. 61, 1988.
 24 Dilolwa 1978.
 25 DPSGM 1965 and "Metal Bulletin Iron Ore Special Issue 1969", page 21.
 26 UNIDO 1986b, page 12. 27 Direct reduced iron. 28 Electric arc furnace
 29 UNIDO 1989b. 30 UNIDO 1986, volume II, page 5.
 31 DPSGM 1965 and Dilolwa 1978. 32 UNTCD 1980. 33 UNTCD 1980.
 34 UNTCD 1980. 35 UNTCD 1980. 36 Hodge 1978. 37 DPSGM 1965.
 38 UNTCD 1980. 39 Concorcio Mineiro de Angola. 40 Gonsalves 1975.
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Fig. 7

BOTSWANA

AREA 570,000 sq km

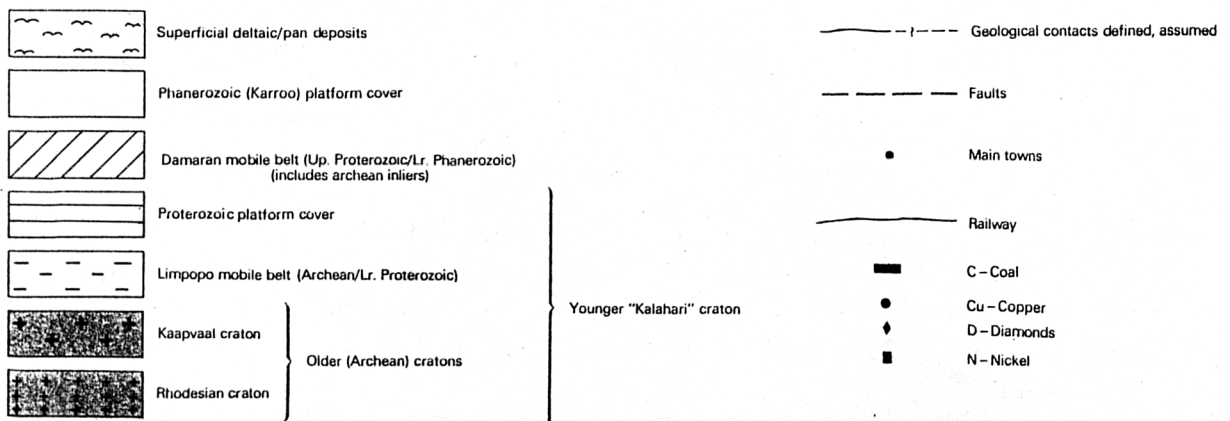
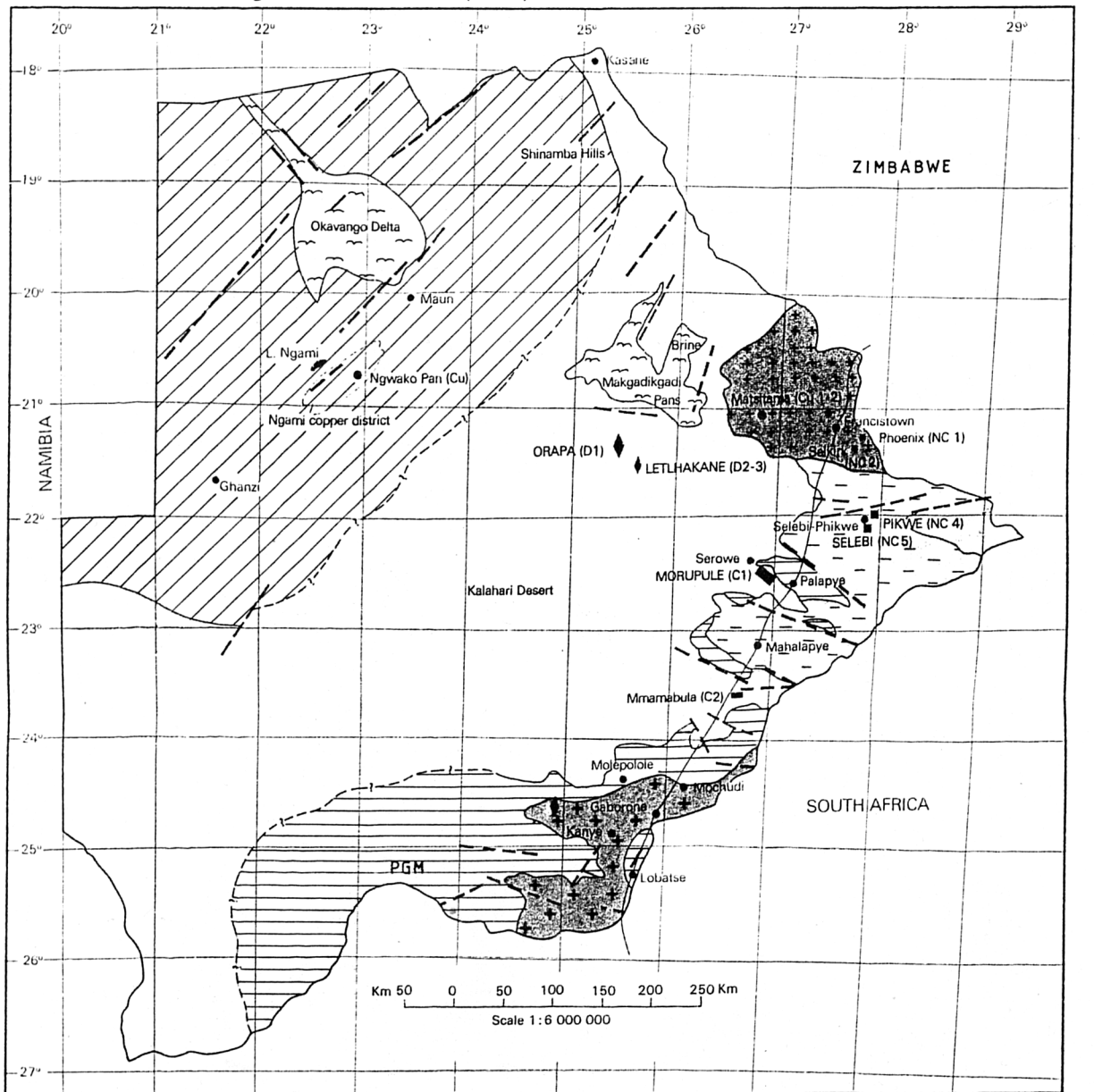
MINERALS



Source: USBM 1984

Fig.8

Geological framework and principal mineral occurrences of Botswana



From : BALDOCK, J.W. 1977

Chapter 8: The Minerals Sector of Botswana

Introduction

History

The original occupants of what is today Botswana are the ancestors of the San (“bushmen”) hunter-gatherers who are now restricted to the more inhospitable parts of the Kalahari Desert. About fifteen hundred years ago the first Bantu-speaking cultures arrived in the area bringing with them iron making technology which was practised over much of Botswana using laterites or haematite as ore. Ancient iron ore mining sites have been discovered at Tautswemogala and Gakgale in the south of the country¹.

With the rise of the Zulu nation in the 1820's, the subsequent generalised warfare (Difaqane) was felt as far west as Botswana as refugees moved west and offshoots from the Zulu nation (Mzilikazi) raided the area. In 1872 Khama the Great became Chief of the Ngwato and proved to be exceptionally astute in balancing the military might of the AmaNdebele (in south-western Zimbabwe) with European missionary interests. It has been noted that missionary penetration was greatest in areas “whose rulers were subject to ... outside pressure and who therefore saw in the missionaries potentially valuable political allies”² who could also aid in keeping the land-hungry settlers (Boers) at bay.

With the creation of the Boer Republics in the mid-19th Century, Bechuanaland, as Botswana was then known, became the main route north and the narrow strip between the Kalahari desert and the Transvaal Republic contained what was known as the “missionary road” to Zimbabwe, Zambia and central Africa.

In 1885 the area north of the Molopo river to 22°S became a British Protectorate called Bechuanaland. In 1888 Cecil John Rhodes, the Cape diamond mining magnate, managed to get the British government to declare the area north of 22°S as far as the Zambezi River, a sphere of British interest for which, in 1889, control was delegated by Royal Charter to his British South Africa Company (BSAC)³.

In 1895 Khama the Great managed to thwart Rhodes' attempt to have Bechuanaland transferred to the BSAC and, together with the other two protectorates (Basutoland and Swaziland), managed to avoid inclusion in the racist Union of South Africa at its formation in 1910. However the Union Act provided for the possible future inclusion of the protectorates with the consent of their peoples and provided for a common customs union with South Africa, which continues to this day.

In 1950 a Joint Advisory Committee, that had both black and white members, was established and in 1965 the country attained internal self-government and the administration was moved from Mafekeng in South Africa to Gaborone. Independence was achieved the next year under the Botswana Democratic Party led by the late Sir Seretse Khama.

Since independence Botswana has attempted to steer an independent course in the face of its powerful neighbour, the Republic of South Africa. Throughout the last two decades it has tried to remain open to refugees from South Africa, Rhodesia, Mozambique, Angola and Namibia, but has not given “sanctuary” to ANC fighters. Botswana left the South African Rand monetary area in 1977 and set up its own currency, the Pula (rain).

Despite South African threats, it decided to join the other independent states of the region (Mozambique, Zambia, Angola and Tanzania) in the Front Line States (FLS) in the struggle for the liberation

of Zimbabwe and the late Sir Seretse Khama was one of the main movers in the formation of the SADCC in 1980. A clear signal on its independent stance was sent to Pretoria when it agreed to house the SADCC Secretariat in Gaborone in 1981 and rejected the South African sponsored CONSAS regional grouping and has also rejected several attempts to sign a "Nkomati" type security accord.

The Economy

At independence in 1966 Botswana was a poverty stricken state with an economy based on cattle and migrant miners remittances from South Africa. Britain even had to subsidise the recurrent budget through aid. This situation started to change with the discovery of the Orapa kimberlite pipe in 1967 followed by the decision to assess the Selebi-Phikwe copper-nickel deposit in 1968. Diamond production started at Orapa in 1971 and the first copper-nickel matte was produced at Selebi-Phikwe in 1974. Further diamond discoveries were made and production started at Letlhakane in 1977 and Jwaneng in 1982.

Fired by mineral production, the economy grew rapidly throughout the 1970's. From 1965 to 1980 the GDP grew by 14.2% per annum in real terms⁴ and by 1980 the GDP was almost one billion US dollars and the GDP per capita about one thousand US dollars. From 1980 to 1987 annual GDP growth was 13%, the highest in the world⁵ and by 1988 the GDP had reached 3.27 GPula (about 1.8 GUSD). But this has led to an economy "in some ways like an oil state, with an enclave producing substantial wealth that has had relatively little direct impact on the majority of the population"⁶, though the provision of welfare, education and infrastructure has improved dramatically with increasing mineral revenues.

Botswana has a small population (about 1.3m) and the second lowest population density (2/km²) in the region after Namibia (1.5/km²). The country has experienced relatively high inflation in the 1980's, about 130% to 1988, mainly due to imported inflation from the country's main trading partner, South Africa, rather than because of domestic policies. Similarly the Pula has been devalued from 1.35 US dollars to the Pula in 1980, to 1.83 Pula to the US dollar in 1988, in line with the devaluation of the South African Rand, but this is well above the Rand which was 2.26 to the USD in 1988.

8.1 BOTSWANA, BASIC ECONOMIC INDICATORS (Pula)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	.88	.94	.98	1.01	1.05	1.09	1.13	1.17	1.21
Pop.density	/km ²	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0
Forex Rate	/USD	.74	.88	1.06	1.10	1.30	1.90	1.86	1.66	1.83
CPI ¹		100	119	134	146	155	170	189	207	229
GDP mp ²	G	.70	.78	1.03	1.28	1.52	2.14	2.45	2.61	3.27
GDP/cap	USD	1074	942	995	1150	1116	1037	1170	1344	1472
Exports fob	M	391	331	467	697	857	1383	1615	2645	2710
Imports cif	M	538	664	704	806	895	1095	1332	1572	2010
Trade Balance	M	-146	-333	-236	-109	-38	289	283	1072	700
GFCF ³	G	307	305	320	338	484	412		484	
GFCF/GDP	%	44%	39%	31%	26%	32%	19%		19%	
Debt	GUSD	.15	.16	.21	.18	.18	.33	.39	.51	
Debt/GDP	%	16%	18%	22%	16%	15%	30%	29%	33%	
Labour Force	k	83	97	100	101	110	117	130	150	169
Govt Revenue*	G	271	283	370	511	755	1085	1461	1758	2131

Area: 600,000 km², Currency: Pula, *financial year to March 31

¹consumer price index, ²gross domestic product at market prices, ³gross fixed capital formation. Sources: CSO 1989.

Economic dependence on South Africa and South African capital is high due to Botswana's location, surrounded on three sides by South Africa and, until 1990, its dependency Namibia, due to its membership of the Southern African Customs Union (SACU), due to its limited size (population) and due to the ownership by South African capital of most of the economy, particularly the mining company, Anglo American/De Beers.

SACU earnings as a proportion of total export earnings have been steadily falling as mineral exports have increased, from 38% in 1980 to 14% in 1988 (average 25%), as has the percentage of trade (imports and exports) with South Africa, from 53% in 1980 to 32% in 1987. Between 1980 and 1987 the average proportion of imports from the RSA was 82% and exports to the RSA 9%.

8.2 BOTSWANA: DEPENDENCE ON THE RSA.

		1980	1981	1982	1983	1984	1985	1986	1987	1988	Avg ³
Exports fob	M	391	331	467	697	857	1383	1615	2645	2710	
SADCC	M	33	35	61	64	34	54	97	128		
RSA	M	26	58	56	59	76	78	91	111		
% RSA		7%	17%	12%	8%	9%	6%	6%		4%	9%
Imports cif	M	538	664	704	806	895	1095	1332	1572	2010	
SADCC	M	36	42	45	59	78	81	101	121		
RSA	M	467	581	609	670	698	814	1022	1251		
% RSA		87%	88%	87%	83%	78%	74%	77%	80%		82%
% Trade with RSA		53%	64%	57%	48%	44%	36%	38%	32%		
Govt Revenue ¹	G	271	283	370	511	755	1085	1461	1758	2131	
SACU receipts		102	104	114	156	155	149	192	234	291	
% SACU receipt		38%	37%	31%	31%	21%	14%	13%	13%	14%	25%
Labour Force	k	83	97	100	101	110	117	130	150	169	
Miners RSA ²	k	21	20	19	19	19	20	21	20	19	
% Labour force		26%	21%	18%	19%	17%	17%	16%	13%	11%	18%
Remittances		45	50	50	52	55	49	48	52	64	
% Exports ⁴		11%	15%	11%	7%	6%	4%	3%	2%	2%	7%

¹financial year March 31, ²migrants in RSA, ³average for years with data, ⁴remittances as a % of exports.
Sources: CSO Bot 1989, Dept of Mines 1989.

In a crisis-ridden Africa Botswana today appears as one of the few buoyant economies. Based on huge mineral resources, this expansion has created a situation where Botswana exhibits a very favourable balance of payments situation. Foreign reserves stood at 3.0 billion US dollars in 1989. This situation, by no means unique to Botswana (other low population mineral rich countries such as Gabon, Papua New Guinea and small oil countries, are similar), raises the question...

“...to what extent Botswana's experience can be characterized as a development process containing the seeds of structural change, or is just another case of growth without development.”⁷

The Mining Sector

General

Until the 1970's agriculture and cattle were the mainstay of the Botswana economy. Today mining is by far the most important economic activity in terms of value, accounting for 40% to 50% of GDP (average 36% for 1980-88) and up to 90% of exports (average 80% for 1980-88) but only 6% of formal employment (average 8% for 1980-88) as the industry tends to be extremely capital intensive.

In 1989 the Botswana mining industry produced 1515 MUSD of minerals but only employed 10,599 workers while, on the other hand, mineral production in neighbouring Zimbabwe was only 4563 MUSD but the less capital intensive industry there employed five times as many people (54,500 workers)⁸. The value of mineral output per miner is the highest in the SADCC region at 114,000 USD/miner in 1988.

8.3 BOTSWANA, BASIC MINERAL SECTOR DATA (Pula)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	Avg ¹
GDP Mining M	204	130	286	405	553	1005	1211	1175	1435	
% GDP Mining %	29%	17%	28%	32%	36%	47%	49%	45%	44%	36%
Min. Prod. ² M	304	288	478	618	961	1031	1245	1360	2155	
Min.Exports M	319	225	325	538	684	1169	1323	2371	2350	
% Min.Exports ³	81%	68%	70%	77%	80%	85%	82%	90%	87%	80%
Min. labour ⁴ k	8.1	8.5	8.8	9.0	9.2	9.4	9.5	9.6	10.3	
Expat.labour ⁵	.71	.72	.71	.70	.66	.66	.62	.65	.68	
% Expat.	8.8%	8.5%	8.1%	7.8%	7.2%	7.0%	6.6%	6.7%	6.6%	7%
% mng labour ⁶	9.7%	8.8%	8.8%	8.9%	8.4%	8.0%	7.3%	6.4%	6.1%	8%
M.Prod/lab ⁷ kUSD	51	38	51	63	80	58	71	85	114	68
avg wage/an ⁸ k	2.23	2.67	2.99	3.69	3.78	4.21	5.58	5.85	6.28	
avg REAL wage	2.23	2.24	2.23	2.53	2.44	2.47	2.95	2.83	2.74	2.52
Mng Revenue M	101	77	99	194	376	581	845	1034	1327	
% Mng Revenue ⁹	37%	27%	27%	38%	50%	54%	58%	59%	62%	46%

¹average 1980-88, ²mineral production, ³mineral exports as a % of total exports, ⁴mining sector labour, ⁵expatriate labour, ⁶mining labour as a % of total formal employment, ⁷mineral production per labourer in kUSD, ⁸average annual wage, ⁹mineral revenue as a % of total govt. revenue. Sources: CSO 1989, Dept of Mines 1989.

Since 1981 mining has replaced the SACU as the principal source of government revenue and by 1988 the industry contributed 62% of government receipts through taxes and royalties (average 46% for 1980-88). Expatriate labour in mining, as a proportion of the total mining labour force, dropped steadily until 1984 when it levelled off at about 7%. By far the majority are white South African employees of Anglo American and De Beers.

The mining sector's contribution to formal employment is small and has fallen from 10% in 1980 to 6% in 1988 (average 8%) due to the capital intensive nature of open-cast kimberlite pipe mining. In 1988 migrants on the South African mines were double the workforce on the national mines. In general miners' salaries have kept ahead of inflation and in 1988 average mining sector wages were 23% higher than 1980 in real terms. In 1988 mining wages were 70% higher than the national average for the formal sector and six times those for the agricultural sector⁹. This has resulted in a relatively "tame" mine workers union with almost no industrial disputes.

The start of diamond mining in 1971 initiated a new era in Botswana's economic development. A significant switch occurred between agriculture, whose share of overall GDP contracted, and mining, whose contribution to GDP rose spectacularly. Similar dramatic changes were not found in any other sector, although trade recorded a modest growth in its share of GDP. Manufacturing and general government even declined somewhat.

Mining's contribution to capital formation is not, on the other hand, particularly significant apart from a few years in the early 1980's. Quite common for this kind of raw material based economy is the important role of the government sector for maintaining the investment level. The 1970's and 80's was

a period when Botswana's dependence on mining deepened considerably. This pattern is clearly visible when it comes to external trade. Diamonds clearly dominate with 60 per cent of total export value in 1980, rising to 74 per cent in 1988 while copper-nickel matte accounted for 22 per cent in 1980, but fell to 14 per cent in 1988, even with the exceptionally high nickel prices that year.

The mining industry in Botswana is dominated by three giant foreign companies: Amax Inc of the USA (30%), Anglo American Corporation of South Africa Ltd (30%), and De Beers Consolidated Mines Limited (DeBs). De Beers and AAC are virtually the same company with each owning a controlling share in the other. These international corporations, primarily South African based, control the production of Botswana's three key minerals, diamonds, copper-nickel matte and coal.

Economic Geology

Superficial deposits of Kalahari sands, of Tertiary to Recent age, thinly mantle about 80% of the surface of Botswana, concealing much of the solid geology. Two principal tectonic domains predominate, firstly: the ancient cratonic regions which have been stable for billions of years and, secondly, the mobile belts which have suffered various phases of deformation/ metamorphism. Baldock¹³ proposes a third, arbitrary, division of "platform areas", consisting of undeformed supracrustal rocks of various ages overlying the cratons and mobile belts.

The cratonic regions or stabilised blocks occur in the east (Zimbabwean craton) and the south-east (Kapaal craton) with the Limpopo mobile belt in between them and consist of granitic and gneissic rocks surrounding Archaean schist belts (greenstone or gold belts) which comprise a volcano-sedimentary sequence containing economic deposits of gold, copper-nickel, copper, iron and minor base metals. The Zimbabwean craton also hosts the Bushman Mine Series (Matsitama) of Proterozoic calcareous sediments containing stratiform copper deposits genetically similar to those of the Lomagundi in Zimbabwe.

The Limpopo mobile belt in the extreme east contains reworked pieces of Archaean schist belts with nickel-copper-cobalt mineralization, the most important of which are the Selebi-Phikwe deposits, and minor iron occurrences. The later, Damaran belt in the north-west is extensively covered by Kalahari sands and therefore is not well exposed. However it is known to contain important stratiform copper mineralisation in argillites of the Ghanzi Group probably formed in a similar environment to those of the Zambian Copperbelt¹⁴.

The oldest platform cover rocks are those of the Ventersdorp and Transvaal Supergroups which extend over the border from South Africa, on the Kapaal craton, in the southeast of Botswana and contain manganese/iron deposits at Kgwakgwe and Lobatse and an igneous complex, similar to that of the platinum and chromite Bushveld Igneous Complex (BIC), has been located in the south at Molopo Farms. The rocks of the Proterozoic also contain minor deposits of base metals and lead-zinc in the extreme south-east of the country.

The sediments of the Waterberg Supergroup unconformably overlie the Transvaal Supergroup, and the Limpopo mobile belt, is intruded by numerous syenitic and doleritic dykes and sills, and contains iron (manganese) deposits. The associated Shoshong Group contains deposits of manganese and iron in arkose and limestone formations.

Sediments of the Karoo Supergroup form a basin running across the country from the south-west to the north-east and contain enormous reserves of coal in the Middle Ecca sediments of the Morupule and

Mmamabula areas. The Kalahari Formation consists of continental clastic sediments overlain by, partially consolidated, aeolian (windblown) sands. The Recent pan and deltaic sediments currently under formation contain important deposits of soda brines in the Makgadikgadi pan.

Finally, the economically most important rocks are the numerous kimberlite pipes intruding the Karoo in the Orapa area and the Kaapvaal craton in the Jwaneng area. These pipes host the diamonds that constitute the bulk of the value of the nation's mineral production and are the source of Botswana's spectacular growth over the last two decades.

Mining Policy

The sixth National Development Plan, 1985-91, states that:

“Development of mineral resources is not an economic objective in itself, rather it is a means to an end. The ultimate objective of mineral development is to realise the maximum national economic benefit from available resources in terms of local value added by the minerals sector”¹⁰

More specifically, the Plan outlines six general contributions that the minerals sector is expected to make towards national development objectives:

- 1) Generate productive economic activity.
- 2) Provide economic activity in the rural areas.
- 3) Generate government revenues for rural development.
- 4) Provide employment.
- 5) Generate indirect economic activity by mining inputs supply
- 6) Training of locals to replace expatriates¹¹.

These objectives are particularly bland and all except the last would occur automatically with the expansion of mineral production. Significantly, no mention is made of any objectives on the downstream processing of minerals for the establishment of local industry based on mineral resources and no mention is made of the crucial area of ownership of the minerals sector. If all of the stated objectives are achieved, Botswana will have made no progress in changing the structure of the minerals industry from that of an enclave, oil-type sector, vertically linked to the developed countries, to that of the primary sector for local resource-based industrialisation.

The National Development Plan goes on to define five specific policy objectives for the minerals sector:

- 1) maximise mineral exploration and exploitation,
- 2) maximise national benefits from mining,
- 3) maximise local value-added,
- 4) maximise employment of nationals,
- 5) minimise environmental damage¹².

Here again, except for the third, the objectives are bland and make no attempt to restructure the present role of the mining industry. In terms of the two decades preceding this Plan, these policies are essentially “more of the same”.

The mining industry is governed by the Mines and Minerals Act of 1976. According to Johnson there are five different aspects to be considered in the Botswana mining policy.¹⁵

- 1) Mineral rights vested in the government: All mineral reconnaissance, prospecting and mining operations are controlled by the Mines and Minerals Act, which stipulates that all rights of ownership of minerals are vested in the State. In 1967, mineral rights on tribal lands were transferred to the

government, with the exception of common building materials. However, in the Tribal Territories this stipulation may be modified by the provisions of the Mineral Rights in Tribal Territories Act. Large areas with important minerals potential were held in private hands. The transfer of these rights to the government was expedited after the enactment in 1972 of a substantial tax on privately held mineral rights.

2) The role of the private sector: The private sector is assigned a major role in the exploration and development of the country's mineral resources. To date, the government has been far more successful in making large multinationals follow its guidelines and policies than small local companies, as almost all investment in exploration is by the TNCs. Government involvement and monitoring of private sector activities includes: equity and board participation; regulation through its Mines and Geological Survey Departments; and the use of specialised consultants.

3) Mineral exploration: A clear concessional system, combined with a policy of releasing geological information to potential investors, are the major tools for encouraging prospecting. In Botswana there are three types of concessions, a reconnaissance permit, a prospecting licence and a mining lease.

A reconnaissance permit can be issued to any individual or company. Such a permit can last for a maximum period of one year and it is offered free of charge. The only obligation to the government is that a report on the activities should be filed within three months after the expiry period. Possession of a permit does not, however, guarantee a prospecting licence.

A prospecting licence covers an area of 1,000 km² or less and can initially be issued for a period of three years and thereafter it can be renewed twice for two years. An application must contain a satisfactory work programme, including a financial commitment. Holding of a licence does not automatically give a right to obtain a mining lease, but a prospecting licence is a pre-requisite for obtaining a mining lease.

Application for a Mining Lease is made to the Minister of Mineral Resources and Water Affairs, through the Mining Commissioner. A Mining Lease is subject to specific terms that are the outcome of negotiations between the parties. Its maximum validity is for 25 years, but may be extended for up to another 25 years.

4) Negotiation and administration of mineral agreements: Generally speaking, government has indicated that private investors should be able to earn a "reasonable" return on their investment. However, what shall be regarded as a "reasonable" return has never been quantified. The government feels that this must be determined on a project-by-project basis.

Royalty is calculated on sales revenue (gross marketable value of the mineral or mineral products less any costs incurred for the transport of output prior to disposal, for insurance and other costs). Rates for different minerals usually vary between 3 and 10 per cent. Free government equity is normally demanded, varying from 15 per cent up to 25 per cent. Government may increase its equity, by purchase, up to 50%. Normal company income tax is applicable and the current rates is about 40 per cent. A withholding tax of 15 per cent of repatriated profits can also be levied.

Following negotiations between the parties, a tailor-made package is agreed upon. According to Johnson, the government enters such negotiations well-prepared and with a clear conception of the viability of each project.

“Government analysis includes an estimation of the internal rate of return to the investor in both current and constant terms and also estimates the government’s net present value of revenues for different fiscal regimes. Because of differences in the discount rate between government and the investor, it has been possible to vary depreciation and government paid equity to a project in order to increase both the government’s net present value and the company’s internal rate of return to produce agreements that might not otherwise have been achieved.”¹⁶

5) Government control of infrastructure: The most sensitive issue concerns the additional costs involved for building up supporting infrastructural facilities. Companies have been reluctant to pick up non-mine related infrastructure costs, even when the overall impact on the internal rate of return on their investment has been minimal. In this regard the rail link for the new Sua Pan project will be financed by the state.

Mineral Production

General

Traditional mining of gold and copper has been carried out in Botswana from five to seven hundred years ago when the schistbelts (goldbelts) in the north-east of the country, around Francistown, were part of the gold mining areas of the Munhumutapa Empire of Zimbabwe. It is estimated that these miners extracted six tonnes of gold from the Tati reefs alone before the decline of the Empire¹⁷. The Monarch reefs near Francistown were the site of the first European mine in southern Africa which started production as early as 1869 and by the late 19th Century there were numerous small gold operations in the Tati area.

8.4 BOTSWANA, MINERAL PRODUCTION.

		1970	1975	1980	1985	1986	1987	1988	1989	Avg	80-89
VALUE	MP	4	53	304	1031	1245	1359	2155	3050		
Coal	kt	0	71	371	437	500	579	613	663	424 ¹	79%
Cobalt	kt	.000	.092	.226	.222	.162	.182	.298	.215	.220 ²	-5%
Copper	kt	.0	6.5	15.6	21.7	21.3	18.9	24.4	23.4	17.6 ²	50%
Diamonds	Mcts	.6	2.4	5.1	12.6	13.1	13.2	15.2	15.3	7.4 ³	200%
Gem Stones	t	13	45	20	14	5	40	38	146	40 ³	630%
Gold	t	.000	.000	.000	.013	.025	.032	.021	.067	.024 ⁴	
Lime	kt	.00	.00	.00	2.60	.23	.34	.23	.00	.46 ⁵	
Manganese	kt	48.3	.0	.0	.0	.0	.0	.0	.0		
Nickel	kt	.0	6.4	15.4	19.6	19.0	16.5	22.5	23.3	16.7 ²	51%
Talc	kt	.04	.14	.08	.00	.00	.00	.00	.00		

¹1976-88, ²1974-88, ³1970-88, ⁴1981-88, ⁵1982-88
Sources: Department of Mines, 1985/9.

In terms of value, mineral production has increased from four million Pula in 1970 to over two billion Pula in 1988. In 1970 mineral production was restricted to diamonds (583 kcarats), manganese (48.3 kt), talc (36 t), semi-precious stones (13 t) and building aggregate. Diamond mining took off in 1972, coal in 1973 and copper-nickel-cobalt in 1975, while manganese production ceased in 1973.

Diamonds

The history of diamond mining in Botswana starts when the first significant diamond discovery was made by De Beers Prospecting (Pty) Ltd in 1967, near a cattle post called Orapa. De Beers Botswana Mining Company (Propriety) Limited (Debswana) was formed in 1969 to develop these deposits. The mine was initially designed to produce 2.5 million carats a year and went into production in 1971.

Continued exploration revealed two further payable, but smaller pipes, at Letlhakane in the vicinity of Orapa. The partners in the company entered into negotiations for the exploitation of these pipes and also for an expansion of the Orapa plant. In 1973 De Beers geologists discovered the Jwaneng pipe.

The government increased its shareholding in Debswana from 15 to 50 per cent in 1975, when preparations for expanding Orapa and opening up production at Letlhakane started. In 1976 negotiations were opened up between De Beers and the Botswana government on Jwaneng. The negotiations were protracted and reflected the government's belief that the original mining agreement should be altered as Orapa had proved more profitable than originally foreseen. Details of the new agreement have not been disclosed, but the net effect is estimated to have raised the government's take of profits, through income tax, royalties and dividends, from 50 to 70 per cent.

The only mining company producing diamonds in Botswana is Debswana which is managed by Anglo American Services Limited. In 1989 the three operations, Orapa, Letlhakane and Jwaneng, produced 15.252 million carats of diamonds from 16.16 million tonnes of ore (0.94 carats/tonne). The three mines have been a key factor in the recent economic growth of Botswana and the future prospects of the country will continue to be intimately tied to their production. Reserves at all three operations are expected to last well beyond their 25 year leases¹⁸ and at Jwaneng, which is the richest kimberlite pipe in the world, opencast operations will continue for 40 years before production starts underground¹⁹.

8.5 BOTSWANA, DIAMOND PRODUCTION

<u>1989</u> Mine	Ore (Mt)	Diamonds		Grade (cts/t)
		(Mcarats)		
Orapa	7.338	6.063	40%	0.83
Letlhakane	2.996	0.774	5%	0.26
Jwaneng	5.828	8.415	55%	1.44
Total:	16.162	15.252	100%	0.94

Source: Dept of Mines 1990, page 13.

Due to Jwaneng, not only does Botswana's overall output exceed that of South Africa in volume, but it also contains a higher proportion of gem diamonds. Only 20 per cent of Jwaneng's output is estimated to be industrial compared to 50 per cent of Orapa's output. In 1988 Debswana's output exceeded the combined production from all De Beers' mines (South Africa and, Namibia). Consequently, Debswana plays a significant role for De Beers' group mines, as it contributes over 60 per cent of total group output²⁰.

In 1989 De Beers stated that of their retained profits of 2.3 billion Rand (over one billion USD) for 1988, only 23% came from their South African and Namibian operations, while 77% came from "elsewhere"²¹. Part of this 1.77 billion Rand (780 million USD) would have come from their operations in Botswana.

8.6 DEBSWANA, FINANCIAL PROFILE (MPula)

	1982	1983	1984	1985	1986	1987	1988
Capital Employed	436	458	478	509	572	990	1104
Fixed Assets	425	444	459	481	517	571	669
Debt	0	0	0	0	0	0	0
Tax	na	118	171	322	370	673	582
Profits	82	177	257	483	555	1009	873
Profit/capital	19%	39%	54%	95%	97%	102%	79%

Source: Debswana 1984-89

The Debswana operations have proved to be extremely profitable and in 1987 the return on capital employed was over 100% and the average return for the period 1982 to 1988 was 69%.

The marketing of diamonds internationally has, as is well known, been the prerogative of De Beers Central Selling Organisation (CSO). During the latter part of 1980, CSO stockpiled some of its diamonds in order to counteract price falls. Prices have since then gradually improved with "the exceptionally high rate of growth in world retail sales of diamond jewellery (which has) provided the impetus for increased CSO sales and continued expansion of the diamond industry worldwide"²².

The government of Botswana became a minor shareholder in De Beers in 1987 when, in July that year, De Beers purchased Debswana's entire diamond stockpile, accumulated during the 1982-85 period of weak demand. Debswana was paid a cash sum of undisclosed amount together with 20 million shares in De Beers, corresponding to a 5.27 per cent interest in the total capital of De Beers. The government of Botswana consequently now holds a 2.63 per cent effective interest in De Beers, valued at 380 million USD at the time of the transaction²³.

The deal has a commercial motivation, but can also be seen in the context of increasing political pressure on South Africa. De Beers is anxious to keep its monopoly position in diamond marketing, and the Debswana deal makes the links closer between Botswana and De Beers, reducing the risk to De Beers that Debswana might seek to market its output independently. In addition, one of the Front Line States (FLS) now has a vested interest in the maintenance of a capitalist system in a post-Apartheid South Africa, as it is unlikely that they would not oppose the nationalisation of their shareholding. Although in 1990 this holding moved to De Beers Centenary in Switzerland, this new company still owns the South African and Botswanan operations.

Since 1974 preliminary sorting of diamonds has been carried out in Gaborone by the Botswana Diamond Valuing Company, a Debswana subsidiary, before the stones are channelled via the CSO to the international market. The stones are flown via Kimberley to London for marketing by the Diamond Trading Company (DTC). The government has also taken steps to establish direct marketing of polished stones, on a small scale, to diamond trading centres; Mabrodium NV, a Belgian diamond cutting firm, was given permission by the government to establish a diamond cutting operation in Gaborone in 1979. In November 1982, Orapa House, Botswana's new diamond sorting headquarters was opened in Gaborone and has recently been expanded to handle 17 Mcarats/annum. In practice, however, the marketing monopoly held by the CSO is really not threatened.

Copper-Nickel-Cobalt

Copper/nickel deposits were discovered in 1966 at Selebi and Phikwe by Bamangwato Concessions Ltd (BCL). This company is a subsidiary of Botswana RST Ltd (incorporated in 1967) which controls 85 per cent of the shares, with the Botswana government having a 15 per cent interest. Botswana RST Ltd, in turn, is jointly owned by Amax Nickel Inc, based in the US, Anglo American Corporation and different private concerns.

Production from Phikwe started in February 1974, using both underground and open pit methods. A concentrator/smelting operation was also established at Phikwe. However, the mine soon ran into operating problems, particularly with the Finnish (Outokumpu Oy) flash furnace which was the largest in the world at that time. Due to these problems, the initially designed production capacity of 45 kt annually was not reached until 1977 and, as a consequence, BCL was unable to repay its massive debt and interest.

The poor financial situation was further aggravated by a decline in the price of nickel and copper during the late 1970's and most of the 1980's. In 1979 a complex restructuring of the debt took place, and again in 1982, so that only 30 per cent of the debt remained payable as senior debt. This was deferred until 1985 and then rescheduled over a 10 year period from 1986 to 1995.

In 1982 the combined effect of low metal prices, high interest rates and foreign currency losses (most of the debt is foreign) due to the Pula's depreciation had created a situation where the mine actually should have been shut down, on commercial grounds alone. However, with 5,000 workers, the mine is one of the country's largest employers and a continuation of operations was regarded as necessary and the rescheduling of the debt was effected. The partners were responsible for their share of the debt and thus preferred to reschedule than to payout the debtors, as the mine has consistently made an operating profit (before interest payments).

As part of the 1985 restructuring, Anglo American Corporation, AMAX and the government agreed to extend the existing emergency funding facility in the ratio 37.5-37.5-25. Finally, the mining lease was amended to increase the royalty due to the government from 3 per cent to 3.41 per cent of the gross metal value in the matte as from 1986.

8.7 BOTSWANA RST, FINANCIAL PROFILE

(MPula)	1982	1983	1984	1985	1986	1987	1988	1989
Capital Employed	304	295	296	384	184	159	323	365
Fixed Assets	324	335	385	462	280	281	288	319
Turnover	64	68	78	120	99	129	421	432
Debt	540	637	865	1323	1326	1281	1629	1583
Tax/Royalties	0	4	5	7	6	7	16	20
Profits	-129	-106	-227	-323	-8	25	-182	93
Debt/Capital	178%	216%	292%	344%	721%	806%	505%	434%

Source: Botswana RST 1983-90.

By 1989 the company had a crippling debt of 1.58 billion Pula, four times the capital employed (365 MPula). In that year, however, it made a profit of 93 MPula due to exceptionally high nickel prices, but the accumulated deficit still stood at 1.25 billion Pula²⁴.

During 1987 there was a major overhaul of the flash furnace which allowed for exceptional output in 1988 of 57.5 kt of matte containing 22.5 kt of nickel, 24.4 kt of copper and 298 tonnes of cobalt. In 1989 the company received a SYSMIN loan of 21.7 MECU from the EEC for exploration and partial re-equipping.

In 1985 Amax agreed to an early termination of its refining contract, if it received compensation (30 MUSD) for loss of matte feed to its Port Nickel refinery in Louisiana. The main new contract is with Falconbridge International of Bermuda, a subsidiary of Canada's Falconbridge now owned by Noranda (USA). BCL will supply Falconbridge's Kristiansand refinery in Norway with 42 kt of matte annually from 1987 until the 14-year agreement expires in 1999.

A second contract is with Centametall of Zug, Switzerland, an international metals trading subsidiary of RTZ Corporation²⁵, for the supply 10.5 kt/an of low sulphur matte from 1986, for a 10 year period. Supplies to Centametall are to be toll-refined by Empress Nickel Mining Company (ENMC), a wholly-owned subsidiary of Rio Tinto Zimbabwe (RTZim), at its Eiffel Flats refinery (RTZim is controlled by RTZ PLC of the UK which has a 56 per cent stake), which had been placed on a care-and-maintenance basis, following the closure of the Empress Nickel Mine during 1982. A small amount of matte (about 3 kt/an) is also supplied to the Anglo American's Bindura Nickel Refinery in Zimbabwe, but this deal will expire in 1990.

Given the corporate linkages between RTZ and Centametall this contract is open to transferring RTZim profits out of Zimbabwe. Conclusive evidence is, not surprisingly, not at hand. But if RTZim is toll-refining at less than the normal, say Kristiansand's, price then a lower profit is made by RTZim and the difference is effectively located in Switzerland (with lower tax and no repatriation limits) instead of Zimbabwe.

In 1988 Tati Nickel Mining Company (Pty) Ltd was granted a mining lease over the Selkirk and Phoenix deposits, east of Francistown in the Tati Archaean schist belt, and production started in 1989 at an initial rate of 60 kt/annum of ore which is toll-smelted by BCL²⁶ and then toll-refined at the Empress refinery in Zimbabwe (2.4 kt of matte per annum). This is a joint venture between Centametall (see above), which holds 51% of the equity, and a group of UK investors. The operation is managed by BCL and reserves at Selkirk are reported to be 1.2 Mt at 2.4% Ni²⁷ and 1.3% Cu²⁸. Although the current production rate only constitutes 2% of BCL's feed, the development of the large Phoenix deposits (2.9 Mt at 2% Ni and 0.8% Cu) could represent a major new source of ore²⁹ which will be developed by BCL under contract to Centametall. The Phoenix ore will also be toll-smelted by BCL and toll-refined by Empress (about 6.5 kt of matte/annum from 1993) which will bring the latter up to full capacity.

The reason why this deposit was not developed by BCL is most probably that, given its huge debt, it could not raise the necessary extra capital, which a new company could. The ramifications of having a purchaser of BCL matte, Centametall, also a supplier of BCL feed, are still unclear.

Coal

Exploration was carried out in the Morupule and Mmamabule areas by the Geological Survey of Botswana between 1952 and 1962 and detailed proving of the Morupule coalfield in 1972. The Morupule Colliery, 93 per cent owned by the Anglo American Corporation, was developed in 1973 to supply the Selebi-Phikwe mine for its smelter and for power generation, by the Botswana Power Corporation (BPC), and accounts for 100 per cent of Botswana's coal production³⁰.

The coal is classified as steam coal (ash 18-24%, CV 23-25 MJ/kg)³¹, in situ reserves amount to 8 Gt³² and output has been expanded to 650 kt/an, half of which goes to meet the requirements of the 123 MW Morupule thermal power station (BPC). The colliery presently supplies the Gaborone and Selebi-Phikwe thermal power stations and the Orapa/Letlhakane diamond mines and provision is being made to supply the Sua Pan soda ash project (see below). Plans to expand production to 1 Gt/an by 1992 are being implemented³³.

The main constraint for developing the huge coal mining potential of Botswana for sale on the world market is the distance to coal-handling ports. The construction of a new large coal mine is dependent on the building of a railway line from eastern Botswana across the Kalahari desert and Namibia to Walvis Bay, which was considered in the early 1980's by Shell Coal Botswana (the Kgaswe Project) but found not to be viable. It was estimated that the Trans-Kalahari railway would cost over one billion USD then (1984) and that an international coal price of at least 60 USD/t (in 1984) would be necessary for the project to be viable³⁴, but given the independence of Namibia, though not yet Walvis Bay, the project is likely to be resuscitated.

Soda Ash

Sua Pan is the most easterly part of the Makgadikgadi depression which contains a brine saturated aquifer rich in soda ash (sodium carbonate) and common salt (sodium chloride) estimated at 2.4 billion cubic metres of brine³⁵ over a 200 km² area. This resource was investigated by RST Exploration Limited in the 1960's, but nothing came of the feasibility study carried out by Arthur D. Little Inc of the USA.

Soda Ash Botswana (Pty) Ltd was formed by BP Minerals, who bought RST in the late 1970's but "...the project was put on ice in 1984 when South Africa refused to ratify a marketing agreement unless Botswana signed a non-aggression pact..."³⁶ similar to the, now infamous, Nkomati Accord of 1984 between the RSA and Mozambique. After BP Minerals pulled out Soda Ash Botswana was taken over by African Explosives and Chemical Industries (AECI, an AAC company) of South Africa, with AAC and De Beers (52%) and the Botswana Government (48%), and South Africa's plans for a synthetic plant were shelved.

The project will cost just under one billion Rand and will start production in 1991. It will produce 300 kt/annum of soda ash and 650 kt/annum of salt, principally for the South African market, generate export earnings of about 100 MPula/annum and employ about 500 people³⁷. The Government's share of the cost is reported to be 270 MPula for the 48% equity and 125 MPula for infrastructure, mainly for the 165 km Sua Pan - Francistown rail link³⁸.

Although some of the product will be purchased by SADCC countries (mainly Zimbabwe and Zambia) in the spirit of SADCC's policy of collective self-reliance, the project goes counter to one of SADCC's principal objectives, that of decreasing dependence on the RSA. Not only will most of the output be dependent on the South African market, but the plant will be owned and run by South African companies. "However, with an estimated 85% of its export revenue already coming from the De Beers controlled diamond operations, Botswana has become used to a life of compromise"³⁹.

Other Minerals

Small amounts of gold are produced at rate of 10-30 kg per annum from old tailings dumps (Golden Sands and Shamrock) and small-scale underground operations (Mineral Holdings and Morex) mainly in the Tati schist belt. In 1989 production started from the Map Nora underground gold mine owned by the Shashe Mining Company, which is a joint venture between Falconbridge (Canada) and Phelps Dodge (USA), and from the new Metore (Pty) Limited operation.

Other mining operations include clay for bricks and tiles (Makoro, Clayton, Kwena and Foley), lime (226 tonnes in 1988), crushed stone (338 cubic metres in 1988) and semi-precious stones (38.6 tonnes in 1988). Manganese ore was produced from 1957 until 1973 from the Kgwakgwe, Lobatse South and Otse deposits, but most of the high grade economic ore has been removed. Exploration in the sedimentary basins of western Botswana has thus far come up with nothing, though work is continuing.

A SADCC/UNRFNRE report of 1988 proposed the further exploration of the Matsiloje limestone deposit, in the north-east near Francistown, as the possible base for a local cement industry, which has been taken up by the Botswana government⁴⁰. The Geological Survey has already conducted a survey of the deposit.

In 1989 a US firm, Interkiln of Houston, signed a joint venture agreement with the Botswana Development Corporation (BDC) for the construction of a brick and tile factory based on the Woodhall clay deposits near Lobatse at a cost of 18 MPula, mainly for the local market, but also for export to South Africa⁴¹. Given Botswana's membership of the SACU, it would appear to be inevitable that a feasibility study of any industrial mineral development will include an assessment of the South African market, thereby increasing Botswana's dependence on that economy.

A layered intrusive thought to be an outlier of the Bushveld Igneous Complex (BIC) in South Africa has been located under the Kalahari sands in southern Botswana near Werda. The prospect (Molopo Farms) is being investigated by Molopo Australia Ltd and Inco (Canada) for platinum group metals. Molopo are also assessing several kimberlite pipes near Jwaneng.

Infrastructure

The infrastructure in the narrow eastern strip, between the desert and the South African and Zimbabwean borders, has improved remarkably in the last two decades, as has road access to the two diamond mining areas (Orapa and Jwaneng), but the vast western hinterland remains practically inaccessible.

Good condition tar roads now run from the Kazungula ferry on the Zambezi River, in the north, down to the Mafekeng road border in the south. There international surfaced road connections are to South Africa and Zimbabwe (Plumtree), but no good road connection exists yet with Namibia, though an upgrade of the Caprivi Strip route is under consideration, particularly for future trade between Namibia and Zimbabwe.

The railway put in by Rhodes in the 1890's, from Mafekeng (RSA) to Plumtree (Zimbabwe) is still all that exists except for minor spurs to Morupule and Selebi-Phikwe. The planned Sua Pan link will be the first major rail extension for a century. The Trans-Kalahari rail link to Gobabis in Namibia is still under consideration.

The power grid covers all of the eastern strip and is linked into both the Zimbabwean and South African grids. The Zimbabwe link was as a result of a Canadian-funded (CIDA) SADCC initiative. In 1987/8 Morupule power station supplied 59% of demand, Selebi-Phikwe 32%, Gaborone 0.6% and imports from South Africa 8.5%⁴².

The construction of the Seretse Khama international airport and the establishment of an earth satellite station have made Botswana independent of South Africa for air links and telecommunications with the rest of the world.

Discussion

In conclusion the present rather favourable economic situation of Botswana is the result of a development process which started in the mid-1970's. This process exhibits some very distinct features:

- * A rapid and unbalanced growth in the GDP
- * A rapid growth in the contribution of mining to total GDP
- * A considerable reduction in the relative and absolute contribution of agriculture to GDP
- * A quickly growing external trade, fuelled by mining activities
- * A strong growth in government revenues, primarily caused by mining revenues and the SACU

Although the economy experienced a temporary slump in 1980-82, growth resumed from 1982 onwards largely as a result of the start of production from the new Jwaneng diamond mine and the depreciation of the Pula. Botswana is heavily dependent upon diamond production and international diamond prices (half of government revenue and three-quarters of exports are from diamond mining). Few if any of the other economic sectors can be expected to contribute anything of significance to the general growth of the economy in the near future.

The structure of the international diamond market is, however, simple in the sense that it is more or less completely controlled by the De Beers dominated Central Selling Organisation (CSO), which is in a position to determine prices. This leaves a country like Botswana in a situation where it will have very little control over the crucial marketing aspects of diamond production a control which would be desirable as market considerations can easily make or break the Botswana economy.

Thus, with an economic structure heavily dependent on the extraction of minerals and with very little room for manoeuvre on the international market for these minerals, the Botswana government is left with few options for independent development. The extent to which the exploitation of her natural resources is controlled by the country herself is of course another crucial matter.

The lopsided growth process, generated by the mining industry in general and the diamond mines in particular, has created a very unbalanced economic structure. The mining industry has had very few positive influences on the development of other economic sectors, except perhaps the public sector and the provision of infrastructure. Unemployment has been rising faster than new jobs even though real GDP growth has outpaced population growth; this is in part due to the capital intensive nature of mineral driven growth over the last two decades. Due to Botswana's small market, it has been difficult to identify industries that would be viable after the eight year SACU infant industry protection period. In this regard Botswana could possibly gain from an integrated regional industrial strategy⁴³ that would locate certain facilities in Botswana to supply the regional market, but the regional industries would then want preferential access to the Botswana market for their products which would be difficult under the SACU.

The lot of the rural poor has not improved economically, though it has in terms of social services, due to the fact that the national cattle herd is at its maximum size⁴⁴ and because other forms of small scale agricultural growth are severely restricted by the low and unreliable rainfall. Ultimately, any plans for agricultural development come up against the hard fact that Botswana people are precariously perched on the edge of a semi-desert and it could well be more rational for Botswana to use its vast reserves of forex in joint ventures with its neighbours such as Zambia and Zimbabwe, who have many viable development projects that lack foreign currency.

The rapid development of the mining industry has deepened Botswana's dependence on the Republic of South Africa and South African mining capital, particularly the AAC- a dependence which even before was substantial through the membership in the South African Customs Union and the presence of Botswana migrant labour in the mines of South Africa. Today, South Africa mining capital controls the production and marketing of diamonds and it exercises a considerable influence on Botswana's copper-nickel and coal production as well. If the mining sector is further developed it is quite likely that not only will South African based mining companies increase their presence in the country, but that use of South African infrastructural facilities will increase as well.

Politically Botswana played an important role in the founding of the SADCC but due to its location, size (population) and historical links to South Africa (SACU and AAC), it has not benefited much from SADCC projects, mainly in infrastructure, and will find it difficult to participate in a regional industrial strategy while still a member of the SACU. The fact that it is the only SADCC member not to join the PTA, indicates its difficulties in participating in an alternative trade arrangement.

Thus, one may safely conclude that Botswana's continued economic progress is completely linked to an extensive development of its mineral resources. This in turn will deepen its present structural feature of a mineral economy with its built-in unbalanced character. Furthermore, continued reliance on mineral exploitation will increase its dependence on South Africa in general and South African mining capital in particular. This process will place important question marks with respect to the role of Botswana in the movement for the political and economic liberation of Southern Africa from the devastating influence of the apartheid regime in Pretoria. In fact time has proved the 1981 assessment of the South African government's Minerals Bureau to be substantially correct, that...

“Despite her oft-repeated opposition to South Africa's domestic policies, Botswana is for the present irrevocably tied to the RSA and it is to be expected that this co-operation between the two countries will likely increase”⁴⁵

Footnotes to Chapter 8

- 1 Machacha 1985. 2 Fage 1978, p338 3 Oliver 1972. 4 World Bank 1988. 5 *ibid*
6 Hanlon 1986, p219. 7 Carlsson 1987, page 35. 8 Jourdan 1989, p12.
9 CSO 1989. 10 MFDP 1985, p227. 11 *ibid*, p227. 12 *ibid*, p227.
13 Baldock 1977. 14 Baldock 1977. 15 Johnson 1981, p353.
16 Johnson 1981, p353 17 Machacha 1985. 18 Machacha 1985.
19 Mining Journal, Vol.313 No.8031, 1989, p92. 20 Mining Journal Ltd. 1989.
21 De Beers 1989, p12. 22 Mining Journal Limited, 1989.
23 "Mining Journal", Vol.309 No.7925, 1987, p23.
24 Botswana RST Limited 1990, p9.
25 EIU, Country Report, 2/1989, p33. However, RTZ deny any links to Centametail.
26 Department of Mines 1989, p3.
27 For comparison, the BNC mines in Zimbabwe grade about 0.7% Ni and 0.1% Cu,
thus this is an exceptionally rich deposit. 28 Mining Journal, Vol.312 No.8026, 30
June 1989, p503.
29 EIU, Country Report No.2, 1989, p33. 30 Mpe 1988. 31 Machacha 1985, p28.
32 Sebetela 1988. 33 Mpe 1988. 34 Financial Mail, 17 August 1984, p47.
35 Machacha 1985, p44. 36 Mining Journal, Vol.312 No.8003, 20 January 1989, p55.
37 "SA Mining, Coal, Gold and Base Minerals", Dec 1988, p29.
38 Mining Journal Limited 1989, pA116.
39 Mining Journal, Vol.312 No.8003, 20 January 1989, p55. 40 UNRFNRE 1988, p7.
41 EIU, Country Report No.4 1989, p29. 42 EIU, Country Report No.2, 1989, p34.
43 Tsie (1989b) comes to the same conclusion, but notes that the SADCC would need
a supra-national industrial planning authority. 44 Hanlon 1986, p233. However other
researchers contest this (Cliffe personal communication, 1990).
45 Minerals Bureau 1981, page 33.
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Chapter 9: Lesotho

Lesotho is a tiny mountain kingdom¹ completely surrounded by South Africa with an almost non-existent minerals sector and thus will be dealt with very briefly here.

The Basotho nation was welded together from refugees from the *difaqane*² by King Moshoeshe I from the mid-1820s onwards³. Under his leadership they were also able to hold out against both the British and the Boers, though they lost their best farmland to the latter (most of what is today the Orange Free State) and were finally forced to seek annexation by Britain in 1868 to keep the Boers at bay.

When the Union of South Africa was formed in 1910, Basutoland, as Lesotho was then called, became part of a customs and monetary union with South Africa. It gained independence from Britain in 1966 under the, pro-South African, Basotho National Party (BNP) led by Chief Leabua Jonathan. During the 1970 elections, when it became clear that Chief Jonathan was losing to the anti-Pretoria opposition Basutoland Congress Party (BCP), he abrogated the constitution and stayed in power, but subsequently changed to a much more anti-apartheid stance to try and regain support amongst the strongly anti-Boer Basotho people. In 1980 Lesotho became a founder member of the SADCC after rejecting the South African sponsored CONSAS concept and in 1982 it hosted the annual SADCC conference. In response, from 1979 the South African government sponsored the destabilisation of Lesotho, through the LLA⁴ of the BCP which had decided to collaborate with Pretoria, which culminated in South Africa imposing complete trade sanctions against the country in 1986, provoking a coup by the military against Chief Jonathan, led by Major General Lekhanya. But although members of the ANC⁵ were expelled, Lesotho remained in the SADCC.

9.1 LESOTHO: BASIC ECONOMIC DATA (Maloti)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7
Pop. density	/km	44	45	46	47	48	49	52	53	55
Forex Rate	/USD	.77	.89	1.10	1.12	1.47	2.24	2.25	2.04	2.26
CPI +		100	115	126	148	165	189	222	245	275
GDP mp	G	.297	.349	.369	.397	.471	.571	.647	.756	.930
GDP/cap	USD	285	287	240	247	218	170	182	229	248
GFCF *	M	100	111	128	134	151	183	229	279	362
GFCF/GDP	%	34%	32%	35%	34%	32%	32%	35%	37%	39%
Debt	GUSD	.063	.077	.118	.133	.139	.172	.182	.237	.281
Debt/GDP	%	16%	20%	35%	38%	43%	68%	63%	64%	68%
Govt Revenue	M	126	125	144	179	244	250	294	394	
SACU Receipts		71	71	79	110	152	161	144		
% SACU Rec. %		57%	57%	55%	61%	62%	64%	49%		

+ consumer price index, * gross fixed capital formation.

Source: IMR SADCC Databank 1989.

There was almost no economic development during 98 years of British rule, instead the country became a poverty stricken labour reserve for the South African mining industry. Exports as a percentage of imports averaged only 9% for 1980 to 1988, the difference being made up by the deferred pay and the remittances of migrants in South Africa which averaged 394% of exports for 1981 to 1987. The average amount sent home (deferred pay and remittances) by each miner has increased by 71% in real terms from 573 to 981 1981 USD from 1981 to 1987. Virtually all of the country's imports (average 96%) and two-thirds of its exports are from or to South Africa. Trade with the SADCC and PTA is almost non-existent due to its membership of the SACU, its geographic isolation and the lack of any export industries other

than a pharmaceutical company. Revenue from the SACU typically constitutes over half of government receipts (average 58% for 1980 to 1986).

9.2 LESOTHO: TRADE AND MIGRANT LABOUR (Maloti)

		1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports fob	M	47	45	41	35	42	49	58	95	137
SADCC	M	.1	.2	.4	1.7	.2	.3	1.1		
RSA	M	19	21	17	30	39	43	50		
% RSA		41%	47%	42%	87%	93%	88%	87%		
Imports cif	M	332	415	505	559	649	707	772	925	1049
SADCC'	M				1.0	.5	.2	1.5		
RSA'	M	322		475	542	599	671	756	784	
% RSA'		97%		94%	97%	92%	95%	98%	85%	
Trade Balance	M	(285)	(370)	(465)	(524)	(607)	(658)	(714)	(831)	(913)
exports/imports		14%	11%	8%	6%	6%	7%	8%	10%	13%
Miners in RSA	k	121	124	118	115	114	116	121	126	126
Remittances*	M	42	63	128	178	206	234	283	313	
Remit/miner	1981 USD	573	934	1244	1077	765	859	981		
% remit. of exports		141%	315%	514%	494%	475%	489%	331%		

* deferred pay + remittances. Source: IMR SADCC Databank 1989.

On average there are about 120,000 Basotho migrants in South Africa annually, which is about 2.4 times the domestic formal labour force. There is very little local employment and a critical shortage of arable land for farming meaning that the country produces a declining proportion of its food consumption⁶.

Lesotho is entirely in the Beaufort and Stormberg series of the Karoo System consisting mainly of sandstones, mudstones and shales (Beaufort) and basic volcanics (Stormberg), too high in the Karoo sequence for the major coal seams of the Ecca series⁷, though there are some uneconomic thin seams in the Beaufort series. The sandstone is quarried as a building material both at an informal level (for peasant huts) and formal level (for modern buildings in Maseru) by the Lesotho National Development Company's subsidiary, Lancer's Gap Sandstone Industries (Pty) Ltd. The Thetsane clay deposit near Maseru is exploited for brick making by the Loti Brick company. The Karoo sediments host widespread low grade uranium occurrences none of which has proved to be economic. The Karoo sediments and volcanics are intruded by diamondiferous kimberlite pipes, blows and sills of possible Upper Cretaceous age and post Karoo (lower Jurassic) dolerite dykes and sills.

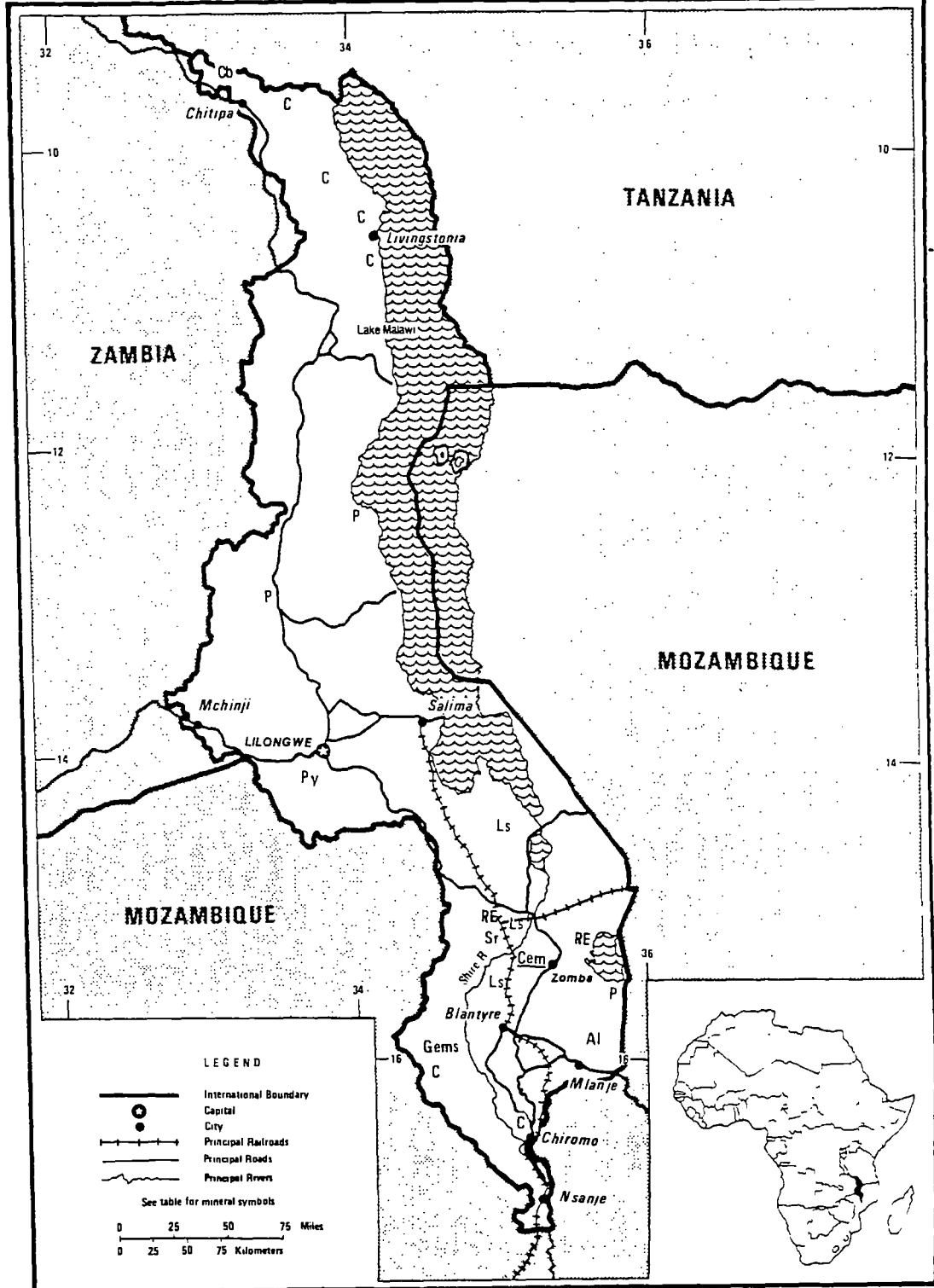
Diamonds are found in both kimberlites and alluvial gravels and are mined on a small scale by cooperatives and one South African company, Swissborough, but there used to be a large scale kimberlite pipe mine at Letseng-la-Terai operated by De Beers which shut in 1982 after running for only six years, due to the falling proportion of large stones and a drop in the market for these stones. However, Hanlon argues that the mine was marginal from the start and Anglo American only opened it as a carrot to lure Lesotho into the South African fold, but when Lesotho refused to cooperate, it was closed⁸. At the height of production, in 1980, 54 thousand carats were produced worth 25 million maloti and constituted 53% of exports. By 1988 diamonds, from cooperatives, only accounted for 1% of exports. The diamonds produced by the cooperatives are auctioned monthly in Maseru. The South African company Swissborough is exploiting the alluvial deposits in streams rising from the Letseng-la-Terai area and interest has been shown in diamond exploration by several other companies.

Fig. 9

MALAWI

AREA 119,000 sq km

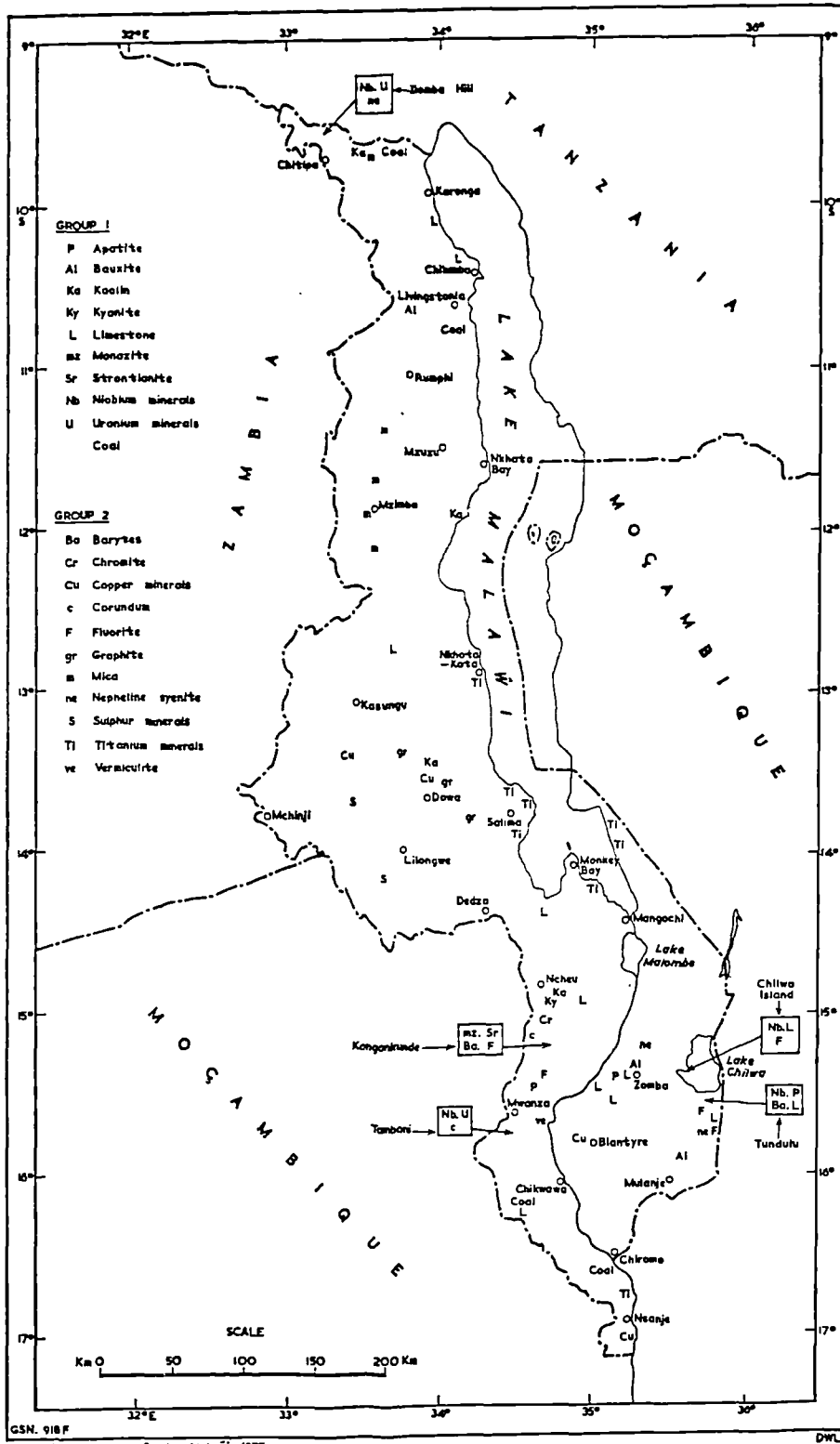
POPULATION 8.0 million



Source : USBM 1984

Fig. 10

MALAWI : MINERAL DEPOSITS



Chapter 10: The Minerals Sector of Malawi

Introduction

History

The territory of what is now the state of Malawi is thought to have been one of the earliest areas of settlement by the iron age Bantu-speaking cultures, in the fourth and fifth centuries¹. These people brought iron mining and smelting technologies to the area and all around Lake Malawi/Nyasa ancient iron slag heaps are found.²

Due to its position on the Lake, on the Zambezi River (via the Shire) and at the end of the Rovuma River valley, Malawi has long been on the ancient African trade routes from the East Coast to the interior. From the 10th to the 12th Century Malawi was on the trade route bringing gold from Zimbabwe, through Tete and on along the Rovuma valley to the Arab and Swahili traders on the east coast (Kilwa) from where it was taken by boat (dhow) to the Arab world and India.

By the end of the 15th Century the Maravi³ Kingdom had come into being at the southern end of the Lake, and by the 17th Century extended all the way to the coast.⁴ In the 18th Century Malawi was increasingly drawn into the lucrative trade in slaves and ivory, first by the Nyamwesi traders of Tanzania, from northern Malawi, then by the Yao trading system from southern Malawi along the Rovuma valley to Kilwa and later by the expanding Zanzibari trading system under Seyyid Said.⁵

The arrival of Nguni raiders (Zwangendaba) in about 1840 plus the expansion west of the Yao caused the collapse of the Maravi Empire, which was by then limited to the Cewa country south-west of Lake Malawi/Nyasa. "In a land where traditional society was disintegrating in the face of (slave) raids from the Yao and invasions of the Ngoni, the Zanzibaris had little alternative but to attempt to take political control themselves".⁶ They set up permanent posts at Nkhotakota, in the centre on the west shore, and on the northern shores.

In the 1870's, following European interest aroused by Livingstone's safaris, two Scottish missionary societies set up in southern Malawi with help from a Scottish trading company, the African Lakes Company. This marked the beginning of the end of slave trade and resulted in a "de facto" British colony. In 1883 the British foreign office appointed a consul (Johnston) in Malawi, mainly due to British public outcry against the continued slave raids, which was followed by attacks on the slavers.

In 1889 Nyasaland, as it was then known, became a formal British Protectorate and in 1890/1 its borders were decided by the Anglo-Portuguese agreements. In 1891 Cecil John Rhodes' Charter Company agreed to subsidise the Protectorate at the rate of 10,000 UKP/annum in exchange for an extension of their charter to include Zambia (northern Rhodesia).⁷

Unlike the two Rhodesias (Zimbabwe and Zambia), which were colonised by a mining company (Rhodes' BSAC) in search of mineral riches to provide profits for their shareholders, Malawi was colonised in a sense by default. In part due to British public indignation over the continued slave trade in the area, in part to limit the territorial designs of Germany to the north (Tanganyika) and the Portuguese to the east and south (Mozambique) and in part no doubt to secure British commercial (trading) interests.

In the early fifties the settlers of southern Rhodesia (Zimbabwe) sought to counter the South African economic block by creating the Central African Federation of the two Rhodesias plus Nyasaland, which

came into being in 1953. In 1958, at the request of the Nyasaland African Congress (NAC), Dr Hastings Banda returned to Malawi from the UK, became president of the NAC and launched the campaign against the settler-dominated Federation. By 1962 the British permitted Nyasaland to withdraw from the Federation and in 1963 Banda was sworn in as the first Prime Minister.

The following year Nyasaland became independent as Malawi under Banda who immediately set about consolidating his power by sacking Ministers opposed to his leadership. In 1966 Malawi was declared a republic with Banda as the executive President and his Malawi Congress Party (MCP) as the only party.⁸ In 1970 he declared himself President-For-Life and has spent the last two decades consolidating his political and economic position.

The South African Connection

At Independence in 1964 Malawi's economic dependence on the Republic of South Africa was extremely low in terms of trade and investment, but high in terms of migrant workers. Since then Banda has built up a close relationship with the apartheid regime and in 1967 Malawi became the first, and last, independent African state to recognise the RSA and to open a full embassy in Pretoria. From 1969 to 1971 South Africa provided loans for the new capital, Lilongwe, and for the link to the Nacala railway.

South Africa is now the country's largest trading partner, a major source of investment and aid and about 20,000 Malawians used to migrate each year to work on the South African mines⁹, but almost all migrants to the mines ceased in 1988 ostensibly because the Malawi government objected to its citizens being HIV tested¹⁰. In addition South Africa has helped train the Malawian armed forces and its internal security units.¹¹

During the anticolonial struggle in Mozambique by Frelimo from 1965 to 1975, Banda consistently collaborated with the Portuguese who reciprocated by training and equipping the Malawi navy on the Lake. Malawi also helped the Portuguese in setting up a rival independence movement, for the liberation of northern Mozambique only. After the independence of Mozambique in 1975, the remnants of this group continued raids into Zambezia Provinces from Malawi and in 1980 a unity agreement was signed between this group and the MNR (Mozambican National Resistance) operating from South Africa, which had been set up by the Rhodesian Government in the late 1970's.

From 1982 the MNR opened up fronts in Zambezia Province, Nampula Province and Niassa Province operating from Malawi. Columns marched through the countryside pillaging, burning and looting, supplied from the air by South African planes operating from Malawi. In 1988 a study on the MNR commissioned by the US Department of State concluded that the "only reciprocity provided by RENAMO (MNR) for the efforts of civilians is the possibility of remaining alive".¹² The extent of the destruction and human suffering caused by the South African sponsored banditry in Mozambique is well documented elsewhere.¹³

Paradoxically, both of Malawi's rail links to the coast, to the ports of Beira and Nacala, have been put out of action by the MNR operating from Malawi which has caused enormous extra transport costs to the economy.¹⁴ Imports and exports have had to be routed overland via Zimbabwe and Zambia to South African ports and via a new, British-funded, link to Tanzania to Dar es Salaam. However, it has been reported that since 1988 Banda has cut back his country's overt support to the MNR, allowing the first trains to operate on the Malawi-Nacala line in 1989. The Malawi-Beira line though remains out of action. A reason put forward for this paradox is that Banda is still hankering after an access to the sea (the "Greater Malawi" that stretched to the Indian Ocean) and was supporting the MNR on the understanding that his territorial claims would be realised¹⁵ as had been his strategy in supporting a

movement for the north of Mozambique against the Portuguese. But, after it became clear that the Frelimo regime was not about to collapse, and the extra transport costs increased, he withdrew his support for the MNR.

The Economy

Malawi is located in central-east Africa between latitudes 9°22' and 17°08'S and longitudes 32°40' and 35°55'E. The 1988 population was 7.7 million and the total land area is 118 thousand km² giving the highest population density in the SADCC region. The density is even higher when one takes into consideration that a large part of the area is made up of water, that of Lake Malawi/Nyasa and the minor lakes in the south (Malombe and Chilwa). Arable land is at a premium in all parts of the country. However, the land is generally very fertile and Malawi has generally had a commercial maize surplus, although many of the poor peasants are malnourished (due to inadequate land).

The local currency has been devalued steadily over the decade, from 1.23 USD to the Kwacha to 2.56 Kwacha to the USD, in an attempt to compensate for declining terms of trade during the global recession in the 1980's. This in turn was the major cause of rapid inflation estimated at 239% from 1980 to 1988 (CPI).¹⁶ The economic crisis of the eighties also provoked an increasing debt burden, which rose from 52% of GDP in 1980 to 93% in 1988.¹⁷

10.1 MALAWI, BASIC ECONOMIC INDICATORS

(KWACHA)		1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	6.0	6.2	6.4	6.6	6.8	7.1	7.3	7.5	7.7
Pop density	/km ²	51	53	54	56	58	60	62	64	66
Forex Rate	/USD	.81	.90	1.06	1.17	1.41	1.72	1.86	2.21	2.56
CPI		100	110	120	136	151	174	200	253	339
GDP mp	G	1005	1108	1244	1436	1707	2022	2302	2866	3699
GDP/cap	USD	206	199	183	186	178	166	170	173	187
GFCF	M	223	168	182	197	223	260	243	333	480
GFCF/GDP	%	22%	15%	15%	14%	13%	13%	11%	12%	13%
Debt	GUSD	.65	.69	.70	.72	.73	.99	1.00	1.16	1.35
Debt/GDP	%	52%	56%	60%	59%	60%	84%	81%	89%	93%
Labour Force	k	348	315	327	388	381	411	428	430	
Govt Revenue	M	199	215	231	273	311	384	465	506	

Sources: RBM 1986/7/8/9, NSO 1988.

Gross fixed capital formation has also reflected the crisis, falling from 22% of GDP in 1980 to 13% in 1988. GDP per capita in current US dollars declined from 206 in 1980 to 187 in 1988 (calculated by converting Kwacha at the average annual exchange rate).

Malawi's main exports in 1988 were tobacco (63%), tea (10%) and sugar (10%). South Africa has become the main trading partner. At independence in 1964 only 6% of imports and 5% exports were with South Africa¹⁸ compared to 35% and 11% by 1987. Since Malawi joined the SADCC in 1980 exports to the region have fallen from 11% of total exports to 9.5% in 1987, while those to the RSA have increased from 3% to 11% in 1988. Imports from the SADCC and from the RSA have remained constant throughout the eighties at around 8% and 37% respectively.

The number of official migrant miners working in the RSA fell from over 100 thousand in 1971 to almost none after the air disaster in 1976, then increased from 14 thousand in 1980 to about 20 thousand in 1988 while their remittances made up around 5% of foreign currency earnings. However in 1988 Malawi refused to allow its citizens to be tested for the AIDS virus and by 1989 almost all Malawian migrants had returned home. This is likely to worsen the unemployment situation, pushing wages down even further.

10.2 MALAWI, TRADE AND MIGRANTS (Kwacha)

		1980	1981	1982	1983	1984	1985	1986	1987
Exports fob	M	228.0	244.0	253.0	289.2	440.7	429.7	462.1	611.6
SADCC	M	25.4	32.0	23.1	31.6	38.0	45.8	43.8	12
PTA	M	24.5	31.8	21.4	24.7	31.6	38.6	23.0	
RSA	M	7.5	12.1	14.9	22.0	32.0	26.8	33.0	67.3
% SADCC	%	11.1%	13.1%	9.1%	10.9%	8.6%	10.7%	9.5%	
% RSA	%	3.3%	5.0%	5.9%	7.6%	7.3%	6.2%	7.1%	11.0%
Imports cif	M	357.3	312.4	322.7	362.9	381.7	492.6	478.0	655.1
SADCC'	M	22.7	26.9	30.6	38.4	48.2	40.6	33.5	
PTA'	M	21.5	25.7	29.5	37.3	46.4	39.9	31.8	
RSA'	M	131.5	103.9	116.5	141.1	153.5	187.3	138.7	229.3
% SADCC'	%	6.4%	8.6%	9.5%	10.6%	12.6%	8.2%	7.0%	
% RSA'	%	36.8%	33.3%	36.1%	38.9%	40.2%	38.0%	29.0%	35.0%
Trade Balance		-129	-68	-70	-74	59	-63	-16	-44
Miners RSA	k	14.2	15.2	16.0	15.8	18.2	19.6	20.0	20.0
Remittances		13.3	18.9	21.2	21.1	22.1	17.9	22.7	33.6
Remit/miner	k	.937	1.243	1.325	1.333	1.214	.913	1.135	1.680
Remit/Exports%	%	5.8%	7.7%	8.4%	7.3%	5.0%	4.2%	4.9%	5.5%

Sources: RBM 1987/8/9, NBM 1986/7, NSO 1988.

Banda has interests in two major Malawian companies, Press Holdings and Admarc which "between them...control the banks, most agricultural estates, and most private companies. ...Together, Press and Admarc control more than half the economy".¹⁹In many ways Malawi is more akin to a fiefdom where the ruler/despot directly controls the security forces, the economy and the civil service, than a modern state.

The Mining Sector

General

The Malawian minerals sector has always been small, generally contributing less than 0.5% to GDP, mainly from cement and coal production. Essentially no minerals are exported and the mining sector employment is typically only 0.1% of the total formal labour force at about 400 workers, but if quarry (stone) and limestone (lime and cement) workers are included, total employment is around 3,000 workers. Average wages in the mining sector are about 60% of the national average, above agriculture but well below manufacturing and services.²⁰

10.3 MALAWI, MINERALS SECTOR (kwacha)

		1980	1981	1982	1983	1984	1985	1986	1987
GDP Mining	M	5.9	5.4	4.7	6.1	7.5	6.8	6.7	8.6
% GDP Mining	%	.6%	.5%	.4%	.4%	.4%	.3%	.3%	.3%
Mineral Prod*	M	8.8	8.0	7.0	9.1	11.1	10.0	10.0	12.8
Min.Prod/cap		1.5	1.3	1.1	1.4	1.6	1.4	1.4	1.7
Min.Exports	M	.0	.0	.0	.0	.0	.0	.0	.0
Mining labour	k	.6	.6	.6	.5	.3	.3	.3	.4
% mng lab	%	.2%	.2%	.2%	.1%	.1%	.1%	.1%	.1%
avg mng wage	k	.34	.38	.42	.45	.85	.57	.62	.53
avg REAL wage	k	.34	.34	.35	.33	.56	.33	.31	.21

* value of cement output until 1984 and cement plus coal from then on. Source: NSO 1988.

With both the railroads to the coast under MNR attack, exports of all minerals other than precious minerals are currently out of the question, but with the normalisation of these routes certain known

mineral deposits such as titanium and monazite (rare earths) sands and bauxite might warrant reassessment.

Responsibility for the mining sector comes under the Ministry of Forestry and Natural Resources which has two relevant departments, the Department of Geological Survey and the Department of Mines. In 1985 a parastatal company, Mining Investment Development Corporation (MIDCOR), was created to undertake mining ventures, either on its own or jointly with private capital. Since its formation MIDCOR has mainly been involved in the development of the coal deposits in the north (Livingstonia) with French aid.

In its publication "Statement of Development Policies"²¹ the government outlines four potential benefits from the development of the minerals sector:

- 1) Diversification of the economy away from agriculture.
- 2) Expansion of industrial employment.
- 3) Increase in forex earnings, both directly and indirectly by substitution of imported minerals.
- 4) Broadening of the geographical spread of industrial development.²²

Surprisingly little mention is made of using minerals for resource-based industrialisation, or the potential role of minerals in the development of other sectors of the economy, particularly agriculture as regards fertilizer minerals.

Economic Geology

The geology of Malawi can broadly be divided into three groups of rocks,²³ namely:

- 1) The Basement Complex
- 2) Post-Basement Complex Sediments
- 3) Intrusives

The Basement Complex is mainly made up of gneisses and granulites and constitutes the Malawi province of the Mozambican orogenic belt. It occupies about 85% of the land area of the country and is host to a variety of metamorphic deposits including marble, kyanite, graphite and iron ore, and pegmatites containing mica, uranium minerals, galena (lead), gold, molybdenum, zircon (titanium) and corundum.

There are also several minor mineral occurrences associated with the mafic and ultramafic rocks of the Basement Complex, including asbestos, chromite, corundum, talc, magnesite, copper and nickel.

The post-Basement rocks are mainly made up of Karoo sediments and volcanics in the extreme north and south containing substantial coal reserves and recent (Cainozoic) sediments containing resources of limestone, residual clays (including bauxites), and unconsolidated heavy mineral sands (titanium and rare earths).

The most important intrusives are the carbonatites and syenites of the Chilwa Alkaline Province of upper Jurassic to lower Cretaceous age, containing rare earths in monazite and strontianite in carbonatite dykes (Kangankunde). Apatite (phosphate) rich intrusives occur at Tundulu and pyrochlore-sovite at Chilwa Island. Fluorite and barytes are found in vein deposits.

Legislation

The ownership of all minerals is vested in the President on behalf of the people of Malawi. The Mines and Minerals Act 1981 provides for non-exclusive prospecting licences (NEPL) which allows prospect-

ing in a particular district and is designed for the individual or small-scale operator. If successful a mining claim, which is one hectare in extent, can be taken out. Larger companies can take out a Reconnaissance Licence or an Exclusive Prospecting Licence (EPL) for period up to three years. A licence lays down a prospecting programme in which the amount of money to be spent annually is specified.²⁴

After prospecting a Mining licence, up to 25 years, can be taken out. Section (10) of the Act enables a company to apply for an agreement which lays down special terms and conditions if a company requires special treatment, normally tax treatment. Royalties vary from 3% for building stone, 5% for precious metals and 10% for precious stones, on gross sales.

The Petroleum Act of 1983 and its regulations of 1984 provide for the issue of oil exploration and exploitation licences.

The Malawian mining legislation is similar to that of other SADCC countries, particularly ex-British colonies and cannot be considered a deterrent to mineral developers. The reasons for the lack of a mining industry must therefore lie elsewhere.

Mineral Production

General

The only minerals currently exploited are limestone for cement and lime, dolomite, coal, clay for bricks and tiles, stone (aggregate) for building and semi-precious stones.

10.4 MALAWI, MINERAL PRODUCTION, 1980-88

Mineral		1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Avg ¹
Coal	kt						1.8	10.5	18.7	29.4	41.7	20.4
Limestone	Mt	.138	.116	.080	.098	.105	.092	.103	.107	.108	.121	.107
Cement	kt	92.2	77.9	53.4	65.5	70.1	61.7	69.7	72.8	84.9	102	75.0
Lime	kt						1.92	2.77	3.13	2.48	na	2.58

¹average 1980-88 for limestone and cement, 1985-88 for lime and coal.
Source: Dept. of Mines 1988/9.

Carter²⁵ divides Malawi's mineral resources into the following three groups:

- Group 1) Mineral deposits with both substantial tonnages and favourable economic circumstances.
- Group 2) Smaller deposits, but still of some economic importance.
- Group 3) Minor mineral occurrences of little or no economic importance.

In the first group are, in alphabetical order, apatite, bauxite, clays (kaolin), kyanite, limestone, monazite and strontianite, niobium minerals and uranium minerals. The second group includes barytes, chromite, copper minerals, corundum, fluorite, graphite, mica, nepheline syenite, sulphur minerals, titanium minerals and vermiculite.

The third group, comprising minor mineral occurrences, includes asbestos, beryl, diatomite, galena, gold, gypsum, iron ore, magnesite, manganese minerals, molybdenite, nickel minerals, platinum, semi-precious and ornamental stones, talc, tantalum minerals, zinc minerals and zircon.

Limestone-Cement-Lime

Limestone (calcitic marble) has been quarried for cement production at Changalume near Zomba since 1970 by the Portland Cement Company, a subsidiary of the Malawi Development Corporation (MDC). Clinker is produced in kilns at Changalume and it is ground and gypsum is added at a mill at Blantyre.

Limestone production peaked in 1979 when 168.6 kt were produced from which 113 kt of cement were made. Since then production of limestone has averaged 107 kt and cement 75 kt, mainly due to a decrease in demand from the construction industry. The industry employs about 700 people.

Another calcitic marble deposit has been investigated in the Chikoa-Livwezi area and was found to be suitable for a cement plant of 126 kt/annum, but there are no immediate plans for its development given current weak demand.

The quarrying of limestone for small-scale limestone production is carried out in the districts of Blantyre, Chikwawa, Machinga, Ntcheu and Karonga. Total lime production runs at 2.5 to 3.5 kt/an, for paint, as a soil conditioner and for the sugar industry. A new, more efficient, vertical shaft kiln has been developed at Chenkumbi, jointly by the Department of Mines and the Intermediate Technology Development Group (ITDG).

Coal

There are four main coal deposits in Malawi, two in the south, Nkombedzi and Chiromo (Shire valley) and two in the north near Lake Malawi/Nyasa, Livingstonia and Nkana near the Tanzanian border. Coal mining started in 1985 in the north in the Livingstonia field in a small Karoo graben at Kaziwiziwi by the newly-formed MIDCOR. It is a small-scale operation producing about 30 kt. an of coal, by bord and pillar mining, which is transported 700 km by road to the markets in the south, principally the clinker plant near Zomba.

In 1987 the French government provided a soft loan for Charbonnages de France to develop a pilot mining operation at Mchenga, about 40 km south-east of Kaziwiziwi, which was running by 1988 operated by MIDCOR.²⁶ Part of the French aid included the establishment of a Malawian coal laboratory in Lilongwe.

Coal from the Kaziwiziwi mine has about 20% ash (usually mudstone) while the Mchenga mine coals have 15% ash. Reserves at the former are estimated at 315 kt and at the latter 2.8 Mt.²⁷

10.5 MALAWI, COAL SUPPLY

Year	Imports	Production	Total Supply
1970	43.9	--	43.9
1975	71.3	--	71.3
1980	65.4	--	65.4
1985	32.9	1.8	34.7
1986	27.7	10.7	38.5
1987	18.3	18.3	36.6
1988	16.0	29.4	45.4

 Source: Dept of Mines, 1989
 =====

Until 1977 almost all Malawi's coal needs were imported from Moatize Colliery across the border in Tete Province in Mozambique, at the rate of about 60 kt/annum. By 1982 half the imports were coming from South Africa. The Moatize operation mainly produced metallurgical grade coking coal for export

(about 0.5 Mt/an), with small amounts of steam coal for the local and Malawian market. No coal has been exported via Beira since the railway was put out of action by the MNR in 1982 and likewise imports up the same line from South Africa to Malawi all but ceased.²⁸

Exports from Moatize by road to Blantyre became hazardous due to MNR ambushes. Due therefore to its own collaboration in the destabilisation of Mozambique, in 1983 Malawi's started experiencing coal shortages and the decision was taken to develop their northern resources, even though the, already operating, Mozambican colliery was closer to the consumers. In 1986 the cost/t of Moatize and Kaziwiziwi was about the same but the cost of South African coal was five times more, and Zambian and Zimbabwean coal three times more expensive.

Within Malawi the question of why the northern and not the southern coalfields were developed has been raised, but it appears that the objections to the northern development are political rather than technical, as the southern coalfields have lower grade, more deformed and hence less economic seams.²⁹

Other Minerals

Other minerals currently exploited are clays at Linthipe and Mangochi (Malindi Potteries), dolomite for scourers, gold (18 gm in 1987), and gemstones.

The principal economic apatite deposit is at Nathace Hill, Tundulu, in Mulanje District where the open-castable reserves are estimated at 1.25 Mt at 15% P_2O_5 . The development of this resource for the manufacture of phosphate fertilizers would have profound impact on agricultural productivity, but would be dependent on the availability of cheap sulphuric acid. The numerous sulphide mineral deposits, particularly at Malingunde Hills near Lilongwe, could possibly provide the basis for a sulphuric acid plant. Due to the small reserves (1.25 Mt) this deposit would be best developed for the domestic market only.

The bauxite reserves of the Lichenya Plateau of the Mulanje massif are estimated at 29 Mt with a grade of 44% Al_2O_3 . These constitute the only appreciable resource for an aluminium industry in the SADCC region and the SADCC Mining Coordination Unit has completed a study to consider the feasibility of establishing an alumina/aluminium industry using hydropower from Mozambique.³⁰ The regional market has been estimated at 15 kt/an of aluminium (about 70 kt/an of bauxite).

The rare earth oxide deposit of the Kangankunde Hill carbonatite complex 25 km from Balaka contains high cerium-low thorium monazite with strontianite as a byproduct. The high grade core contains 10% rare earth oxide and the feasibility of exploiting this deposit is under consideration by BRGM of France.³¹

A sandstone containing uranium at Kayelekera in the north has been studied by the Central Electricity Generating Board of the UK who are considering establishing a mine. Kyanite was exploited in the 1950's at Kapidimba Mountain about 16 km south of Ncheu. The vermiculite reserves at Kapiri Kamodzi deposit are estimated at 300 kt grading 10% vermiculite and are also the subject of a SADCC utilisation study together with deposits in Zimbabwe.

Niobium-bearing minerals (pyrochlore, betafite and columbium) occur principally in the carbonatites of the Chilwa Alkaline Province complexes, but also are associated with nepheline syenites. At Ilombo Hill, 25 km NW of Chipita, the ore grades 7.5% Nb_2O_5 and has associated uranium, but there are no current plans for the development of this deposit.

Heavy mineral sand deposits occur on the beaches of southern Malawi containing monazite (rare earths) and titanium minerals (ilmenite and rutile) and are part of a SADCC study project on the “Assessment of Heavy Mineral Sand Deposits and Feasibility of a Titanium Oxide Plant”, together with the resources of Mozambique and Tanzania.³²

In 1988 the United Nations Revolving Fund for Natural Resources Exploration (UNRFNRE) published a study on potential mineral exploration targets in the SADCC region³³ which, for Malawi, recommended that the following deposits warranted further exploration work:

Vermiculite, Mwanza,
Heavy Mineral Sands, south Lake Malawi/Nyasa,
Limestones, across the country,
Refractory clays and kyanite, several locations,

All of these have been incorporated into SADCC Mining Sector Projects³⁴ which will be implemented as soon as funding is secured.

In 1987/8 hydrocarbon exploration work was carried out by Duke University (Lake Malawi/Nyasa) and Placid Oil (Shire Valley) which was inconclusive. Mobil Oil is reported to be considering further exploration.³⁵

Infrastructure

Traditionally the Lake has served as Malawi’s principal highway for transporting goods and it continues to be an important form of transport. The south of Malawi is well served by railways running from Mchinji, on the border west of Lilongwe, to Salima, near the Lake, then down the Shire Valley, where the two international lines come in from the ports of Nacala and Beira in Mozambique. The Beira line has been out of action since 1982 and the Nacala line operates sporadically, depending on the security situation in Mozambique.

Malawi boasts a relatively good paved road network that has been extended to the north and on to Tanzania to connect to the Tazara railway. The country also has international road links to Zambia (paved, bad condition), to Zimbabwe via Tete Province in Mozambique (paved, reasonable condition), to Nacala in Mozambique (unpaved, impassable) and to Beira in Mozambique (unpaved, impassable). The main route for imports and exports is currently to Zimbabwe with Zimbabwean military convoys through Tete in Mozambique.

Unlike other SADCC countries, Malawi has no mineral deposits that cannot be exploited due to their distance from the transport system (water, road or rail), but due to the security problems on the two export railroads, the development of low value export minerals is out of the question at present.

The south of the country is well covered by the existing electricity grid, but any mineral developments in the north of the country would most probably require their own power generation.

Discussion

Malawi’s small minerals industry in comparison with other countries in the region is mainly due that to the fact that it has no major deposits of precious or base minerals such as the diamond pipes of Botswana, the Copperbelt of Zambia or the Great Dyke of Zimbabwe. It does however have significant deposits of industrial minerals, particularly bauxite (aluminium), apatite (phosphate), monazite (rare earths) and pyrochlore (niobium), which have not been developed for export, mainly due to their distance from sea ports.

The development of export minerals is clearly limited by access to the Mozambican ports of Nacala and Beira. The former is considered the best natural port on the east coast of Africa and would be the obvious choice for bulk mineral exports, but its development depends on a normalisation of the security situation in northern Mozambique, a situation in part brought about by the Malawian regime itself, by supporting the MNR dissidents.

Over the last decade some progress has been made in developing the smaller, industrial, mineral deposits for local consumption, such as clays for ceramics, coal for boilers and cement manufacture and lime for industry and agriculture. It would seem a pity however that the coalfields were developed at the expense of a closer, regional, supplier (Moatize Colliery), thereby diminishing the already tiny intra-SADCC mineral trade.

Several mineral deposits are to be reassessed as regional, SADCC, projects including kaolin, heavy mineral sands (both rare earth and titanium minerals), vermiculite and limestones, as possible sources for regional resource-based industries. The small Malawian market is a major limiting factor for the exploitation of a diverse range of industrial minerals, but given the larger, regional, market, exploitation may be feasible, particularly for bauxite (aluminium) and apatite (phosphates).

In conclusion, Malawi is a predominantly agricultural country, and therefore the initial phase of minerals development should be directed towards this, already established market, for the supply of mineral inputs such as lime for soil conditioning and sugar processing. In this regard it would appear that a major project worth considering would be the development of the Nathace Hills apatite and the Malingunde Hills sulphur minerals deposits for the local production of phosphate fertilizers. There is already a substantial market in the large scale commercial farming sector and the potential market for low-priced phosphate fertilisers in the peasant farming sector is also likely to be considerable.

Footnotes to Chapter 10

- 1 Fage 1978. 2 After independence Nyasaland was renamed Malawi and Lake Nyasa Lake Malawi, but the Mozambicans keep the old name (albeit Niassa) as do the Tanzanians. The Lake is therefore referred to here as Lake Malawi/Nyasa.
 3 The origin of the modern name, Malawi. 4 Fage 1978, p134 5 *ibid*
 6 *ibid*, p299 7 Oliver 1972, p196. 8 Drum 1983.
 9 17,600 on gold and coal mines alone in 1987. CMSA 1989.
 10 Chamber of Mines of South Africa 1989, page 35. 11 Hanlon 1986.
 12 Gersony 1988, p42.
 13 See for example Hanlon 1986, Martin and Johnson 1986 and 1989.
 14 Estimated at 70 MUSD in 1984 alone. Hanlon 1986.
 15 David Martin, personal communication, 1989.
 16 Reserve Bank of Malawi 1989.
 17 World Bank 1990. 18 Tostenson 1982. 19 Hanlon 1986, p236.
 20 NSO 1988 21 DEPD 1988. 22 DEPD 1988, p49.
 23 This section is based on Carter 1973.
 24 Fairbairn 1987 25 Carter 1963, p39. 26 Ottley 1989.
 27 Kalyati 1988 28 MIREM 1988. 29 Dept of Mines 1988. 30 SADCC 1990.
 31 Ottley 1989. 32 SADCC 1990. 33 UNRFRNRE 1988.
 34 SADCC Projects 4.0.3/4/5/6, SADCC 1990. 35 Ottley 1989.
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MOZAMBIQUE

Fig. 11
MINERALS

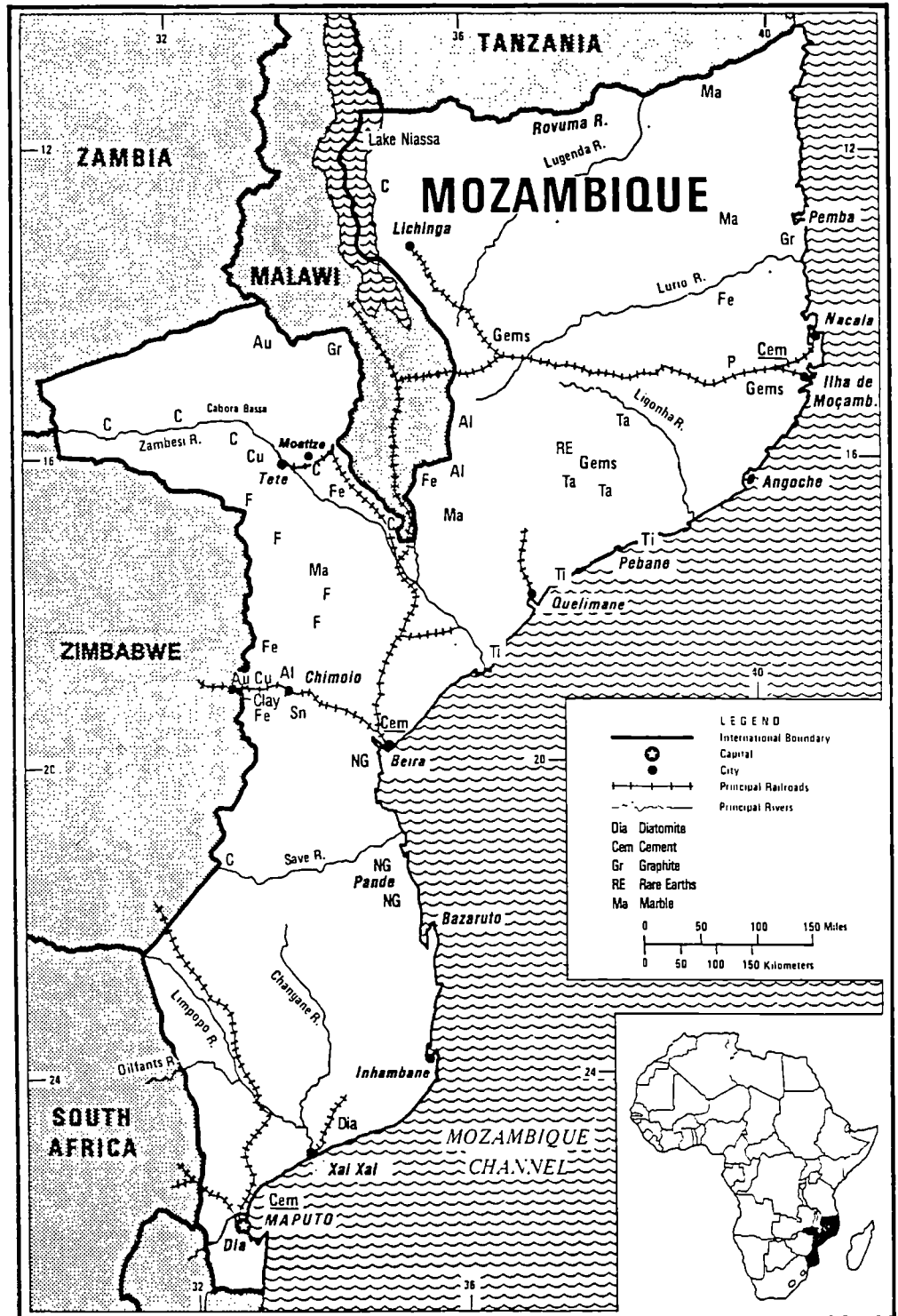
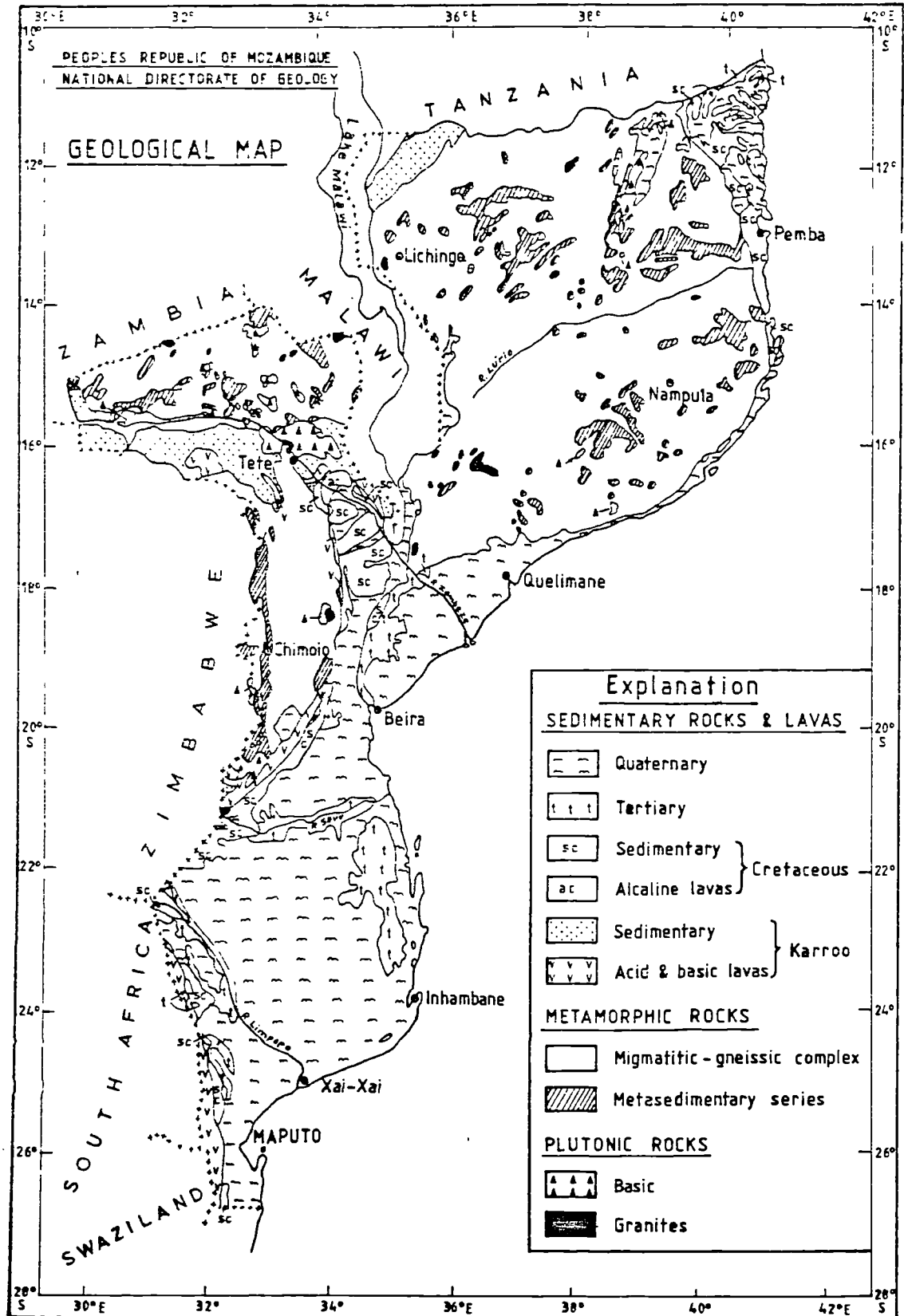


Fig.12



Chapter 11: The Minerals Sector of Mozambique

Introduction

Background

The Island of Mozambique, whence the country gets its name, was an Arab trading centre, handling gold, ivory and slaves from the African interior. It was taken over by the Portuguese in the sixteenth century, who also occupied several other ports along the coast, but they did not colonise the hinterland until the last century. In the wake of the British and French decolonisation of Africa in the late fifties and early sixties, a nationalist movement, the Front for the Liberation of Mozambique (Frelimo), was formed in 1962 from several other organisations in Dar es Salaam in neighbouring Tanzania. In 1964 Frelimo launched an armed liberation struggle against the Portuguese who had made it clear that they were not at that time willing to follow the lead of the other major European colonizers by giving independence peacefully to their colonies.

By 1974 it had become apparent to a group of officers in the Portuguese army that they were slowly losing their colonial wars and that the cost to the metropolitan economy was greater than the benefits derived from having an “empire”. In April of that year there was a coup in Lisbon against the fascist government that had held power since the late twenties, carried out by officers from the colonial armies (the Armed Forces Movement, MFA).

The Economy

Following a ceasefire in 1974, The Peoples Republic of Mozambique (PRM) came into being on the 25th June 1975 under Frelimo which inherited a backward colonial economy, dependent not only on Portugal but also on neighbouring white-ruled South Africa. In 1973 imports stood at 11.4 GMT (MT = Metical) while exports were less than half this value at 5.54 GMT. Invisibles made up 3.5 GMT leaving a negative balance of -2.4 GMT. Most of the invisibles came from South Africa in the form of tourism, transport (ports and railways) and the repatriation of miners' salaries. In 1973 the port of Maputo handled 6.6 Mtonnes of cargo, mainly for South Africa. but by 1983 this had fallen to 1.1 Mtonnes and from 1973 to 1988 the number of Mozambicans working on South African mines fell from 100 thousand to 46 thousand.

From 1973, when it became apparent that the war was going badly, the 250 thousand Portuguese settlers started to leave Mozambique. In 1974 the exodus increased and after Independence in 1975 most of the remainder panicked. By the end of 1976 there were only a few thousand settlers left. Thus Mozambique had lost over 80% of its skilled technicians by the second year of Independence. This was the main contributor to the rapid economic decline in 1975, 1976 and 1977. By 1978 the slide had been halted and the economy once again started to show positive growth through to 1981, despite the undeclared war with the then Rhodesia which had started with the Mozambican imposition of UN sanctions in March of 1976 and continued with direct attacks and by fostering the MNR until the independence of Zimbabwe February 1980. The total cost of supporting the Zimbabwean struggle was estimated at 556 MUSS in 1983, more than the total export earnings over the three years 1977 to 1979¹.

From 1981 the economy once again went into decline, this time due to South African destabilization, both direct and indirect via the now South African run MNR (Mozambican National Resistance) bandit activities. In March 1984 Mozambique and South Africa signed the, now infamous, Nkomati Accord whereby Mozambique would cease to allow its territory to be used by the African National Congress (ANC) to infiltrate South Africa and, in exchange, that country would cease training and supplying the

MNR bandits. But there has been ample evidence proving that South Africa has continued to run the MNR, at least until 1989, even though Mozambique has kept strictly to its side of the bargain. In 1986 the Mozambican President, Samora Machel, was killed in a plane crash, with half of the cabinet, on the South African side of the border, near Maputo, which is widely believed to have been engineered by the South African security system using a false beacon. By 1988, according to the World Bank, Mozambique was the poorest country in the world with a GNP per capita of 100 USD² compared to 250 1988 USD in 1980, a fall in real terms of 60%; and the national external debt had risen to 4.4 GUSD, a staggering 353% of GDP.

11.1 MOZAMBIQUE: BASIC ECONOMIC DATA (meticaais)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	12.1	12.6	12.9	13.3	13.6	13.8	14.2	14.5	14.9
Pop. density	/km ²	15	16	16	17	17	17	18	18	18
Forex Rate	/USD	32.4	35.4	37.8	40.2	42.4	43.2	40.4	289	529
CPI (1)		100	102	120	155	202	261	362	953	1431
GDP mp	G	70	74	84	83	100	147	167	428	660
GDP/cap	USD	179	165	171	155	172	246	291	102	86
GFCF*	G	15	16	18	9	11	10	16	102	214
GFCF/GDP	%	21%	22%	21%	11%	11%	7%	10%	24%	32%
Debt	GUSD	.27	.23	.33	1.17	1.22	3.04	3.52	4.35	4.41
Debt/GDP	%	12%	11%	15%	57%	52%	90%	85%	294%	353%
Govt Revenue	G	15	18	21	22	22	19	22	69	131

* gross fixed capital formation. IMR SADCC Databank, 1990.

Since 1985 the security situation improved in the centre of the country where Zimbabwean troops are deployed to guard the Mutare-Beira corridor and in 1988 Malawi agreed to stop allowing the bandits transit from South Africa as they had lost both their rail export routes, to the ports of Nacala and Beira, due to bandit activity. From 1987 the government has implemented an economic recovery programme (PRE³) entailing a massive devaluation of the currency which has led to super-inflation and a substantial fall in the purchasing power of wages, but the economy has started to show modest growth, albeit from an extremely low starting point. In 1989 the government entered into talks with the MNR in an attempt to stop the war but they came to nothing and in 1990 they announced that open multi-party elections would be held in which the MNR was free to participate.

Mozambique's main exports have always been agricultural. In 1973 they were cotton 20% of exports, cashew nuts 18%, sugar 10%, wood 5%, petroleum products 5%, tea 4%, copra 4% and prawns 2%. By 1988 the principal exports were prawns 43%, cashew nuts 26%, cotton 5%, sugar 5%, and copra 4%. The banditry in the countryside has made it difficult for crops to be planted and marketed which is in part responsible for the ascendance of prawns as the main export, as it is a relatively "bandit free" product. In addition, since the closure of the Matola oil refinery in 1984 no exports of petroleum products have been made. Although South Africa is the main source of non-aid forex, this is mainly in the form of remittances of migrant miners, which were 70% of the value of exports in 1988, rather than direct trade. From 1980 to 1988 South Africa accounted for 6% of exports and 11% of imports.

11.2 MOZAMBIQUE: TRADE AND MIGRANT LABOUR (meticaís)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Exports fob	G	9	10	9	5	4	3	3	28	54
SADCC	G						.0	.0	.2	.5
RSA	G	1.0					.1	.1	1.2	3.6
% RSA	%	11%					4%	5%	4%	7%
Imports cif	G	26	28	32	26	23	18	22	181	373
SADCC'	G	.0	.3	.7	1.1	.4	.2	.4	4.6	16.7
RSA'	G	2.9	3.5	2.6	2.4	2.7	2.1	2.3	21.9	51.7
% RSA	%	11%	12%	8%	10%	12%	12%	10%	12%	14%
Trade Balance	G	(17)	(18)	(23)	(20)	(19)	(15)	(19)	(153)	(319)
exports/imports		35%	35%	28%	21%	18%	18%	15%	16%	15%
Miners RSA	k	46	41	45	40	52	56	59	50	46
Remittances		1.7	2.3	2.4	3.0	2.4	1.8	2.0	16.8	37.8
remit/migrant\$		1145	1576	1397	1879	1098	749	842	1154	1548
1981 USD		1145	1440	1204	1559	879	582	638	847	1100
% remit.of exp		19%	23%	28%	57%	59%	54%	63%	60%	70%

Source: IMR SADCC Databank, 1990

The Mining Sector

General

The mining industry of Mozambique has always been tiny in comparison to other countries in the region, but even so it has shrunk substantially since 1981, when the effects of the South African sponsored banditry were first felt. In 1981 mining contributed 0.8% of the country's GDP and 4% of national exports. By 1988 these contributions had fallen to 0.2% and 2% respectively, mainly due to the effects of banditry as mines tend to be more isolated than other sectors of the economy.

11.3 MOZAMBIQUE: BASIC MINING SECTOR DATA (meticaís)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
GDP Mining	G	.4	.6	.4	.2	.2	.1	.2	.9	1.0
% GDP Mining	%	.5%	.8%	.4%	.3%	.2%	.1%	.1%	.2%	.2%
Mineral Prod.	M	700	966	778	510	362	234	236	875	1171
Min. Prod/cap	USD	1.8	2.2	1.6	1.0	.6	.4	.4	.2	.2
Min.Exports	M	437	421	220	98	76	26	110	188	1096
% Mineral Exports		4.8%	4.2%	2.5%	1.8%	1.9%	0.8%	3.4%	0.7%	2.0%

Source: IMR SADCC Databank 1990.

At Independence in 1975 the mining industry was totally in private hands. In 1978 and 1979 all of the mining companies were nationalised. At this time mining came under the Ministry of Industry and Energy and two state mining companies were created to run the new acquisitions: Carbomoc for coal and MAGMA (Empresa Nacional de Minas) for other minerals. In 1983 the Ministry of Mineral Resources (Mirem⁴) was formed with responsibility for mineral exploration and exploitation. Mirem has under it the National Institute of Geology (ING⁵: geological survey), the National Directorate for Hydrocarbons (DNH⁶: for gas and oil), the Coal Cabinet (GPC: for coal) and the National Directorate of Mines (DNM⁷: for other minerals). In addition to the two state companies mentioned above, a state company for semi-precious stones (GPL) was created and in 1980 the National Hydrocarbon Company (ENH) was formed to handle oil and gas exploration and exploitation contracts. Recently, the

possibility of setting up a state Minerals Development Corporation has been under consideration, which would be the state holding company for joint ventures with private capital and take over certain of the existing state companies. Since 1986 the government has been actively encouraging private investment in mining.

11.4 MOZAMBIQUE MINERAL EXPORTS 1978, 1980, 1984 & 1988 (Mmeticais)

Mineral	1978		1980		1984		1988		Rank
	Value	Vol.	Value	Vol.	Value	Vol.	Value	Vol.1988	
Asbestos (kt)	3.01	0.42	1.70	0.21	2.73	0.24	0.85	0.02	7
Bauxite (kt)	0	0	0	0	0	0	451.7	6.55	1
Bentonite (kt)	0.53	1.55	1.04	0.61	0.08	0.02	14.66	0.26	6
Beryl (t)	0.36	31	0.52	33	0.48	17	0	0	
Coal kt	41.30	38.8	121.70	98.5	22.60	15.1	295.1	14.9	2
Copper* (kt)	2.21	1.20	7.53	1.40	3.37	1.0	57.68	0.59	4
Marble (m3)	0	0	0	0	0	0	223.53	787	3
S-P Stones+	0.01	-	8.09	-	1.07	-	52.64	-	5
Tantalite^(t)	44.10	48.2	163.70	44.0	58.00	24.0	0	0	
Others	29.80	-	7.39	-	0.50	-	0	0	
Total	121.32	-	311.27	-	106.19	-	1096	-	

* copper concentrate (20% Cu), + semi-precious stones, ^ tantalite concentrate. Note: neither tantalite nor asbestos were produced in 1988, exports were made from stocks. Source: Mirem 1986/7/8/9.

Economic Geology

An interesting aspect of the geology of Mozambique is that, for the centre and south of the country, the geological and political borders are virtually the same. Whether this was because the mining magnate Cecil John Rhodes had realised the relationship between the stable cratons and mineral resources or whether the highlands were considered preferable due to their mild climate and absence of tropical diseases, particularly malaria, is not known, but either way the borders of southern Mozambique correspond to the limits of the infertile sandy Cretaceous to Recent low-lying sediments containing few mineral resources (except natural gas), while Zimbabwe and South Africa contain the whole of the two major mineral-rich stable cratons within them, the Zimbabwe craton and the Kaap-Vaal craton.

The oldest rocks in Mozambique are the extension of the Archaean schistbelt from Zimbabwe across the border in Manica Province in the centre of the country. This belt is also known as the Mutare gold belt and contains most of the country's gold resources and also has deposits of copper, asbestos, lead, iron ore and nickel. The next are the meta-sediments of the Gairezi and Umkondo groups, also on the frontier with Zimbabwe, which host deposits of copper and limestone. The extension of the Limpopo from Zimbabwe contains metamorphosed cratonic rocks with few mineral occurrences.

Most of the centre and north of Mozambique contain rocks virtually exclusively of the pre-Cambrian "migmatitic-gneissic complexes" (mobile belts) which contain metamorphosed volcano-sedimentary sequences in Zambezia province with numerous pegmatites containing tantalum, niobium, lithium and feldspar, except for the Metangula Karroo Graben in the north-west and the Rovuma Basin in the north-east while Tete Province contains the Karroo sediments (coal-bearing) of the Zambezi Rift and pre-Cambrian rocks of a "migmatitic-gneissic complex". The younger sediments of the south and the northern coast contain limestones, diatomite and, still under formation today, heavy mineral beach sands (titanium).

At Independence in 1975 most of the country was geologically unknown. Virtually all deposits had been found by hunters and prospectors and less than two-thirds of the country had been mapped at 1:250,000 scale. Large areas of the north had not even been topographically mapped. The primary task on gaining Independence was therefore one of surveying the country in order to assess the mineral potential. In this respect large advances were made from 1975 to 1983 when most exploration work had to be abandoned due to the increasing South African sponsored banditry in the countryside.

11.5 MOZAMBIQUE GEOLOGICAL EXPLORATION ACTIVITY (thousand km²)

Activity	Pre 1975	1975-1985	%
Geological Mapping:			
1:250,000	467.42	478.59	51
1:100,000	-	345.00	100
1:50,000	-	35.00	100
Airborne Geophysical Mapping:			
1:250,000	496.02	476.65	49
1:100,000	-	476.65	100
1:50,000	-	12.68	100
Geochemical Mapping:			
1:250,000	134.70	238.30	64
1:100,000	-	66.00	100
1:50,000	6.63	7.08	52
Total (K km²):	1104.77	2135.95	66%
* % 1975-85 of total. Source: Kashamila 1985.			

The majority (66%) of systematic geological, geochemical and geophysical mapping of Mozambique has been done since Independence. This effort is all the more significant when considered against the virtually non-existent mineral exploration infrastructure left by the departing Portuguese colonial authorities. At Independence there were five professionals, three drillers, two draughtsmen and 13 trained assistants, all of them foreign except for 3 assistants. By 1985 there were 11 professionals, 23 draughtsmen and 330 qualified assistants, all nationals.

The main foreign companies working in exploration since 1975 have been: LKAB (Sweden), coal, tin and iron ore; BIC (Integrated Complex Brigade: USSR), pegmatites, coal, graphite and others; Limex (GDR), pegmatites and coal; Huntings (UK), airborne geophysical mapping and geological mapping; BRGM, airborne geophysical mapping and geological mapping, and Aquater (Italy), geological mapping and titanium.

This large investment in exploration since 1975 had the following three objectives: a) The formation of a national skilled manpower base for mineral exploration; b) The creation of an inventory of mineral resources through geological exploration; c) The reactivation of the existing mining industry. Of these three the first two have been successfully pursued while some headway was made in reactivating existing mines before the deterioration of the security situation from 1981. In 1981 there were 52 geological brigades operating in various parts of the country. By 1990 there were virtually none.

Legislation

a) Minerals:

The Mining Law was enacted in April, 1986 is a relatively brief act, containing broad principles, and was supplemented by more detailed regulations promulgated in 1987. Subsequent to the Moatize colliery disaster in 1977, extensive mining safety regulations, for both open cast and underground operations, were drawn up and issued in 1981.

To date contracts have been negotiated on a case by case basis using a model agreement developed by the National Directorate of Mines in consultation with the Technical Assistance Group of the Commonwealth Secretariat. The contracts follow the formulations used generally in the international mining industry, including both government participatory and non-participatory models.

In effect, there are two phases incorporated in each contract: the first, comprising the survey, exploration and feasibility periods, is governed by a Prospecting Licence; the second phase, comprising the mine development and production periods, is governed by a mineral concession. Both the licence and the concession are mineral specific, although provision is made for preferential rights to mine associated minerals as well as other minerals discovered in the course of operations.

During the term of the prospecting licence, the Agreement Area may be reduced or may be enlarged if the deposit proves to extend beyond the original borders. Depending on the mineral resource and the exploration operations being conducted, a specified percentage of the initial area may have to be relinquished during the course of the work and/or prior to any extension being approved.

All operation expenditures must be in convertible foreign currency, except that where Mirem participates in the venture, its participation may be calculated in any rights, benefits, infrastructure etc... contributed and in local currency for any expenditures such as local wages and services. A minimum work programme and budget is required for these initial expenditures with the provision that any shortfall be paid to Mirem. During the term of the prospecting licence, a mineral rights use rent calculated on the basis of the total surface area of the Agreement Area is collected. During the term of the Concession, a land use and occupation tax is payable under the Land Law and Regulations.

A royalty on production and income tax on profits must be paid. The royalty is not set by law but is negotiable. Provision is made for exemption from import and export duties and personal income tax for foreign employees resident in Mozambique less than a total of 180 days of a year. Profits are 100% exportable. An adjustment or exemption from any taxes is negotiable. All data resulting from the operations is the property of Mirem and is treated as confidential. Disputes, if not resolved by negotiation are subject to arbitration. Under the Foreign Investment Law of 1984 (Law No.4/84, 18 August, 1984) arbitration of disputes regarding the interpretation and application of the contract is done by an arbitration committee nominated by the two parties; failing that, by the International Chamber of Commerce in Paris.

A comprehensive training and preferential employment programme for Mozambican nationals is included and preference is also to be given to local goods and services, provided that they are of comparable quality, price and availability.

Thus the Mozambican legislation has become amongst the most "liberal" in the region, mainly in order to attract foreign investment despite the considerable security risks.

b) Hydrocarbons:

In 1981 the new law regulating petroleum activity was approved. Under it all concessions are given to ENH (state oil company) which is then permitted to enter into contracts with foreign companies for the exploration and development of the concession. The law also has regulations regarding the protection of hydrocarbon resources and the environment, gas flaring, petroleum export rights, the employment and training of national personnel and the use of local goods and services.

In 1983 and 1984 ENH entered into three production sharing contracts with oil transnationals (Esso/Shell, Amoco and BP). The salient features of these contracts are: An initial exploration period of three years with two optional extensions of two years and 25% of the concession will be given up after the first 3 years and a further 25% after the first two year extension; a development period of 20 years, a 15% royalty on all production; an after tax and royalty profit division between the company and ENH according to the production sharing scale (variable); and, a tax exemption from essentially all tax except for industrial (company) tax at 50% of profits. Unfortunately none of these exploration programmes made any discoveries.

Mineral Production

General

With the exodus of Portuguese personnel in 1975/6 mineral production fell, but by 1981 output had recovered for most minerals, and for some production levels were well above those of the colonial period. With the rapid increase in banditry from 1982 production of all minerals slumped except for bauxite, marble, bentonite and salt.

11.6 MOZAMBIQUE: MINERAL PRODUCTION

Mineral	Unit	1973	1977	1981	1985	1986	1987	1988	1989	1973-81	1981-88
Asbestos	kt	.15	.00	1.42	.40	.05	.00	.02	.00	848%	-99%
Bauxite	kt	.00	.00	.00	.35	3.92	5.07	6.00	7.24	nap	nap
Bentonite	kt	2.99	2.64	.72	.90	1.11	.94	1.00	.13	-76%	40%
Beryl	t	5.5	31.0	6.7	9.0	1.4	.00	.00	.00	22%	-100%
Bismuthite	t	2.00	7.16	3.62	.40	.08	.00	.00	.00	81%	-100%
Coal	kt	394.	288.	535.	20.	4.	43.3	24.0	62.0	36%	-96%
Copper conc+	kt	3.18	.00	.88	1.77	1.30	.72	.70	.42	-72%	-20%
Fe, Steel	kt	47.8	12.4	13.2	9.1	2.5	8.0	4.9	na	-72%	-63%
Felspar	kt	.83	.82	.78	.20	.07	.00	.00	.00	-7%	-100%
Kaolin	kt	.10	.20	.30	.57	.15	.14	.00	.00	197%	-100%
Lmst, Cement	kt	611	326	261	86	73	73	64	na	-57%	-75%
Marble	m3	368	0	167	7860	1137	1140	1100	687	-55%	559%
Mica	kt	.31	.43	.30	.00	.00	.00	.00	.00	-3%	-100%
Salt	kt	52.9	51.5	86.4	10.5	17.3	43.7	62.5	na	63%	-28%
Ta Microlite*	t	53.8	40.9	48.7	10.4	2.6	.00	.00	.00	-10%	-100%
Ta Tantalite*	t	30.3	37.6	34.1	5.2	2.7	.00	.00	.00	13%	-100%

+ 20% Cu * concentrate. Source: IMR SADCC Database 1990

Coal

Coal is, under normal circumstances, the most important mineral in terms of both production and exports. In 1975 coal mining contributed 60% of total mineral production and 3.5% of national exports. By 1988 these figures had fallen to 27% and 0.5% respectively. Coal production fell from 575 kt to 24 kt over the same period. Coal exports in 1980 were 99 kt worth 122 million meticaais (3.8 MUSD), 39% of total mineral exports. In that year tantalum pentoxide exports were worth more, at 164 million meticaais (5 MUSD), due to an exceptionally high tantalum price on the world market at that time. By 1989 coal exports had fallen 88% to 12 kt, 21% of total mineral exports of one billion meticaais (1.4 MUSD).

The coal mines are in the Moatize Basin in Tete Province. They used to be owned by the Companhia Carbonifera de Mocambique, a subsidiary of Union Miniere (Belgium) but were nationalised in 1977 after a major colliery disaster in which 130 miners lost their lives. Since then they have been run by Carbomoc (state coal mining company) and technical services were provided by the German Democratic Republic until March 1990. There are four underground mines, each with an annual capacity of 150 to 200 kt. The total installed capacity is 800 kt/annum of coking and steam coal (1:1). Since 1981

production has fallen radically (by 90%) due to the sabotage of the railway from Moatize to the port of Beira. The only exports in 1989 were to neighbouring Malawi and Zimbabwe by road, but the former market will ultimately be lost as the Kaziwiziwi mine is developed in northern Malawi. Zimbabwe currently imports roughly 50 kt/annum of low phosphorus and sulphur coke from South Africa as a reductant for ferrochrome production by Zimasco in Kwekwe. The Moatize coking coal has the correct characteristics and in this regard the SADCC Mining Sector has a project underway to assess the feasibility of establishing a coking plant at Moatize to supply Zimasco, funded by France.

Confirmed reserves in this basin are estimated at 490 Mtonnes and resources in the larger Moatize-Minjova basin are put at 5.5 Gtonne. Planned production, before the breakdown of the railway, was forecast at 1.8 Mtonnes worth roughly 50 MUS\$ in foreign exchange for 1986, increasing to 5 Mtonnes in 1995, almost all for export. Actual production in 1989 was roughly 62 kt. In 1989 a new plan, "Integrated Development of Coal" was drawn up which consists of two phases. Phase one is for the rehabilitation of the five underground mines to produce 0.8 to 1.0 Mtonnes/annum of metallurgical grade coal, to be done by Carbomoc with assistance from the Soviet Union and East Germany, but it appears that the latter has withdrawn from its involvement in coal in Mozambique with the reunification with West Germany. The second phase entails the development of large opencast mines, as a joint venture with TNCs, to produce up to 25 Mtonnes/annum of ROM coal of which 10 to 15 Mt/annum will be saleable coal, about 60% of which will be of metallurgical (coking) grade. The middlings (waste) could be used for a thermal power plant but there are no immediate markets for the electricity, though in future power might be sent via the Cabora Bassa transmission line to South Africa.

The joint venture for the second phase will most probably be made up of Trans-Natal Coal Corporation of South Africa (a Gencor subsidiary) as the operator, CVRD of Brazil (state company) will undertake the technical and feasibility studies and Lonrho will carry out the initial testing using their South African coal mining subsidiary (Tweefontein United Collieries). The cost of whole project is estimated at 1.5 GUSD, including the rehabilitation of the 600 km of railway to the port of Beira and the upgrading of the terminal. Part of the metallurgical coal will be exported to Brazil to pay off Mozambique's 300 MUSD debt to that country. One commentator has however noted that it is....

"...strange that South Africa is now involved in a project which will restore the Beira railway, of which in previous years Pretoria was at the very least partly responsible in destroying".¹⁹

A pilot opencast mine is being developed with Soviet financial and technical aid and should be operational by the end of 1990.

Under normal circumstances the Mozambican market consumes 160 to 180 kt of steam coal annually mainly by the Maputo power station. Due to the location of the Moatize mines it is cheaper however to import coal for Maputo from South Africa than to bring it from Moatize. In terms of the SADCC, it might be feasible to source this coal from Swaziland via the Goba line instead.

There are several other basins the most important of which are Mucanha-Vuzi Basin on the northern edge of Lake Cahora Bassa, Minjova Basin to the east of the Moatize Basin, the Sanangoe Basin south of Cahora Bassa Dam and, out of the Zambezi Rift, the Metangula Basin in Niassa Province and a small deposit near Espungabera on the Zimbabwean border. Most of these deposits are medium to high ash steam coal. In 1989 the coal resources in the Zambezi Rift were put at over 8 Gtonnes (Moatize-Minjova and Mucanha-Vuzi). However, all coal development plans await an improvement in the security situation.

Pegmatites

The most important product from the small scale pegmatite workings is tantalum. Most of the workings are in Zambezia and Nampula Provinces. The tantalum/niobium minerals produced are tantalite and microlite and are exported as a concentrate. Production of contained Ta_2O_5 increased by 40% from 1973 (33t) to 1981 (46t) before the operations finally closed down in 1987 after several bandit attacks including the abduction of 22 Soviet technicians in 1983, of whom four were killed. Planned exports, under normal conditions, for 1986 would have been 120 tonnes of Ta_2O_5 worth roughly 10 MUS\$ in export receipts, but due to the security problems only 5% of this figure was produced.

In 1975 the US Bureau of Mines estimated the Mozambican tantalum resources to be 4.4 kt or 1.7% of the world total, but at this time the tantalum pegmatite areas of Mozambique had not been geologically mapped. The principal tantalum workings are Morrua, Muiane and Marropino in central Zambezia Province. The total Ta_2O_5 reserves at these three workings were estimated at 5.8 kt in 1985 grading 735 ppm at Morrua and 160 ppm at Marropino and Muiane and further reserves at Mutala and other pegmatites are estimated at 1.7 kt. Since 1986 Mirem has been trying to interest foreign companies in the tantalum deposits and although substantial interest has been shown, including Soviet, US and South African companies, nothing can be finalised until the security situation in the area improves.

In addition to tantalum minerals, the pegmatite workings produce semi-precious stones (emeralds, morganite, topaz, tourmaline, aquamarine), monazite, mica scrap, industrial beryl, and pollucite (Li). The lithium minerals are stockpiled at present for lack of a market.

Copper

All copper production comes from the Mundonguara Mine (ex Edmundian Mine) in Manica Province near the Zimbabwean border, 13 Km west of Vila de Manica. The mine used to be run by Lonrho from Zimbabwe who stopped production in 1976 when the border with Zimbabwe was closed. Pre 1976 production was about 3.2 kt of copper concentrate (22% Cu) per annum, but it is thought that these figures were inflated to cover for production from Zimbabwe (Inyati Mine) in order to get around the UN sanctions against that country at the time.

The government reopened the mine in 1977 and since then production has been running at about 1000 tonnes of concentrate per year. In 1986 a contract was signed with the Zimbabwean state company, Mhangura Copper Mines (MCM), for the refining of the concentrate at their Alaska refinery, making it the second regional beneficiation project whereby more of the value-added remains in the region. However, in 1990 Mirem was reported to be considering closing the loss-making operation down, or at least privatizing it.

Other Minerals

Anthophyllite asbestos production at Mavita, south-west of Chimoio, stopped because no markets have been found for the product since the asbestos-cement factory in Beira ceased operations as a result of the closing of the Beira cement plant, in turn due to the security situation at the limestone quarry (Mwanza). In 1985 the mine suffered a major bandit attack in which most of the plant and equipment were destroyed.

Garnets are at the Cuamba garnet mine outside the town of Cuamba in Niassa Province. The alluvial deposit is mined by opencast methods and the garnets are hand picked from the ore. Production was 3.54 tonnes of gem grade garnets and 6.45 tonnes of "waste" garnets in 1973. This had fallen to 2 tonnes of gem grade and 6.2 tonnes of "waste" by 1989. In 1984 prognostic reserves were put at 80 tonnes of garnets.

The Boa Esperanca kaolin deposit is situated in Ribaue District in Nampula Province. The deposit has been mined since 1952 by opencast manual methods. The kaolin is washed and sorted at the mine site. Production of kaolin increased from 100 tonnes in 1973 to 297 tonnes in 1981 before falling to 152 tonnes in 1985 when production stopped due to the deteriorating security situation. Up to 1983 feldspar was also produced from the deposit but reserves were exhausted in that year. From 1984 to 1986 feldspar was produced at the open-cast manual operation at Tuluva near the Port of Nacala in Nampula Province, but the operation closed down due to the security situation.

The Montepuez marble deposit is located 5 Km north of the district capital of the same name, in Cabo Delgado Province. The quarry is particularly known for its "snow white" marble but other types are also produced. In 1989 the quarry produced 687 m³ of marble, 63% for export. The operation is run jointly between Magma and an Italian company (Technostone SpA), which also does the marketing. Reserves are estimated at 30 thousand cubic metres. A major expansion of the operation is planned which will increase capacity to 15 thousand m³ per annum and for the establishment of a cutting and polishing plant in Pemba to produce 300,000 m³/annum of slabs and tiles for export. The Monte Mataca "black granite" (gabbro) deposit, in Manica Province 30 km from the Beira corridor is also being assessed for export via Beira.

The Luzinada bentonite deposit is situated 35 Km south-west of the capital city of Maputo. Production started in 1967 and it is an opencast operation using front-end loaders. The ore is milled, dried and activated with sodium carbonate near the mine site. Its main uses are the foundry industry, as an insulator in the construction industry, as a lubricant for drilling and it is used in animal feeds. Installed treatment capacity is 6 kt/annum and in 1989 production was 126 tonnes, 91% down on 1982 (1455 tonnes) due to security problems in the area. In 1989 reserves were put at 8452 kt. Negotiations have been held with several foreign companies, including G & W Industrial Minerals of Zimbabwe, with a view to turning this operation into a joint venture or to privatise it completely. Due to its importance as the only regional alternative to South African supplies to the SADCC states a SADCC Mining Sector sponsored study was carried out on the deposit which concluded that it was a low grade bentonite that could however be used for certain applications in the region.

Mozambique has three cement plants: one in the south outside Maputo (Matola), one in the centre outside Beira (Dondo) and one in the north at the port of Nacala. In 1978 185 kt worth 5.6 MUSS were exported and 354 kt were produced. By 1988 production had declined to 64 kt using imported clinker due to the closure of the limestone quarries supplying the Matola and Dondo plants. Production of asbestos-cement sheeting peaked in 1977 at nine thousand m³ before falling to 2.2 thousand m³ in 1988. Mozambique has ample limestone resources and in 1989 total national reserves were put at 39 Mtonnes. Reserves for the Maputo and Beira plants have been secured for the next 20 years while those of the Nacala plant quarry are under investigation. The limestone at the Muanza quarry (for the Dondo plant), is thought to be suitable to substitute for a special grade of burnt lime currently imported from South Africa for ferrochrome manufacture at Zimalloys in Zimbabwe. Tests will be carried out as soon as the security situation allows.

In December 1984 a contract was signed with E.C. Meikle (Pvt) Ltd. of Zimbabwe whereby their bauxite mine (Alumen) on the border of Mozambique at Penhalonga could mine the extension of the deposit into Mozambique, making it the first (and so far only) SADCC cross-border mining operation by a local company. In 1989 7.2 kt were produced. The bauxite grades about 60% Al₂O₃ and is used for the production of aluminium sulphate for water treatment by Zimphos (owned by Chemplex, an AECI company in turn owned by AAC) in Zimbabwe. A SADCC study on the possibility of setting up an

alumina/aluminium industry in the region concluded that the deposit was not suitable for this purpose and should continue to be used for aluminium sulphate production.

From the above discussion it is apparent that the Mozambican mining industry was small and underdeveloped even before the contraction since 1981 due to the deteriorating security situation. With the exception of coal and copper, most mining is at an artisanal level using open cast labour intensive methods.

Hydrocarbons

A limited amount of oil and gas exploration took place before Independence mainly in the onshore and nearshore areas between Maputo and Beira by Gulf, Amoco, Aquitaine, Hunt and Sunray. During this period three gas fields were discovered, at Pande (32 billion m³) and two smaller deposits at Buzi and Temane, but were not developed at the time. In 1980 the state oil company, ENH, was created to supervise hydrocarbon exploration and in the same year a new petroleum law was passed and a model production sharing agreement was drafted. ENH has negotiated a contract with the USSR (Tecnoexport) to do a re-evaluation of the Pande gas deposit by seismics and drilling to confirm the reserves of the known Pande field and to investigate a possible additional field close to Pande. The project will go ahead as soon as the security situation allows. Soon after the formation of ENH contracts were negotiated with Western Geophysical and the Geophysical Company of Norway (GECO) for a speculative survey over the whole length of the continental shelf. In addition, the Japanese state oil company, JNOC, completed a shallow-water seismic survey of Bazaruto Bay in 1984 and ENH have done an extension to this south of Beira, with promising results. Lake Niassa (Malawi) has also been seismically surveyed by Duke University of the USA.

In 1983 and 1984, ENH signed exploration and production contracts with four oil companies. Esso/Shell took an onshore concession in the Rovuma Basin on the border with Tanzania and after detailed seismic surveys in 1985 they drilled a 3.8 km dry hole near Mocimboa de Praia in 1986. ENH are continuing the work and in 1989 they signed a joint exploration agreement with the Tanzania Petroleum Development Corporation (TPDC) for work in the Rovuma Basin which extends across the border. This is the first exploration agreement between SADCC states.

Amoco took four blocks off the Zambezi delta where Hunt drilled two (dry) wells in the early seventies and BP Petroleum Development took a concession offshore over the African Rift extension in southern Mozambique off the mouth of the Limpopo River where they drilled an exploratory hole in 1987 and, with Amoco, are expected to sink a second hole.

Prospects

There are significant reserves of heavy mineral sands (titanium) on the beaches of Mozambique particularly between the port of Quelimane and Angoche. In 1959 and 1960 ilmenite from Pebane was exported to the UK. A large deposit was located off the Zambezi delta in 30 to 60 m of water in the early seventies, by the Geological Survey of West Germany, containing 55 Mt of heavy minerals (91% ilmenite). From 1983 to 1986 Aquater (Italy) assessed the reserves in the Quelimane area and provisional estimates are 24.9 Mt grading 9.61% economic heavy minerals (94% ilmenite). A study of the dunes and beaches around the mouth of the Limpopo determined 18 Mtonnes of economic heavy minerals grading 3.5%.

Exploration work was carried out by a Yugoslavian team (Geoloski Zavod) in the Angoche (Congalone) area which came up with 28 Mt grading 7.8% of economic heavy minerals (5% cut-off grade). Kenmare Resources, a Dublin based loss-making subsidiary of Cluff Minerals, did further work on the deposit with Mineral Deposits Limited (MDL) of Australia and reserves are now estimated at 167 Mt

grading 3.25% heavy minerals. Kenmare is going ahead with a 100 MUSD project to exploit the deposit under a joint company (71.25% Kenmare, 25% state, 3.75% Geoloski Zavod) and, once operational in 1992, annual revenues will be about 44 MUSD/annum over the 10 year initial life of the operation which will have its own port. Kenmare is also considering a 60 MUSD plant to convert the ilmenite into synthetic rutile. The project includes provision of 760 kUSD/an for a security force made up of a Mozambican army detachment under the control of a British security company, to protect the operation from the MNR bandits.

Edlow Resources (USA) has signed a contract with Mirem for the assessment of the titanium sand deposits in the Moebase area in 1990. A SADCC project to study the feasibility of setting up a regional titanium oxide plant based on the heavy mineral beach resources of Mozambique, Tanzania and Malawi (lake shore), still awaits funding.

In 1986 Lonrho PLC signed a contract with Mirem, valid for 25 years, for exploration and mining rights for gold in six blocks in Manica Province on the border with Zimbabwe. In the first phase a joint mining company called Minas Auríferas de Manica (Manica Gold Mines, 20% State, 80% Lonrho) was formed to carry out operations. The blocks contain primary deposits of gold in the extension into Mozambique of the Mutare Gold Belt. Lonrho's Redwing gold mine in Zimbabwe is on the other side of the border near Penhalonga and exploration work has been carried out by Lonrho Zimbabwe although the contract is with Lonrho PLC in London. This area has several old gold mines (over 30) that were worked in the past. Several areas, where access was possible, have been assessed and feasibility studies are being carried out. Lonrho have formed their own security organisation, which works jointly with the Mozambican army.

In 1988 a second company, Aluvioes de Manica Limitada (Alma) was formed (20% State, 80% Lonrho PLC) to explore the alluvial deposits in the same area and Lonrho has recently announced that it will start up a dredging operation that will produce 20 to 25 kg/month of gold from 50,000 m³ of washed gravels on the Chua River. Lonrho operated a dredge on the Revue River (Revue Dredging Co.) in the forties which closed due to an exhaustion of accessible reserves, but only dredged to 6m (reserves extend to 30m).

Deposits of high grade diatomite earth occur in Maputo (Boane) and Manhica Districts. In 1990 Cluff Minerals PLC, together with Rockwood Holdings PLC signed a contract with Mirem (40% Cluff, 40% Rockwood, 20% Mirem) for the appraisal and possible development of a diatomite deposit 70 km north of Maputo. Neighbouring South Africa offers an excellent market as it consumes about 18 kt/annum, 95% of it imported from the USA.

Several foreign mining companies (Soviet, US and South African) have shown interest in the vast tantalum-niobium pegmatite field of central Zambezia Province, but nothing can be finalised until the security situation improves. There are also a string of pegmatites containing significant rare earth grades west of the Ta-Nb pegmatites in Zambezia and Nampula Provinces. They have yet to undergo systematic geological appraisal which would be difficult to carry out under the present security situation.

Flake graphite deposits occur in numerous locations in the centre and north of the country. Graphite was mined on and off from 1911 in Tete (Angonia) and Nampula Provinces but all operations were abandoned in the early fifties. The most promising deposit in terms of both grade and infrastructure is situated at Ancuabe near the mouth of the Lurio River, south of the port of Pemba. Reserves for this deposit are estimated at 35.5 Mtonnes of flakey grade graphite with 15 to 20% carbon. A joint company has been set up (Kenmare 40%, Shamrock Mining 30% and state 30%) to assess and exploit the deposit.

An apatite (phosphate) occurrence near Monapo on the line of rail south-west of the port of Nacala has recently been surveyed by Intergeo (Czechoslovakia). The ore grades 9% P₂O₅, 7% FeO, 4% MgO and 1% TiO₂. Reserves of phosphate are put at 15 Mtonnes. The area also has a good infrastructure in terms of rail and road access and electricity supply, and will hopefully in the future form the basis for a fertiliser plant.

The Honde iron ore deposit was assessed by a Swedish team (LKAB) in the late seventies and reserves are estimated at 124 Mt of low phosphorus and sulphur ore. This deposit has been considered as the feed for a direct reduction plant at Beira using natural gas or at Tete using coal and a 1986 study on the steel industry in the PTA/SADCC region concluded that the latter (Beira) should be considered as the next source of regional steel once demand had outstripped Zisco's capacity. The sponge iron produced would be made into steel using electric arc furnaces and in 1984 the Mozambican foundry in Maputo, Cifel, investigated the purchase of two 26-tonne furnaces and a continuous billet caster (80 kt/an) to supply feed for its rolling mills which can handle 50 kt/annum and are being rehabilitated with Spanish aid. The project is still on ice due to the security situation in the Honde area.

Cassiterite (tin) has been mined intermittently from the Inchope deposit since 1919, but ceased in the late fifties. This deposit, of pegmatite origin, is situated close to the line of rail and the main highway between Chimoio and Beira in the centre of the country. The area was re-surveyed in 1978 and significant anomalies of tin, tantalum and niobium were encountered. Grades of 390 to 680 g/m³ of tin and 25 g/m³ of Ta-Nb were found over a wide area. Mirem is currently looking for finance for a detailed evaluation of this resource, but since the collapse of the tin price in 1985 there has not been much interest shown.

There are several other prospects for which Mirem has been looking for potential investors/partners. These include the Mt Muambe carbonatites, the Djanguire and Mt Domba fluorites and the poly-metallic deposits of the Mueda Plateau in Cabo Delgado, but as yet not much interest has been shown.

11.7 MOZAMBIQUE: PRINCIPAL MINERAL RESOURCES.

Mineral	Resources	Mineral	Resources
Apatite	274 Mt	Heavy mins. (Ti)	352 Mt
Asbestos	500 kt	Iron ore	254 Mt
Bauxite	6.1 Mt	Kaolin	4.4 Mt
Bentonite	8.5 Mt	Limestone	39 Mt
Chalk	40 kt	Marble	30 k-m ³
Coal	9.8 Gt	Mica	72 kt
Copper	382 kt	Natural Gas	120 G-m ³
Diatomite	1.3 Mt	Nepheline syenites	4.3 Gt
Felspar	12 kt	Perlite	954 kt
Fluorite	3 Mt	Red clay	12 Mt
Gold	47 t	Silica sand	12 Mt
Graphite	36 Mt*	Tantalum pentoxide	20 kt+
Guano	100 kt	White clay	6 Mt

+ author's 'guesstimate', * 35.5 Mt at 15-20% carbon.
Sources: CNP 1989, UNDP 1986, DSGM 1974.

In 1983 ENH commissioned a feasibility study on the Pande natural gas resource by Fluor Corp. and Arthur D. Little. This study concluded that an ammonia plant producing 365 kt/annum, located on the coast at Inhassoro, would be viable. The study was for a self-sufficient operation with its own power generation and processing local groundwater in the plant, with its own marine facilities. In 1984 the total investment needed was 182 MUSS of which pledges for 66 MUSS had been secured. The project has also

been taken up as a regional project by the SADCC industrial coordination division and both the World Bank and the African Development Bank have shown interest, but no progress has been made in the creation of a SADCC facility. In 1987 talks were held with the Zimbabwean state IDC for a possible joint venture to replace the high-cost ammonia operation at Sable Chemicals, but appear to have come to nothing. In 1989 ENH held discussions with Anglo American, its subsidiary AECI, and the state oil-from-coal company SASOL, with a view to obtaining capital and expertise for the setting up of a plant based on the Pande deposit. ENH also commissioned the American company Bechtel to do a study on the possibility of using the gas to make petrol and diesel, but no decision has been made in this regard.

Discussion

In 1975 the Mozambican mining industry was both undeveloped and backward and the geology (and hence the mineral potential) of the country was only superficially known. The few mines that existed were generally using artisanal, labour intensive methods. The first priorities of the new socialist government, in the minerals field, were: 1) to keep the existing mines operational in the face of abandonment and the exodus of Portuguese artisans and technicians; 2) to launch an extensive mineral exploration program in order to assess the national mineral potential; and, 3) To train the necessary manpower to effectively carry out the above two.

By 1981 all the mines had been nationalised and mineral production was once again reaching pre-1975 levels, with technical aid from the socialist countries, principally the Soviet Union and the German Democratic Republic, and internationalist volunteers. Exploration activity had covered over 90% of the the country and several new (and some old) mineral resources had been systematically assessed, again with socialist aid. Manpower development had progressed rapidly, to the stage where there were several times more qualified nationals than the pre-1975 total of settlers and nationals. The battle on all three fronts appeared to be well in hand if not virtually won.

However, after the Independence of Zimbabwe, in early 1980, the South African regime took over the running of the MNR, which had been the creation of the Rhodesian security forces, and with their considerably more extensive resources for the training and supply of the bandits, the destabilisation war was rapidly escalated. By the end of 1983 virtually all mineral exploration activity had been abandoned and the mining industry was collapsing, both due to the banditry in the countryside.

The government then attempted several compromises in an effort to halt the rapid disintegration of the economy. The first was the Nkomati Accord of March 1984 whereby they tried to halt or at least diminish South Africa's sponsorship of the bandits and to increase its stake in the Mozambican economy principally in their traditional (pre-1975) areas of invisibles, namely, ports/rail, miners and tourism. At the same time a Western diplomatic offensive was launched with the objective of getting the OECD states to use their leverage on South Africa to cease running the bandits and to exploit the contradictions between Western imperialism and South African sub-imperialism. To achieve this, a new policy of encouraging Western foreign investment was launched to the extent of part-privatising state enterprises, but generally to be run as joint state/TNC operations. The foreign investment regime was changed to the degree that it is now more favourable than those of most neighbouring countries. Repatriation of after tax profits is 100% for Mozambican mining companies, 50% in Zambia and a mere 35% in Zimbabwe.

Until 1989, the results of these two strategies had been mixed: In South Africa's case there had been only a marginal decrease in their support to the bandits and an insignificant increase in their involvement in

the port of Maputo, tourism and the recruitment of miners. Regarding the West, there has been increased pressure from some quarters on South Africa to stop its destabilization policy, but to no great effect, while there has been significant interest in the opening up of the economy to foreign investment, though not much action, mainly due to the security situation. In a negative sense, it can be argued that the government has achieved the victory of the USA not openly recognising and supporting the MNR, as they have in UNITA's case in Angola.

The only foreign investment contracts signed to date are for petroleum (Esso/Shell, Amoco and BP), where the process started as far back as 1983, gold (Lonrho) which lies within the relatively secure Beira corridor zone and titanium sands (Kenmare) on the coast. South African concerns have shown interest in both the diatomite and bentonite resources of Maputo Province, the tantalum pegmatites in Zambezia and the Pande gas.

Since the advent of "pretoriastroika" in 1990, official South African government support to the bandits appears to have stopped, but support is reported to be continuing from private sources in that country. Mozambique's late president, Samora Machel's, claim in 1975 that Mozambique would never be free until South Africa was free appears today to have been more true than seemed at the time.

At a regional level (SADCC), the proposed urea plant based on Pande natural gas has been taken up as a SADCC project, but with little concrete action. It has also been considered as a joint Mozambique (ENH) - Zimbabwe (IDC) project, but this idea has not been developed. The establishment of the region's second iron production plant (DRI sponge iron) based on Honde ore and Pande gas has been considered. A project for the assessment of Mozambique's lime resources has been completed and recommended that the Muanza (Dondo) deposit be assessed for metallurgical quality for export to Zimbabwe. Mozambican copper concentrates have been refined in Zimbabwe since 1986 and Mozambican bauxite is being mined by a Zimbabwean company and treated at a plant in Zimbabwe. Further areas of collaboration are under investigation such as the possible supply of activated carbon (coconut shells) to Zimbabwe. However, it now appears that the Mozambican mineral potential is likely to be realised by the South African mining TNCs, particularly AAC and Gencor.

In conclusion, Mozambique has extensive mineral resources, but their development is dependent on an improvement in the security situation. Nevertheless some "defensible" projects are going ahead, which will soon make the mining sector the nation's main forex earner. But this has been achieved at the cost of making the investment regime so advantageous to foreign companies that the state receives almost no rent. All that it receives is part of the forex employment and the development of the resource.

Footnotes to Chapter 11

- 1 CNP 1984. 2 World Bank 1990, page 178.
3 Programa de Reabilitacao Economica.
4 Ministerio de Recursos Minerais 5 Instituto Nacional de Geologia
6 Direccao Nacional de Hidrocarbonetos 7 Direccao Nacional de Minas
8 Kashamila 1985. 9 GPRM 1984. 10 ENH 1986. 11 ENH 1985.
12 Project 2.0.4 "Manufacture of Coke at Moatize Colliery".
13 CNP 1985 and 1989, page 10. 14 Run of Mine.
15 Commonwealth Secretariat 1990, page 5-68.
16 Companhia do Vale do Rio Doce
17 Mining Journal 314/8064, 30 March 1990, page 250 and Mining Magazine 162/6,
June 1990, p410.
18 E&MJ 09/1990, page 160. 19 Coal Monitor No. 3, 2/1990, page IV.
20 CNP 1989, page 10. 21 Personal communication with the ex mine manager, 1986.
22 Now running on imported clinker. 23 CNP 1985 and 1989. 24 Austroplan 1990.
25 ENH 1986. 26 Mirem 1990. 27 CNP 1989, page 10.
28 Mirem 1986b. 29 Kenmare Resources Plc, Annual Report 1989, page 17.
30 Industrial Minerals, December 1989, page 60. 31 Silva & Banze 1990, page 3.
32 Mining Journal, 314/8074, 8 June 1990, page 453.
33 This is a British Company, but all of its revenue comes from gold operations in
Zimbabwe (Royal Family, Freda-Rebecca).
34 A British security company. 35 Cluff Minerals PLC, Annual Report 1990, page 17.
36 UNIDO 1986, page 85. 37 Mining Journal 341/8064, 30 March 1990, page 250.
38 ENH 1986. 39 Industrial Development Corporation. 40 Mirem 1990.
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Fig. 13

NAMIBIA

AREA 823,000 sq km

POPULATION 1.5 million

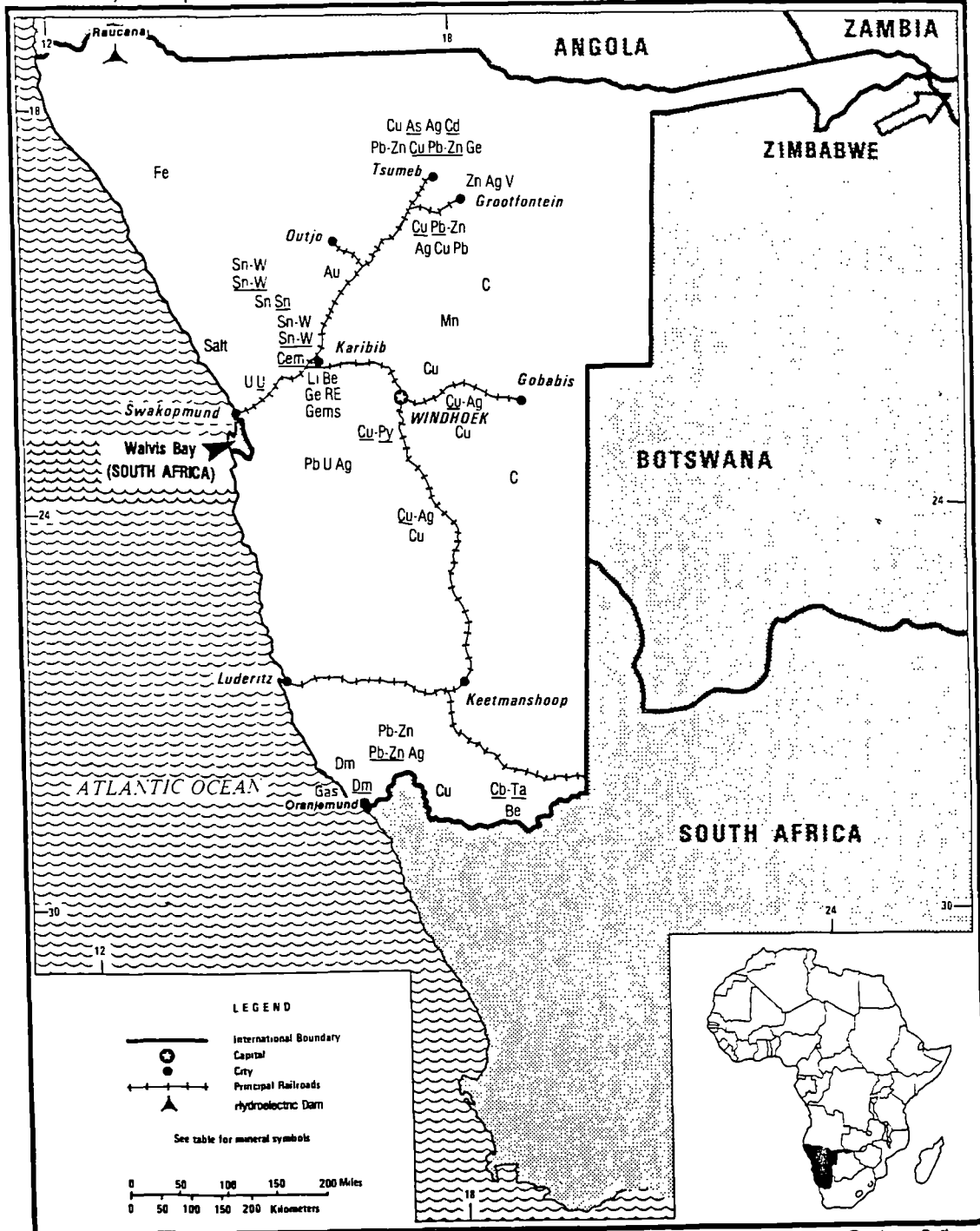
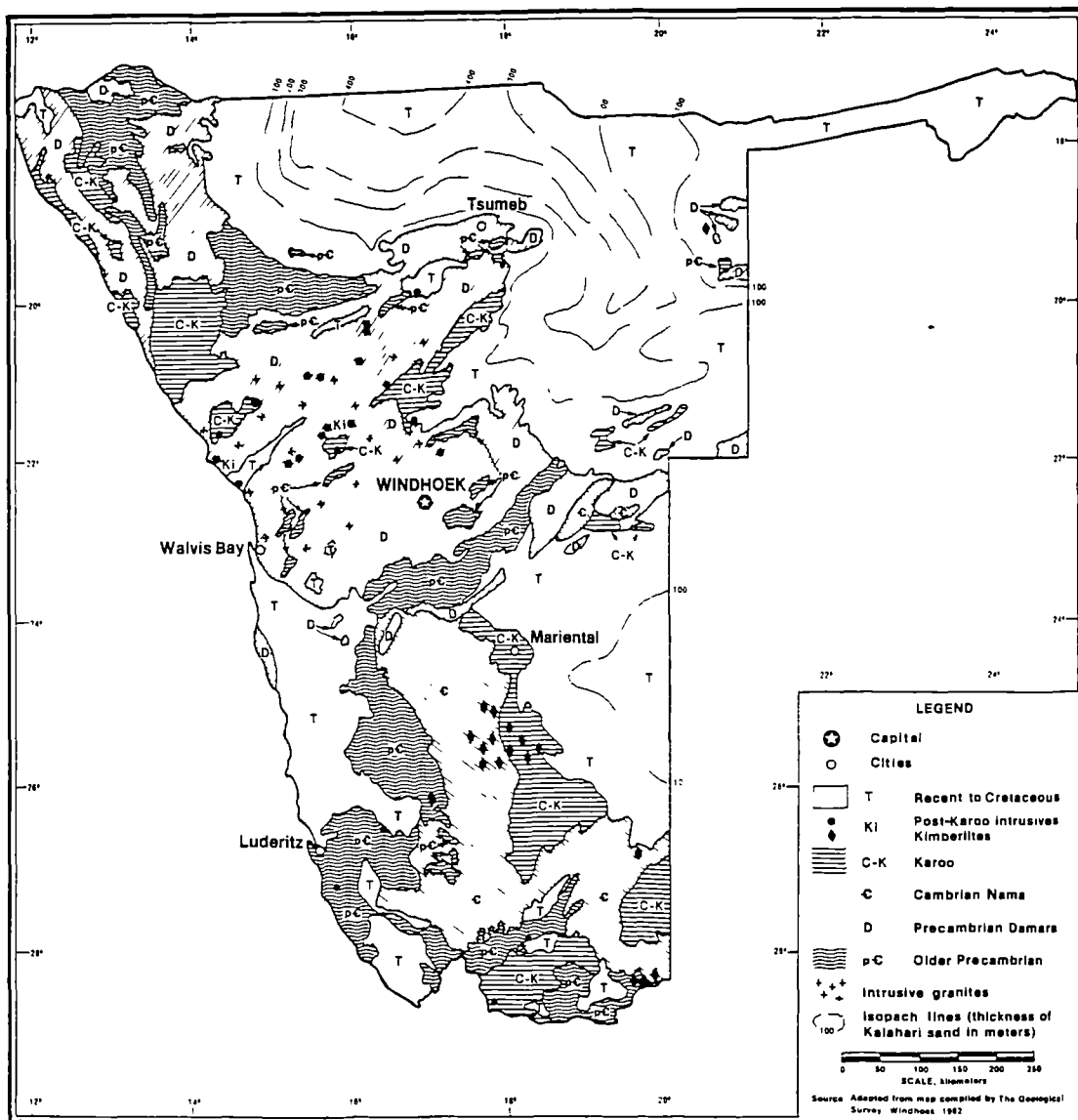


Fig.14



Generalized geological map of Namibia.

Chapter 12: The Minerals Sector of Namibia

Introduction

Background

Both ferrous and non-ferrous mining was carried out before the arrival of the German colonists at the end of the last century and it is thought that the ancient Kingdoms of the Ondonga and the Ukwanyama were based on mineral trade, iron and copper respectively¹. In 1851 an explorer, Thomas Galton, noted copper smelting in the Otavi area by Owambo men and in 1855 the Walwich Bay Mining Company mined copper ores in the Windhoek area, but it was not until the turn of the century that major mining started, for copper ore, at Tsumeb by a German company².

Namibia was "allotted" to Germany at the Berlin Conference in 1884 on the basis of dubious treaties obtained by Adolf Luderitz, a prospector/explorer, from the local leaders. In 1904-06 there was a series of revolts against the colonisation which resulted in genocide in parts of central and southern Namibia, particularly of the Herero people, to make way for European farmers (ranchers). After the revolt, the railway to Tsumeb mine was completed using forced captured Herero labour. In 1908 the coastal diamond fields were discovered and mining took off.

After the First World War Namibia was taken over by South Africa, under a League of Nations mandate, and the diamond mines were taken over by South African companies. By 1924 mining, mainly diamonds, constituted 44% of the colony's GDP³. In 1946 the UN ruled that the former League mandate territories were UN trust territories and should be prepared for independence. South Africa refused and hung on to Namibia, with support from the USA, until 1990.

The nationalist movement SWAPO⁴ was founded in 1960 and in 1966 it launched a guerrilla war to liberate the country, first from bases in Zambia and later from southern Angola. In the pre-independence elections SWAPO gained an absolute majority, but not the two-thirds majority necessary to change the constitution. Independence was finally granted in March 1991 and Namibia joined the SADCC in the same year.

The Economy

12.1 NAMIBIA: BASIC MACRO-ECONOMIC INDICATORS

(Rand)	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	.96	1.01	1.04	1.06	1.10	1.14	1.18	1.23	1.27
Pop.density	/km ²	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5
Forex Rate	/USD	.77	.89	1.09	1.11	1.48	2.19	2.27	2.04	2.26
CPI		100	115	133	149	162	181	206	232	261
GDP mp	G	1.56	1.51	1.79	1.88	2.11	2.54	2.93	3.08	4.28
GDP/cap	USD	2107	1682	1588	1591	1301	1017	1093	1232	1492
Exports fob	M	1138	947	1009	941	1101	1593	1994	1811	2126
Imports cif	M	888	1067	1107	1024	1177	1269	1543	1808	1946
Trade Balance	M	250	(120)	(98)	(83)	(76)	324	451	3	180
GFCF	G	.44	.43	.41	.36	.33	.37	.42	.48	.65
GFCF/GDP	%	28%	29%	23%	19%	15%	15%	14%	16%	15%
Govt Revenue+	G	.34	.29	.44	.57	.69	.96	1.20	1.31	1.45
SACU receipts					250	250	300	350	350	394
% SACU receipts					44%	36%	31%	29%	27%	27%

Source: IMR SADCC Database 1990, EIU 1990.

The Namibian economy is highly dualistic in nature in that the agrarian and industrial sectors are both well defined. The primary commodity-producing sectors provide the bulk of the country's wealth, while the traditional subsistence agriculture sector produces little cash income and supports most of the population, both directly and indirectly through the migrant labour system.

The main economic activities are mining, cattle ranching, sheep farming (karakul pelts) and fishing. The economy used to be run as South Africa's "fifth province", but during the eighties several national institutions were created. Namibia is part of the Rand Monetary Area (CMA) and the new government has decided to stay in it for at least two years. Namibia is officially not a signatory to the SACU Agreement, but is part of the common customs union and for some time it has been receiving a "grant" from South Africa in lieu of duties that would have accrued to it. However the grant is not calculated on the SACU (1.42) formula and constitutes 27 to 44% of government receipts, but this is estimated to be less than what would accrue under full SACU membership. South Africa accounts for 80 to 85% of imports and 20 to 30% of exports and South African companies dominate the economy. National debt to South African banks was estimated at 320 million USD in 1989 (19% of GDP)⁵, but the new government is insisting on a detailed breakdown of all debt to Pretoria before any repayment is made, to determine which debts were contracted to finance the war.

Namibia is potentially one of the wealthiest countries in sub-Saharan Africa with an exceptionally high level of resources per head of population, due to the vast and accessible mineral deposits. However, the economy is very vulnerable to external factors, particularly mineral prices which have been the major cause of the turbulent growth pattern of the economy since 1978. Although it has the highest GDP per capita in the SADCC the distribution of wealth is highly racially skewed, with the small "white" population (about 80,000, 6.6% of the population) owning the majority of the wealth. In 1986 the estimated average daily calorie intake was the lowest in the SADCC with the exception of war-torn Mozambique⁶.

The economy's productive capacity is based on the export oriented sectors of mining (principally diamonds and uranium) and agriculture (cattle and karakul sheep ranching). These sectors normally account for over 40% of GDP and roughly 90% of exports and employ 35% of the total labour force. Agricultural "subsistence", in which half of the population is engaged, produces only about 5% of GDP. There are not many countries in the world where mineral wealth per capita is as large as in Namibia. While the territory has a strong mineral resource base, this resource is being rapidly depleted.

The Mining Sector

General

Before colonisation the mining sector was part of an integrated economy, supplying its output to the manufacturing sector, and trade in minerals was developed with ores being moved to northern Namibia for smelting and manufacturing. Minerals were then, as they no longer are, part of an integrated economy.

Ten years after the partition of Africa, mining concessions passed from small prospectors to larger syndicates, financed from Germany, Britain and South Africa. From then on the mining sector became an enormous suction pump, extracting minerals and wealth from Namibia for consumers in Europe. Minerals are almost entirely exported; from a value of 2.5 million rand (21 million 1978 USD) in 1945 they rose to 677 million rand in 1978 (567 million 1978 USD) with the start of the Rossing uranium mine. The foreign currency generated pays for imported inputs and the repatriated profits of the foreign-owned mining companies (as dividends to shareholders).

12.2 NAMIBIA: BASIC MINING SECTOR DATA

(RAND	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
GDP Mining	M	680	452	465	473	547	991	1144	779	1052
% GDP Mining	%	44%	30%	26%	25%	26%	39%	39%	25%	25%
GFCF, Mining	M	112	75	48	41	32	32	75	95	171
% Mng GFCF	%	26%	17%	11%	11%	10%	9%	18%	20%	26%
Mineral Prod.	M	870	627	764	723	842	1272	1629	1309	1528
Mineral Prod/cap		906	621	735	682	766	1116	1380	1064	1203
Min.Exports	M	908	657	755	715	851	1285	1645	1322	1543
% Min. Export		80%	69%	75%	76%	77%	81%	82%	73%	73%
Mining labour	k	19.8	19.2	17.3	16.6	15.6	14.9	14.0	13.0	13.1
% mining lab	%	9.6%	9.5%	8.7%	8.4%	8.1%	7.8%	7.4%	7.0%	7.1%
Min.Prod/lab	kUSD	57.0	36.7	40.7	39.1	36.5	39.0	51.3	49.5	51.7
average wage/an	k	5.51	6.28	7.64	8.42	8.93	10.3	11.5	14.0	18.5
avg REAL wage/an		5.51	5.46	5.74	5.65	5.51	5.68	5.57	6.03	7.09
Mining Revenue	M	183	151	55	64	112	203	267	273	220
% Mng Revenue		54%	52%	13%	15%	19%	25%	26%	24%	19%

Source: IMR SADCC Database 1990, EIU 1990.

The mining industry of Namibia has been the economy's most important productive sector with a current output value of around one and a half billion rand, employing 7% of the labour force, contributing 80% to exports (average 76% for 1980-88) and 25% to GDP (average 31% for 1980-88). Although the mining sector generates enormous wealth, it only employs about 13,000 people due to its capital intensive nature. The mining industry is also a major source of government revenue and for the period 1980 to 1988 it contributed an average of 27% of state receipts.

Average wages for the industry in 1988 were 18,500 rand/annum (about 7,000 USD) or 7,000 deflated 1980 rand, a real increase of 29% from 1980 to 1988. However, while the average annual earnings look impressive there is no equity in the distribution of the earnings and since most black Namibians are unskilled and semi-skilled, they receive much lower average wages. Until 1972 workers were recruited under a harsh migrant labour system where they had few rights. After a series of strikes in December 1971 the conditions of recruitment were changed giving the migrants the right to break contract and to continue a contract without returning to the rural areas. With increasing international criticism, in the late eighties the major mining companies (Rossing and CDM) moved towards the creation of a stable labour force.

The mining industry exports over 90% of its output. Diamonds are the greatest contributor to government revenue through a 10% export duty, a 45% diamond mine tax and a 4.5% surcharge. Export orientation makes the whole economy very vulnerable to world economic recessions as was the case in 1982/3 when revenue from mining fell to 13% and exports to 69%.

The mining industry is dominated by three major companies, all foreign: Consolidated Diamond Mines (CDM), Rossing Uranium and Tsumeb Corporation Limited (TCL), which account for 90% of mineral production in terms of value. This foreign ownership of the mining industry has far-reaching implications for the Namibian economy; the mineral wealth of Namibia has so far not benefited the nationals, but has rather resulted in their exploitation, both economic and political. Because of its nature the mining sector has not been used as a propelling sector in economic development, but only for growth in GDP. However, the high level of foreign capital involvement and the emphasis on exports in the mining industry has led to a large disparity between national income and GDP (1988 GNP = 90% GDP) due to the net outflow of corporate profits and expatriate remittances.

However, the mining companies have contributed to the infrastructural development of Namibia: they have built up towns such as Oranjemund, Uis, Kombat, Rosh Pinah and Arandis to accommodate employees. Also the discovery and establishment of mines has provided government with economic justification and means for extending physical infrastructure into previously undeveloped or underdeveloped parts of the country for the benefit of the non-mining community as well.

The major source of investment in the mining industry are mining companies based in South Africa, the United Kingdom, Canada, France and the United States. Five of South Africa's finance houses have extensive and frequently overlapping interests in diamonds, uranium and base metals exploration and production.

12.3 MINES, OWNERSHIP AND MINERALS OF NAMIBIA

Company/mine	Major Shareholder/s	Mineral/s
CDM	De Beers (RSA)	diamonds
Koes Salt	Private	salt
Kombat	Tsumeb Corporation (RSA)	copper, lead
Navachab	AAC (RSA), Metallgesellschaft (FRG)	gold
Otjihase	Tsumeb (RSA), Otjihase Mining	copper, silver
Okorusu	Private (40% UK)	fluorspar
Peralin	Private	marble, gold
Rosh Pinah/IZ	Isacor (RSA), Molly Copper (USA)	zinc, lead,
Rossing Uranium	Rio Tinto-Zinc (UK)	uranium
Salt Company	Private	salt, calcite
SWA Lithium	Metramco (FRG)	beryl, petalite
Tsumeb	Gold Fields of Namibia (GFSA, RSA)	copper, silver
Uis/Imcor Tin	Isacor (RSA)	tin, arsenic
Usakos	Private	tin, tantalite
		lime

Source: Chamber of Mines 1986, UNIN 1987.

Economic Geology

The oldest rocks in Namibia belong to the Vaalian (> 2 Ga) to lower Mokolian (1.8 - 2 Ga) which contain metamorphic complexes which host mineral occurrences of lead, copper and fluorite in fault zones (Huab Complex), gold in quartz veins, pegmatites with columbite (Nb), tantalite (Ta) and beryl (Abbabis Complex) and kyanite (Hohewarte Complex). The Kunene Anorthosite Complex, located in the extreme north-west, contains few mineral deposits of economic importance⁷.

The calc-alkaline volcanics and intrusives (1.8 Ga) of the Orange River Group contain porphyry copper deposits (Haib deposits) and massive sulphides are found in the Khoabendus Group. The magnetite quartzite of the Namaqualand Metamorphic Complex contains associated exhalative sulphides and the late Proterozoic red sandstones host red-bed copper deposits (Klein Aub Mine). The Damaran Pan-African rifts and the margins of the deep Pan-African basins of the Gariab Complex contain economic sedimentary exhalative sulphides (Rosh Pinah Mine, Namib lead mine and Tsonguari Pb/Zn prospect), while the Pan-African mid-oceanic ridge areas contain volcano-exhalative massive sulphide deposits (Otjihase and Matchless Mines). The Pan-African shelf carbonates have associated pipe sulphide deposits (Tsumeb, Kombat, Adenab and Berg Aukas Mines) while the alaskites of the lower Damaran are uranite-bearing (Rossing Mine), and tin-bearing pegmatites occur in the upper Damaran (Uis Mine). The Damaran sequence also hosts hydrothermal tin deposits (Brandberg Mine) and gold lode deposits (Navachab Mine).

The Nama Group has occurrences of uranium and lead-zinc and the Karoo grabens are important for their coal seams but none are currently exploited. The off-shore Cretaceous sediments host gas, and

possibly petroleum, resources (Kudu field). Much of the north-east, east and south-west of the country is covered by Kalahari sands. The recent calcretes contain uranium (Langer Heinrich) and recent (Tertiary) beach deposits which mined for diamonds (CDM) and inland pans contain salt (Etosha)⁸.

Legislation

The mineral policies and legislation encourage investment by both foreign and domestic private sector mining companies. Most of Namibia's mining regulations were written by the South African Government as in the Mines, Works and Minerals Ordinance of 1968. Ownership of all mineral resources is vested in the state, and the right to prospect, mine, and dispose of all minerals is vested in the Minister of Mines, but the Mining Code provides easy access to prospecting and mining licences for foreign and domestic companies. A new mining law is being drafted, but it is not expected to be substantially different as regards the mining TNCs.

The policy statement on the code of foreign investment states⁹ that Namibia welcomes foreign investment and would prefer joint ventures with local state or private capital, except for mining where a state share of equity will be necessary. At present there are no restrictions on the remittability of profits or on the sale of minerals. Although SWAPO's 1976 program stated that TNCs "...must be prepared to subordinate their profit-maximization philosophy to the goals of the socialist development programme of an independent Namibia"¹⁰, in general, the new government has gone out of its way to allay the fears of foreign investors, it is therefore unlikely that there will be any nationalisation of mining companies or the creation of a minerals marketing authority in the near future. However, the Minister of Mines and Energy, Andimba Toivo ya Toivo, has been reported as saying....

"...that while nationalisation of some sectors remained a long-term prospect, the government would move cautiously in introducing changes so as not to imperil optimum production levels by the industry."¹¹

Mineral Production

Introduction

12.4 NAMIBIA: MINERAL PRODUCTION

	Unit	1970	1975	1980	1985	1986	1987	1988	1989	70-80	80-89
Arsenic	kt	4.5	6.7	1.3	2.5	2.2	1.9	3.0	2.4	-71%	86%
Cadmium	kt	.23	.11	.09	.06	.06	.05	.11	.88	-62%	889%
Copper (blist)	kt	28.6	39.0	42.3	47.6	50.1	37.7	42.2	37.9	48%	-10%
Diamonds	Mct	1.77	1.61	1.48	.91	1.01	1.02	.94	.90	-16%	-39%
Gold	t				.2	.18	.17	.20	.34		
Lead	kt	70.1	44.3	42.7	38.5	40.0	40.6	44.4	44.2	-39%	4%
Lithium	kt	6.9	51.6		1.9	2.1	3.1	1.6	1.4	-100%	
Marble	kt				.40	.60	.60	.26	.60		
Pyrite	kt				174	190	120	227	197		
salt	kt	110	210	230	154	136	125	150	121	109%	-48%
silver	t	38	44	105	83	91	95	108	138	176%	32%
Sodium antimonate		0	0	0	0	0	51	156	73		
Tin	kt	1.01	.76	1.00	1.50	.71	1.10	1.20	.50	-1%	-50%
Uranium	kt	.00		4.77	3.39	3.49	3.70	3.80	3.60		-25%
Vanadium	kt	.42	.56	.00	.00	.00	.00	.00	.00	-100%	
Zinc	kt	46.1	37.7	25.4	30.5	34.1	39.4	37.3	39.3	-45%	55%

Sources: BGS 1975-89, EIU 1990

Production of most minerals has declined in the eighties, due to the global recession and the lack of investment in turn due to the South African occupation and a UN resolution prohibiting the

exploitation of the country's mineral resources. With the lifting of sanctions and the upturn in the metal markets a significant expansion in uranium, copper and gold can be expected and possibly a small expansion in diamond output.

Diamonds

CDM is a wholly-owned subsidiary of De Beers Consolidated Mines of South Africa which works closely with its partner, Anglo American Corporation of South Africa. CDM is the sole producer of diamonds in Namibia and is extremely important to De Beers Consolidated Mines: in the early 1970s their Oranjemund operation generated over 30% of De Beers' worldwide after-tax profits, but in 1980 the share had declined to 17% due to the development of new De Beers group mines, particularly in Botswana.

Control of Namibian diamonds remains crucial to the De Beers mining strategy: they are almost all of gem grade (>95%) and are a key factor in the maintenance of control of the world diamond market by the Central Selling Organisation (CSO). However, the Thirion Report published in 1986 severely attacked the over-mining strategy of CDM (concentrating on high grade ores only) which could lead to the rapid exhaustion of gem grade diamonds. Diamonds are extremely important for state revenue and in the 1988/9 fiscal year CDM was responsible for 41% of all mining revenue to the Namibian government and accounted for 8% of national revenue.

Diamonds are mined by CDM from alluvial coastal deposits north of the Orange River. The proved and probable reserves of gem diamonds available in Namibia may be as much as 30 million carats. The types of assessed reserves include raised beach conglomerates and other terrestrial deposits (1-6 million carats) and foreshore deposits (9 million carats), but the greatest long term potential lies with the submarine deposits (10-15 million carats). Production in 1989 at 0.938 million carats is only 60% of the 1,56 million carats produced in 1980, but with the opening of the new Elizabeth Bay and Auchas areas, production should increase by 300 thousand carats per year in the 1990's and submarine mining is also under consideration by both CDM and an independent company. The recovery is about 11,12 carats per 100 tons, and although this is relatively low, it has a high percentage of gem diamonds (95%) of which about a quarter are large diamonds over 1 carat in size.

12.5 NAMIBIA: CONTRIBUTION OF DIAMONDS TO STATE REVENUE.

	TAX	DUTY	TOTAL	%TOTAL
1979/0	134	41	338	52%
1980/1	101	34	292	46%
1981/2	33	21	436	12%
1982/3	24	22	453	10%
1983/4	27	23	571	9%
1984/5	47	21	687	10%
1985/6	50	39	957	9%
1986/7	121	50	1197	14%
1987/8	114	42	1309	12%
1988/9	60	50	1451	8%
total	711	343	7691	14%

Source: UNIN 1987, EIU 1989.

Diamond mining is controlled under the Mines Ordinance by the Diamond Board. All producing mines have to deliver all diamonds to the board which then markets the diamonds through the Central Selling

Organisation (CSO) in South Africa. However, in 1990 government officials visited Endiama in Angola to look at their system of marketing at least part of production independently. Diamond sorting and valuation has been transferred from Kimberley in South Africa to Windhoek where Namibians are being trained by CDM.

Uranium

Namibia's known uranium reserves occur in three deposit types: in granitic rocks as at Rossing, in superficial sediments (Langer Heinrich) and in older sediments of the Karoo. The predominant uranium mineral is uraninite which constitutes 60% of uranium deposits.

Rossing mine is the sole producer of uranium in Namibia: the mine is the largest open-pit uranium mine in the world with an average grade of 0,04% uranium pentoxide. This makes Namibia the fourth largest uranium producer in the world outside the Eastern Bloc countries. Rossing uranium produces 17% of the western world's total output. The uranium has been transported secretly to foreign countries in contravention of United Nations decree banning prospecting, mining and removal of Namibia's minerals without the Council's approval.

Rossing Uranium is a subsidiary of Rio Tinto Zinc Corporation of the UK which has 45.6% of the issued shared capital. General Mining Union Corporation (Gencor) and the Industrial Development Corporation (IDC) both of South Africa and Minatome of France are the other major share holders. Through the Capricorn Trust the state has 3.5% of the equity and 50% of the total voting rights. Production in 1980 stood at 5,000 tons but fell to 3,500 tons during 1985-89. The company employs about 3,200 workers and claims to contribute R100 million a year in wages and taxes. The mine accounts for 35% of national export earnings and around one-fifth of the gross domestic product. Uranium prices have been low throughout the eighties and earnings have fallen for Rossing as the long term sales contracts have expired and they have resorted to sales on the spot market. The main uranium customers have long-term contracts and include power utilities in France, Japan, West Germany, Spain and Taiwan.

With the upturn in uranium prices and the lifting of sanctions it is expected that Rossing will be moving towards its full capacity of 6,000 tonnes in the 1990s.

Base Metals

Tsumeb Corporation Limited (TCL) is a wholly-owned subsidiary of Gold Fields of South Africa (GFSA) through Gold Fields of Namibia (GFN). TCL also operates an integrated copper smelter, lead refinery and ancillary plants for by-products.

The mines owned by TCL include Tsumeb, Kombat, Asis Ost, Asis West and Otjihase. The base metals produced include copper, lead and zinc with byproducts silver, cadmium and arsenic. Otjihase is the largest source of copper concentrate for smelting into blister and a producer of gold (which is recovered from blister). Copper smelting and lead refining are done at Tsumeb mine.

The South African parastatal, the Iron and Steel Corporation (Iskor), produces lead, silver and zinc from Rosh Pinah mine near the border with South Africa in the south-west and all production is exported as a concentrate to South Africa for refining. Iskor also owns the Uis tin mine which also produces columbite/tantalite minerals. The Uis tin deposits (probably the largest tin-bearing pegmatite mine in the world) occur as low grade ore (0.15%). The proved, probable and possible reserves of tin in Namibia are 120 kt which is 2% of world reserves. Tin concentrate from Uis is sent to the Iskor refinery in South Africa.

The proved zinc reserves of 836 kt in Namibia are distributed as follows: Tsumeb 315 kt, Rosh Pinah 90 kt, Berg Aukas 155 kt and Otjihase/Uis/Kombat 270 kt. Three main types of zinc minerals are presently exploited in Namibia, requiring different technologies for beneficiation and extraction. Zinc ores are either sulphidic (Tsumeb, Berg Aukas, Rosh Pinah), carbonaceous or siliceous. Namibia with proved reserves of 670 kt of lead ores accounts for 1.4% of world reserves and 20% of Africa's reserves.

Gold

Gold and silver are produced as byproducts of base metal mining, but Namibia also has several small gold deposits. De Beers, in collaboration with Anglo American Corporation of South Africa, opened the country's first gold mine in 1989, Navachab, at a cost of ninety million rands. It is an open-cast operation and is expected to produce 750 kg/an from a low grade ore containing 2-3 g/t of gold.

Other Minerals

Dasig Mining Company is a South African company involved in mining and prospecting for amethyst, white marble, pink granite at Bonnie Brae and Burgershof in the Otjiwarongo district of central Namibia. Dasig has also acquired all the major sodalite deposits in Kaokoland in the north west where mining has begun.

SWA Lithium Mines owns Rubicon mine near Karibib which produces lithium minerals. The mine is operated by Metramco of South Africa, but the ultimate owner is Klockner of Germany. In 1987 production consisted of 2.173 kt of quartz, 750 t of petalite, 106 t of amblygonite, 53 t of lepidolite and one ton of beryl.

Locally owned companies are also involved in mining and these include: Deblin Mining which produces lead, zinc and silver from a deposit near Rossing, The Salt Company which produces coarse salt from pans near Swakopmund, and Peralin wich produces marble.

Namibia's reserves of vanadium are comparable to those of South Africa, Finland and Peru. Reserves at Berg Aukas amount to 1,7 million tonnes, but they are low grade and there has been no production since 1978.

Cadmium is recovered as a by-product of zinc smelting and Namibian reserves at 5 kt are 0.7% of world reserves. The mineral is partly refined in Namibia and the rest is treated abroad from concentrates and fluedust and sold mainly to the UK and the US. Tungsten is known to occur in Krantzberg and Brandberg West. Namibia's mine production of concentrate varies between 60 and 120 t of contained tungsten per annum from Uis tin mine.

Salt production from the area around Swakopmund has been a relatively important part of Namibia's mineral industry for the past 45 years and the prospect for further production is virtually unlimited on the coastal strip. Salt is produced from salt pans and in 1987 124 kt of coarse salt were produced.

Namibia also has resources of several industrial minerals including arsenic, sulphur, trona, feldspar, fluorine, selenium and phosphorus. A new fluorspar mine opened in 1988 at Okorusu Mountain at the initial rate 50 kt/annum of acid grade fluorspar, owned by local interests and 40% by a UK investor.

Although there are numerous suitable limestone deposits there is still no cement plant and all requirements are imported from South Africa, though the establishment of a local plant is under consideration.

Substantial reserves of sub-bituminous coal have been identified in Namibia in the Karoo basins at Aranos, Toscanini and Caprivi, but are generally low grade (high ash) and deep.

There is evidence of onshore oil potential in the Etosha Region of northern Namibia where Etosha Petroleum holds an exclusive prospecting grant who are re-investigating the area. Several multinational corporations have been prospecting for oil in Namibia and methane gas has been discovered in the Kudu gas field, 120 km off the Orange river mouth.

Conclusion

Mining is potentially the most important sector of the Namibian economy because of its potential contribution towards wider national, social and economic development. Indeed, in order to foster socio-economic development, a substantial part of the resources collected in the form of “rent” from this sector will need to be spent on development in general, and industrial development in particular. Due to the cartelisation of diamonds the opportunity for reaping monopoly rents are large and in fact they are a major contributor to government revenue. Yet the Debswana rent sharing system in Botswana is acceptable to De Beers, meaning that Namibia could still get more of the rent via an equity stake (50% in Debswana).

The mining sector, in general, accounts for more than 80% of exports by value while other sectors (agriculture and manufacturing) account for the remainder. In respect of export earnings, direct and indirect tax revenue and investable surplus, the mining sector provides about half of the national totals and therefore it is important that the mining sector be kept efficiently functioning to facilitate development of other sectors and to build forward and backward sub-sectors related to mining and thereby integrate the sector effectively into the rest of the economy.

Within the mining sector there is substantial room for further value added. Several minerals leave the country as concentrates such as zinc and tin that could be refined locally, and copper is exported as blister to be refined overseas. As almost all diamond output is of gem grade there should be possibilities for the local cutting of a proportion of production as is done in Botswana. Further beneficiation of uranium yellow cake would not be feasible due to the high technology and enormous costs involved.

The legacy of years of colonial domination in Namibia has resulted in a one-sided path of economic growth and a heavy dependence on the mining sector. Given the instability of the minerals market, the depreciating nature of the resources and the substantial possibilities for expanding agricultural and industrial participation in the economy, there is need to broaden the Namibian economic base and make the economy less vulnerable to external shocks and at the same time formulate a path for sustained economic development. Indeed, there is need for caution to avoid the country getting trapped into a false sense of well-being as was the case in Zambia in the first few years of independence.

The almost total absence of indigenous Namibians in any skilled positions in the mining companies, in part due to South African racist education policies, needs to be urgently addressed. At the diploma-level (skilled artisans), in the short to medium term Namibians could be trained outside the country, particularly at SADCC institutions (Zambia and Zimbabwe), but in the longer term facilities will have to be created in Namibia. However, it may not be worth creating sophisticated and expensive training facilities for the relatively small number of degree-level graduates required. It may be worth considering using an already established institution in the region.

The admission of Namibia as the tenth member of the SADCC will strengthen economic cooperation in Southern Africa and at the same time reduce the domination of the South African regime in sub-

Saharan Africa. Namibia is well endowed with mineral wealth and its membership will increase the regional resource base for uranium, diamonds, copper, silver and lead, zinc, coal and natural gas. The admission of Namibia as a SADCC member state has increased regional mineral output: lead will increase by 86%, zinc by 71%, silver by 65%, tin by 55% and copper and gold by about 10% each. The membership of Namibia will also mean the addition of a new mineral, uranium, to the regional range. However, overall, the region will become more dependent on mining and transnational companies, particularly South African TNCs. With Namibia, the SADCC proportion of gem quality diamonds should be enough to put them collectively in a strong position regarding the De Beers cartel.

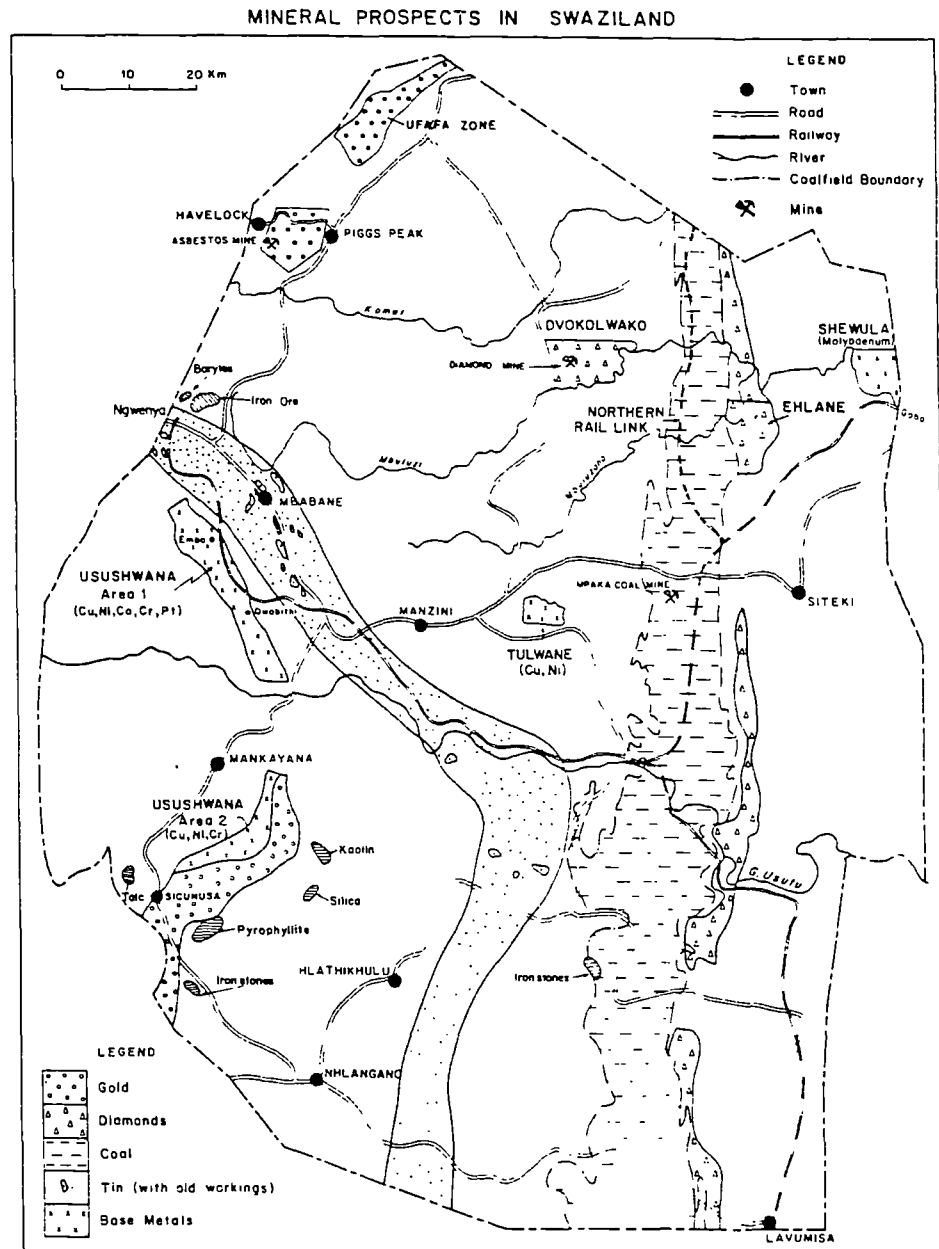
Nevertheless, an independent Namibia, will greatly enhance and give further impetus to the viability of SADCC. Other than being a source of the strategic uranium, Namibia could also serve as an important market for other SADCC countries and also could, in the long term, provide ports (Luderitz and Walvis Bay) for other landlocked members and thereby reduce pressure on the east coast ports. However, due to the lack of a railway connecting Namibia to the rest of the SADCC, economic interaction with the region will be difficult, although Zambia is already exporting a tiny amount of its copper via Namibia. In addition, it appears clear that South Africa will hang onto the country's only viable port, Walvis Bay, giving them substantial power over Namibia's external trade.

In conclusion, Namibia is a highly mineral dependent country, particularly in terms of exports and state revenue, very similar to Botswana, but unlike Botswana the mineral rent extracted by government has not until now been used to the benefit of the majority of the people (education and social services) instead it has gone to the companies and to enrich the small "white" elite. There are almost no mineral supply manufacturers and no mineral based industries, not even a cement works. The only mineral that is integrated into the economy appears to be salt. Yet, unlike Botswana, Namibia has other resources that it could be developed with mineral surpluses such as agriculture in the north and Caprivi Strip and fishing all along its extensive coastline.

Footnotes to Chapter 12

- 1 CIIR 1983. 2 Chamber of Mines of Namibia/SWA.
 3 CIIR 1983. 4 South West African Peoples Organisation
 5 EIU 1990. Namibia-Mining 6 World Bank 1990.
 7 Geological Survey of Namibia 1982. 8 Miller 1990.
 9 Government of the Republic of Namibia 1990.
 10 UN Institute for Namibia 1987, page 132.
 11 Mining Journal 314/8076, 22 June 1990, page 489.
 12 Mining Journal 314/8076, 22 June 1990, page 490.
 13 Industrial Minerals July 1987, page 11.
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Fig.15



GSM D 1986

Chapter 13: The Minerals Industry of Swaziland

Introduction

History

The original Swazi people belonged to the Nguni sub-group of the Bantu and, under Nkosi Dhlamini, broke away from the main Nguni group in the sixteenth century and settled in what is today southern Mozambique. Later, under Chief Ngwane, they moved to southern part of present day Swaziland¹. The Kingdom of Swaziland was created at the same time as the rise of the Zulu state in the 1830's by a chief called Sobuza and was further consolidated by his son, Mswati, from whom the state took its name². The original state was made up not only of Nguni people but also of some Sotho refugees.

In the 1840's the first Europeans started entering the country and secured mineral concessions from the Swazi kings and in 1881 at the Convention of Pretoria, the British and Transvaal Republic governments ratified the present day frontiers of Swaziland which deprived the nation of much of their best farmland, which was incorporated into the Transvaal Republic. Since then the land issue has remained central to Swazi relations with South Africa.

In 1902 British administration of the country commenced, which continued until independence in 1968. In 1973 the Westminster type constitution was suspended and since then Swaziland has been essentially an absolute monarchy which was ruled by King Sobuza II until his death in 1982. After four years of disputed ascendancy Crown Prince Makhosetive was installed as Ingwenyama (king) in 1986.

In the late 1970's and early 1980's, with the rapidly changing regional geopolitical configuration, caused by the independence of the ex-Portuguese colonies (Mozambique and Angola) and the capitulation of the settler regime in Rhodesia (Zimbabwe), Swaziland made a tentative attempt to reduce its dependency on the Republic of South Africa. The most important acts in this regard were that Swaziland rejected the South African sponsored regional grouping, CONSAS, and instead joined the SADCC³, expanded its electricity generating capacity (to reduce South African imports) and installed its own telecommunications link with the outside world (that did not go via South Africa).

But these moves came to an end in 1982 when Swaziland signed a secret security agreement with South Africa undertaking not to allow the ANC to operate from its territory. The reasons for "relinking" were complex including both internal Swazi politics and incentives/disincentives offered by the RSA, the most important being the offer of a transfer of land from South Africa to Swaziland, between southern Swaziland and the Indian Ocean, thereby giving them access to the sea. This transfer never finally materialised.

Since the signing of the security agreement with South Africa it appears that their security apparatus has had fairly free access to Swaziland and throughout the decade there were numerous kidnappings and assassinations of South African exiles and ANC cadres in Swaziland. In addition there have been persistent reports of the South African sponsored MNR bandits using Swaziland for recruiting, for transit to Mozambique, as a refuge and even as a rear base. Paradoxically, the Swazi railway to Maputo via Goba has regularly been out of action due to MNR attacks and sabotage by MNR operating from Swaziland.

The Economy

The Swazi economy is heavily dependent on the RSA for both imports (around 90%) and exports (around 30%) and in terms of control by South African business interests. In addition Swaziland is a

member of SACU whose revenues consistently generate the bulk of government receipts (40% to 65%) and South African firms own most of the economy, except for the sugar and forestry industries. Invisibles from South African tourism and remittances from Swazi workers in South Africa complete the picture of a country that is a virtual satellite of its huge neighbour. Even the Swazi currency (emalangen) is pegged to the South African Rand at 1:1, meaning that South African companies treat Swaziland as a small extension of their domestic market.

13.1 SWAZILAND: DEPENDENCE ON SOUTH AFRICA

(ME) Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	
Exports fob	M	287	340	332	324	332	373	610	709	844
RSA	M	83	108	123	105	111	125	204	342	
% RSA	%	29%	32%	37%	32%	33%	33%	33%	41%	
Imports cif	M	406	443	469	516	548	617	689	743	995
RSA'	M	361	433	467	512	492	575	621	692	
% RSA	%	89%	98%	99%	99%	90%	93%	90%	92%	
Trade Balance	M	(119)	(102)	(137)	(193)	(216)	(243)	(79)	(34)	(151)
Govt Revenue+	M	126	150	182	185	213	245	255	337	428
SACU Receipts	M			118	121	130	137	120	135	162
% SACU Receipts				65%	65%	61%	56%	47%	40%	38%
Migrants RSA	k	11	11	11	14	14	14	15	17	18

Sources: CSO 1985/6/7, CBS 1987/8/9, EIU 1988/9, DEPS 1989.

Swaziland's population is the lowest in the SADCC, but its population density is one of the highest at 34 persons/km² in 1988. The main economic activity is agriculture which typically accounts for about one quarter of GDP. Its GDP per capita is third in the SADCC region (after Namibia and Botswana), mainly due to its relatively large manufacturing sector (about one-fifth of GDP) and in real terms GDP growth has managed to keep ahead of population growth throughout the 1980's, unlike most other SADCC states⁴. There clearly are certain advantages in collaboration with the apartheid regime.

13.2 SWAZILAND: BASIC ECONOMIC INDICATORS

(ME)	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	.56	.58	.60	.62	.64	.66	.68	.71	.74
Pop. density	/km ²	32	33	35	36	37	38	39	41	43
Forex Rate	/USD	.77	.89	1.10	1.12	1.47	2.24	2.27	2.07	2.26
CPI		100	114	129	148	164	199	230	252	289
GDP mp	G	.42	.50	.55	.58	.66	.74	.96	1.10	1.35
GDP/cap	USD	975	974	831	831	696	502	623	753	807
GFCF	M	148	140	153	170	209	225	229		
GFCF/GDP	%	35%	28%	28%	29%	32%	30%	24%		
Debt	GUSD	.17	.16	.17	.18	.17	.18	.22	.27	
Debt/GDP	%	30%	29%	34%	34%	38%	55%	53%	51%	
Labour Force	k	85.3	90.2	88.2	90.1	89.2	85.2	91.6	94.7	
Area: 17,364 km ² , Currency: Emalangen										

Sources: CSO 1986/7/8, EIU, 1988/9, DEPS 1989.

The main forex earners are sugar (35% of exports in 1987) which is controlled by British transnationals, woodpulp (18%), fruit (fresh and canned) and vegetables (11%) and minerals (5%). In addition significant forex is earned through SACU receipts, tourism (mainly South African controlled) and migrant workers' remittances. National debt is about half GDP and around 75% of the total value of exports. The country has experienced high inflation in the 1980's, almost 200%, mainly due to the fact

that the Emalangenzi is pegged to the Rand and therefore devalued at the same rate as the Rand causing "imported" inflation from South Africa.

With the increasing isolation of the South African regime, in the form of economic sanctions, due to its racist policy of "apartheid", there has been a temptation for Swaziland to obtain quick profits by becoming a centre for sanctions busting for South African goods. There have been several well documented instances where South African goods are labelled "made in Swaziland" for export onto the world market⁵. There also appears to be evidence to suggest that certain South African products are exported to the EEC under Swaziland's Lome quotas⁶.

With regard to the minerals sector there are suspicions that not all Swazi coal exports come from Swazi mines⁷ and in 1988 it was announced that two Australian companies (WMC and Boulder), jointly with Swazi (Tibiyo) and European interests, planned to open a ferrochrome smelter in Swaziland that would produce 120 kt/an of ferrochrome⁸, but as Swaziland has no chromite deposits, the ore would have had to be imported, and the only economic source would have been South Africa. The project was however later abandoned.

The Mining Sector

General

Ancient exploitation of iron ores for red (haematite) and black (specularite) ochres by hunter gatherers occurred as far back as 43,000 years ago about 20 km north-west of the present day capital of Mbabane⁹. This deposit was later mined out by a consortium led by Anglo American Corporation in the 1960's and 70's. Iron mining and smelting people came to Swaziland in the 4th and 5th centuries and ancient mining sites are found in several locations across the country.

The discovery of gold in the late 1870's in the Forbes Reef area heralded the beginning of the modern era of mineral exploitation, that of incorporation into the world capitalist economy. Gold was the principal mineral produced until the First World War when it was replaced by tin until production of asbestos started at the Havelock Mine in 1939. From 1964 to 1979 iron ore was exported to Japan at the rate of about 2 million tonnes per year, "leaving Swaziland with nothing but a hole and a railway to Maputo"¹⁰

13.3 SWAZILAND: BASIC MINERAL DATA

(ME)		1980	1981	1982	1983	1984	1985	1986	1987	1988
GDP Mining	G	14.1	16.4	14.4	15.7	12.4	18.0	21.5		
% GDP Mining	%	3.3%	3.3%	2.6%	2.7%	1.9%	2.4%	2.2%		
Mineral Prod.	M	19.2	21.3	18.4	24.4	21.8	29.6	35.4	38.9	43.6
Min.Prod/cap	USD	44.3	41.4	28.0	35.0	23.2	20.0	23.1	26.5	26.0
Min.Exports	M	20.2	20.9	17.4	21.7	22.2	28.8	32.4	35.9	39.7
% Min. Export	%	6.5%	6.2%	5.2%	6.3%	6.9%	8.8%	6.0%	5.1%	4.0%
Mining labour	k	2.6	2.6	2.5	2.2	2.4	2.4	2.4	2.4	2.1
% mng lab	%	3.0%	2.9%	2.8%	2.5%	2.7%	2.9%	2.7%	2.5%	
Min.Prod/lab	kUSD	9.8	10.8	6.8	9.8	6.3	5.5	7.1	8.1	9.3
average wage	k/an					3.81	4.11	4.69	5.20	6.08
average REAL wage/an						3.81	3.39	3.35	3.39	3.46

Sources: CSO 1985/6/7, DEPS 1989, GSMD 1987/8/9.

The contribution of the minerals sector to GDP has fallen steadily from 3.3% in 1980 to around 2% today due to both a drop in volume and real value. Mineral production per miner has also fallen in USD terms, from 9,8 kUSD in 1980 to 9.3 kUSD in 1988. Minerals as a percentage of total exports has

decreased from 6.5% in 1980 to about 5% in 1989, due to a fall in mineral exports rather than an increase in other exports.

From 1980 to 1988 the number of official migrants in South Africa, mainly on the mines, increased by three-quarters to 17,600. Hence there are more Swazis on the mines of South Africa than on their own mines. Mining sector employment as a proportion of total wage labour has always been low, at around 3% and is expected to fall further in the 1990's as the asbestos mines wind down. Average monthly wages were about 500 E (220 USD/m), well below equivalent wages in South Africa and fell in real terms by 10% from 1984 to 1988.

For many years all mining royalties went into the Tibiyo TakaNgwane Fund, directly under the control of the King, and the fund has provided the main vehicle for Swazi capital accumulation by buying back foreign owned land and by taking a minority share in most major foreign investments¹¹.

Economic Geology

The economic geology of Swaziland is dominated by the ancient granite-gneiss basement in the centre, the Archaean schist belts in the west and south-west and the sediments and volcanics of the Karoo System in the east¹².

The granite-gneiss basement hosts very few minerals but the younger, post Swaziland, granites are thought to be the source of, and contain, numerous cassiterite-bearing pegmatites which, upon erosion, give rise to Swaziland's scattered elluvial and alluvial tin deposits.

By far the most economically important rocks are those of the Archaean schist belts or gold belts. These metasediments and volcanics belong to the Swaziland System which is made up of the Onverwacht Series (volcanics), the Figtree Series (metasediments) and the Moodies Series (sediments), though the last is also thought to constitute a System of its own. This system contains the gold deposits (Forbes Reef Area and Pigg's Peak District), the iron ore (enriched banded ironstones) deposits, the barytes deposits (Fig Tree Series), talc and antimony deposits¹³.

The Jamestown Igneous Complex is thought to intrude the Swaziland System and contains the Havelock asbestos deposits in a sill-like body of serpentinite roughly conformably intruded into the sediments of the Fig Tree Series¹⁴. The post Swaziland sediments of the Mozaan Series contain several occurrences of kaolin clay but the later intrusive basic Ushushwana complex contains no mineral deposits of economic importance.

The eastern part of the country contains a monocline of Karoo sediments and volcanics striking north-south dipping east towards Mozambique. The Ecca Series of the Karoo System contains extensive coal seams and the weathering of Ecca shales has resulted in brick clay deposits.

Finally, the kimberlite pipe at Dokolwayo, in the centre-north of the country, is the source of the country's diamonds.

Legislation

All minerals are vested in the King (Ngwenyama), in trust for the Swazi nation, who is advised by his Minerals Committee which appraises all applications for prospecting licences and mining rights for approval by the King¹⁵. Individually tailored exclusive prospecting licences are granted by the King and the activities of the prospecting company are monitored by the Geological Survey and Mines Department to whom quarterly reports must be submitted.

Mining rights are issued in the form of notarial mining agreements and are for a limited time period after which they can be renewed. Company tax is relatively low at 37.5% and there is a non-resident's shareholders tax on dividends of 15% while the balance may be repatriated¹⁶.

Mineral Production

General

By value the principal minerals produced in 1988 in Swaziland were asbestos, diamonds, coal and stone in that order. No iron ore has been produced since the last ore was moved from the Ngwenya Mine in 1979 and no gold has been produced since 1966. Except for stone (aggregate) all minerals are exported.

13.4 SWAZILAND: MINERAL PRODUCTION

Mineral		1970	1975	1980	1985	1986	1987	1988	1989	Avg ¹
Asbestos	kt	33.1	37.6	32.8	25.1	23.1	25.9	22.8	27.3	31.7
Barium	kt	.34	.22	.00	.00	.00	.00	.00	.00	.09
Coal	kt	123	127	184	166	172	165	165	165	146
Diamond	Mcts.	.000	.000	.000	.021	.039	.100	.120	.055	.018
Iron ore	kt	2552	2240	0	0	0	0	0	0	---
Kaolin	kt	1.6	2.7	.0	.0	.0	.0	.0	0	.7
Talc	kt	.25	.00	.00	.00	.00	.00	.00	.00	.04
Tin	kt	.000	.000	.000	.000	.000	.000	.000	.000	.001

¹Average for 1970-88, Source: GSMD 1989, BGS 1980

Asbestos

Chrysotile asbestos mining first started at Havelock Mine in 1939 in the north-east of the country close to the South African border. The mine is in fact so close to the frontier that the asbestos is transported by aerial cableway from the mine to the railhead at Barberton in South Africa.

The mine was originally owned by Turner Newall of Manchester. The Swazi Nation (Tibiyo) took a 40% share of the equity and in 1985 Gencor (Sanlam group) of South Africa, owners of the Mswali Asbestos Mine across the border, bought out Turner Newall and are now the mine operators. The reasons behind Gencor's purchase are thought to be more strategic than economic as the mine has limited reserves and the world asbestos market has been depressed since the seventies due to its perception as a health hazard in the West. If sanctions were imposed against South African asbestos, it has been suggested that it would be difficult to differentiate between Mswali (RSA) and Havelock (Swazi) fibre on the world market.

Production peaked in 1969 at 38.5 tons and averaged 32 tons for the period 1970 to 1988 from an average of roughly 860 kt/an of ore milled. The yield varies between 3.5% and 4% of ore milled. Reserves are limited and the mine is slowly being scaled down and closure is expected in the 1990's if no further reserves are located. In 1988 the company was granted an exclusive prospecting licence to explore in the surrounding area and a mining lease was obtained for the exploitation of the adjacent far west area.

In 1988 the mine employed 1,484 workers and sales of fibre amounted to 19.3 ME. Exports were 99.3% of sales (28.15 t) and mainly to South Africa (44%), the EEC (18%), Japan (13%) and south-east Asia (8%). All exports are via South Africa.

Coal

Coal seams belonging to the Ecca Series of the Karoo System occur in a band about 20 km wide running north-south in the eastern part of the country. Although the deposits were drilled in the early twenties,

mining did not start until the railway line from the Nwenya iron ore mine to Maputo (then Lourenco Marques), which runs through the coal fields, was built in 1964 making exports feasible. In 1965 29 kt of anthracite were produced increasing to over 123 kt by the end of the decade. From 1970 to 1988 production averaged 145 kt/an.

All production is from the Mpaka Colliery in the centre of the coal band, near both road and rail links, which employs about 350 people. It used to be owned by Swaziland Collieries Limited (Anglo American Corporation of SA) but was bought by Gencor in 1985 and is now called Emaswati Coal (Pty) Limited in which the Swazi nation (Tibiyo) also has a share. As with Gencor's take over of Havelock, it has been suggested that the purchase of Emaswati could also be to cover for at least part of Gencor's South African production in the event of sanctions.

Of total sales in 1988 of 191.6 kt, 160.2 kt (84%) were exported and 31.3 kt were consumed locally, mainly by ranches for power generation. Exports were to Bamburi Cement Works in Kenya (82%) and to South Korea (18%). Exports are both via the Goba line to Maputo and the Golela southern link to Richards Bay in South Africa.

Paradoxically, Swaziland imports as much coal as it exports. In 1985 a total of 173 kt was imported from the RSA for the pulp manufacturer (38%), the asbestos mine (27%), the railways (17%) and industry (11%). These imports are of bituminous grade for burning installations (boilers) that originated from South Africa and require South African, lower, grade coal with a high volatiles content. A SADCC mining sector project funded by France will study the possibility of adapting the facilities to burn Mpaka coal, which has a higher calorific value¹⁷

Swaziland's coal reserves are estimated at one billion tonnes of which about 250 Mt have been proved to be mineable. The low volatile, low sulphur anthracitic coals are the only resources of this grade in the region outside South Africa.

Diamonds

Diamonds are a recently discovered mineral resource. Opencast production from the Dokolwayo kimberlite pipe started as late as 1984 when 16,837 carats were produced. An alluvial deposit has also been located at Ehlane in a band running parallel to the coal in the north.

The Dokolwayo operation will continue as an open pit mine until 1994 when it is planned to start mining underground. The Swazi nation and a South African company, Trans-Hex (Rembrandt Group), have equal shares in Dokolwayo Diamond Mines Limited. Trans-Hex is a holding and investment company, and the diamond marketing arm of the Rembrandt (tobacco) group¹⁸. Production is about 40,000 carats/an mainly of industrial grade stones which are sold independently of the CSO, who most probably are not concerned given the small amount involved.

In 1988 there was some concern that gem grade stones were reaching the London market by routes other than Trans-Hex. Dokolwayo employs about 150 people and has become the second largest mineral producer and exporter after asbestos, with exports of about 7.8 MUSD in 1989.

Other Minerals

The Ngwenya iron ore mine was opened in 1963 and the first ore was shipped to Japan the next year. The mine was owned by the Swaziland Iron Ore Development Company in which Anglo American had a majority holding in partnership with Guest, Keen & Nettlefolds and the CDC¹⁹. From 1964 to 1979 over 28 million tonnes of high grade (62.5% Fe) iron ore was shipped to Japan. Further resources at Ngwenya and elsewhere (Gege, Maloma, Mahlamati) have been assessed but found not to be feasible for exploitation.

There has been renewed interest in the gold deposits of the goldbelts of the Swaziland System, but no new operations have materialised. Historically the main production areas were the Forbes Reef Area, the Pigg's Peak District and various alluvial deposits. From 1880 to 1966 126,868 thousand troy ounces were produced²⁰. There has also been some interest in the schistbelts in the south-east of the country, but no firm commitments.

Kaolin was produced at the Mahlangatsha deposit until 1976 at the rate of about 2 kt/an. The development of these deposits as the raw material for a ceramics industry for the production of whiteware (porcelain) forms part of a regional (SADCC) study in this regard.

A clay exploration programme was carried out at Lubhuku in 1983/4 which delineated substantial reserves of good quality brick clay, but there are currently no firm plans for the exploitation of the deposit. Talc deposits associated with a chlorite-carbonate-schist of the Jamestown Complex were mined near Sicunusa until 1974 at the rate of 200 to 300 t/an.

Swaziland Barytes Limited used to operate a small mine in the extreme west of the country near the border post of Oshoek in the meta-sediments of the Fig Tree series. Opencast (quarry) production took place from 1945 to 1976 at the rate of 200 to 300 t/year.

Tin mining has been carried out intermittently since 1892 (Mbabane district) from alluvial and eluvial cassiterite-bearing gravels, from pegmatites in the younger granites, in a belt running south-east from the west (Ngwenya) to the centre, then turning south to southern border. There has been no production since the late seventies and there are no immediate plans for new operations.

Other minerals that have in the past been exploited are diasporite (Sicunusa), pyrophyllite (Sicunusa), yttriotantalite (in tin-bearing gravels), corundum (Hlatikulu), beryl (pegmatites) and fluor spar. In addition there are minor occurrences of a wide variety of other minerals that have never been exploited such as manganese, nickel, lead, calcite and quartz.

Discussion

Any discussion on the minerals industry of Swaziland must inevitably use as its starting point Swaziland's domination, in all fields, by its neighbour, the Republic of South Africa, with which it shares a common currency and customs union.

After becoming a British colony in 1902, initial penetration and development of the economy was more by British capital (eg Turner Newall) than South African. The biggest exports, sugar and woodpulp, are still controlled by British interests (Tate & Lyle, Lonrho, CDC and Courtaulds), but most other sectors of the economy have been taken over by South African capital, particularly the mining sector which is now completely controlled by South African firms (Gencor and Trans-Hex). What is also noteworthy is that both the South African companies come from the smaller Afrikaner section of South African capital and both investments were made relatively recently, in the eighties.

The possibility that these, relatively small, investments were as a contingency in the event of sanctions being imposed against South Africa has been raised and, if true, would embroil Swaziland even further in support of the South African regime than is already the case under their joint security agreement. The ferrochrome project, now shelved, was a fairly clear example of attempt to "relabel" chromite ore from a South African bantustan (Lebowa) as Swazi ferrochrome for export.

The development of Swazi mineral resources for the SADCC market is unlikely given the logistic problems of moving goods to other SADCC states, except for southern Mozambique, particularly coal for the Maputo area. Although the possibility of establishing a SADCC whiteware industry, based on Swazi kaolin resources, is being investigated, in the final analysis the feasibility of the project will most probably depend on the South African market.

The future development of Swaziland's minerals is likely to be determined by the world market for high unit value precious and base minerals and the local and South African market for lower unit value industrial minerals, except for the substantial coal resources which are only 100 km from the port of Maputo. A high international gold price is all that is needed to provoke the development of the country's numerous gold occurrences. In addition, these have not been reassessed in terms of low grade high tonnage open cast heap leach operations. This type of operation accounts for almost all of the spectacular increase in gold output in western Australia, on Archaean schist belts very similar to those of the Swazi System. Both an improvement in the security of the Goba line to Maputo (Matola) and an increase in price would be necessary for the establishment of a large scale coal exporting industry.

South African gold mining technology is centred on large scale underground reef operations on the Witwatersrand System, which is not particularly applicable to the small scattered occurrences of the Swazi schist belts. The small scale gold mining technology of Zimbabwe could be more appropriate for the development of an indigenous mining sector. Zimbabwe has over 600 small gold mines with less than ten workers.

The rapidly changing situation within South Africa is also certain to have an impact on Swaziland. In this regard it is likely that the Swazi leadership will also start to hedge its bets by cooling its collaboration with the present white regime in anticipation of a post-apartheid government.

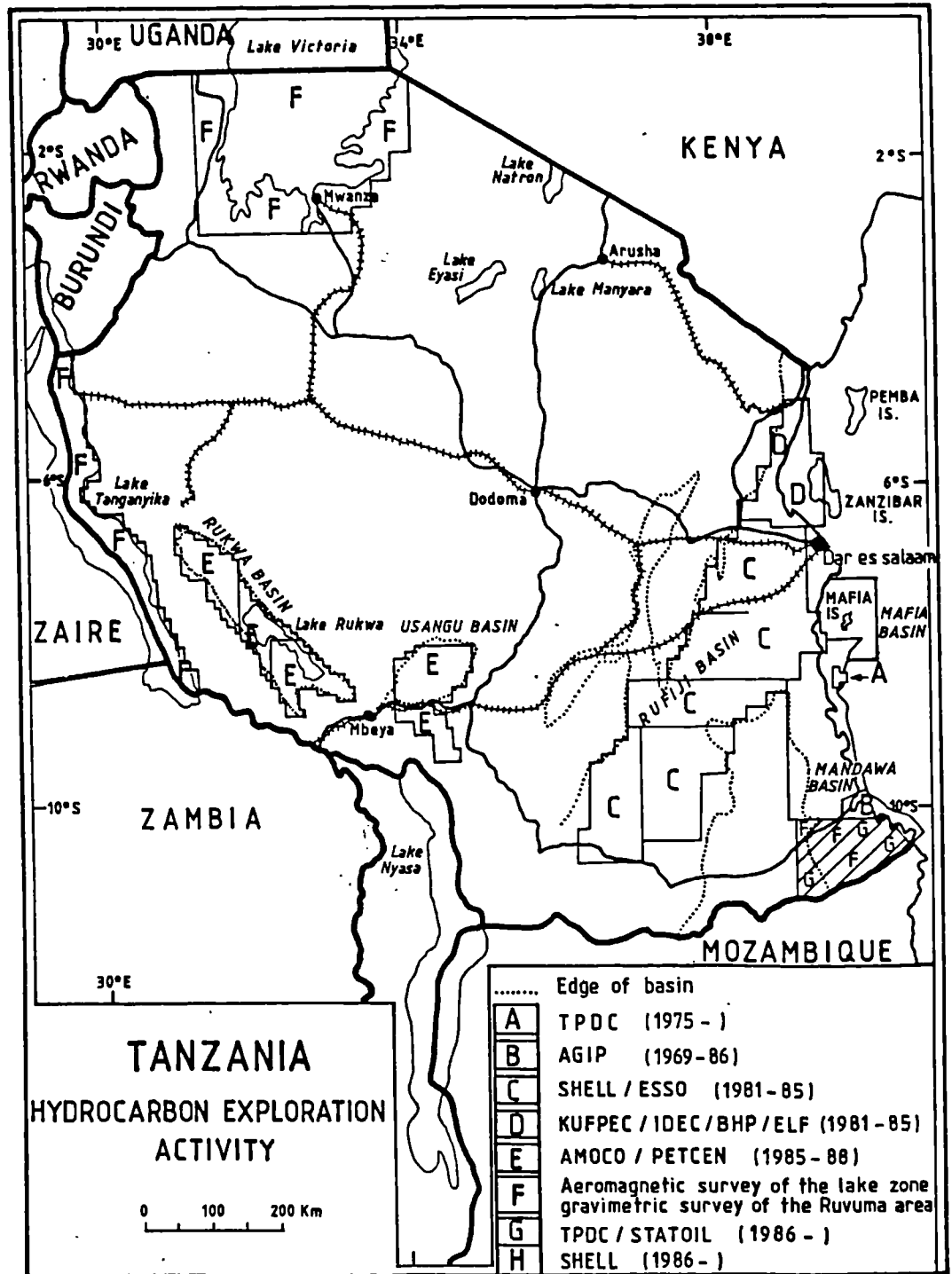
The first signs of this happening were recently reported when Turner Newall offered to set up its purchasing office, for all their South African companies, in Swaziland. All the group's purchases would have been invoiced to the Swazi company, but even before arrival at the South African port the products would have been resold to the South African companies, to whom they would be directly despatched, on arrival. In this way bans on exports to South Africa would have been circumvented, but it is reported that the Swazi government turned down the plan as it would have drawn them further into the maintenance of the apartheid government and would have been difficult to conceal.

Finally, the Swazi minerals industry is structurally typical of a third world country in that almost all production is exported with minimal beneficiation. The linkages to the rest of the economy are low except in that the mining sector generates foreign currency for the import of goods by other sectors. In 40 years the asbestos mines have initiated almost no downstream processing, even though the previous owner, Turner Newall, is a worldwide producer of asbestos-based products such as brake pads (Ferodo) and asbestos-cement products. There are attempts to integrate coal mining and a ceramics industry based on the Lubhuku clay (for bricks) and the Mahlagatsha kaolin (for porcelain) which would go some way in transforming the minerals sector into a vehicle for national development.

Footnotes to Chapter 13

- 1 Barclays Bank, 1986 2 Fage 1978 3 Hanlon, 1986 4 DEPS, 1989
5 Hanlon 1986 and Askin 1988 6 Hanlon 1986 7 Times of Swaziland 31/12/86
8 Mining Journal, 24/02/89 9 Lanning, 1979 10 Hanlon, 1986, p98
11 Hanlon, 1986 12 Haughton, 1963 and 1969 13 Hunter, 1962
14 Haughton, 1969. 15 GSMD, 1986 16 Barclays, 1986 17 SADCC 1988
18 Mining Annual Review 1989 19 Metal Bulletin 1969 20 Hunter 1962
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Fig. 17



Chapter 14: The minerals sector of Tanzania

Introduction

Background

Tanzania's main political party, the Tanganyika African National Union (TANU), was formed in 1954 by Julius Nyerere and it led a smooth transition to independence which was gained in 1961. In 1964 a union with the island of Zanzibar was formed which was named Tanzania. In 1967, under the leadership of Nyerere, the ruling party TANU made a dramatic commitment to socialism and self-reliance with the Arusha Declaration. The policies embodied in this declaration have officially guided the country since 1967. In 1977 the parties of mainland Tanzania (TANU) and Zanzibar (ASP) were merged to form the Chama Cha Mapinduzi (CCM) party.

Mining has long been practised by the people of Tanzania. Ferrous mining and smelting, mainly of haematite and laterite, has been carried out over the last two millenia over the whole of the country, while gold and base metal mining has been practised in selected areas (the so-called Archaean "greenstone schist belts"). Iron smelting at Ufipa was renowned right up to the time of German colonisation.¹ There was a rapid increase in mineral exploitation following colonial penetration by Germany at the end of the last century. After the First World War control of the country was transferred to Britain to be held in trust for the League of Nations. After the Second World War Tanganyika, as it was then called, became a Trust Territory under the United Nations, administered by Britain.

The Economy

At independence in 1961 there were only 220 industrial establishments employing more than 10 persons with assets of more than 20,000 Tshs (1,000 UKP, 9,500 1987 USD) in the whole country and total manufacturing employment was a mere 20,000 workers.² As Tanzania was only a Trust Territory, the British directed most investment to neighbouring Kenya which was a full colony. The East African Community (EAC) was made up of Tanzania, Uganda and Kenya but most of the infrastructure and industry to service this zone was located in Kenya. The EAC finally broke up in 1977. In 1980 Arusha, in Tanzania, was the venue for the founding of the Southern African Development Coordination Conference (SADCC), which grouped Tanzania with the states to the south including the newly independent countries of Zimbabwe, Mozambique and Angola.

14.1 TANZANIA: MACROECONOMIC INDICATORS (Tsh)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	18.5	19.1	19.8	20.4	21.1	21.7	22.5	23.2	24.0
Forex Rate	/USD	8.2	8.3	9.6	12.5	16.3	17.2	37.8	64.8	99.3
CPI (1)		100	126	162	206	280	374	495	643	868
GDP mp	G	37.5	43.9	52.5	61.0	76.3	99.3	131.3	198.1	277.8
GDP/cap	USD	248	277	278	240	222	266	155	132	121
Exports fob	G	4.7	4.8	4.3	4.2	6.1	5.7	11.0	18.5	38.4
SADCC	G	.0	.0	.0	.1	.1	.1	.1	.5	.6
% SADCC	%	.4%	.2%	.2%	2.1%	1.7%	1.3%	.6%	2.4%	1.5%
Imports cif	G	10.2	9.7	10.5	9.1	13.4	17.5	34.3	73.9	117.9
SADCC'	G	.0	.1	.2	.1	.2	.3	.5	.3	1.3
% SADCC'	%	.2%	.7%	1.9%	1.0%	1.5%	1.5%	1.4%	.4%	1.1%
Trade Balance	G	(5.5)	(4.9)	(6.2)	(4.8)	(7.3)	(11.7)	(23.3)	(55.4)	(79.5)
Debt (3)	GUSD	2.0	2.2	2.4	2.6	2.5	2.9	3.7	4.1	4.7
Debt/GDP	%	44%	42%	44%	53%	54%	50%	107%	134%	169%

Sources: Bank of Tanzania 1987/8/9, Bureau of Statistics 1987.
IMR SADCC Databank 1990.

From 1980 to 1986 inflation was nearly 900%; over the same period the Tanzanian Shilling dropped from 8 to the USD to 99 to the USD and exports as a percentage of imports fell from 46% in 1980 to 33% in 1988, while external debt as a percentage of GDP quadrupled from 44% in 1980 to 169% in 1988. Agriculture has always been the principal economic activity of the country and its percentage contribution to the GDP has varied between 39% and 60%. The contribution to GDP of the manufacturing sector increased more than four-fold from 1961 to the early seventies but had decreased to 8.1% in 1988.

14.2 TANZANIA: GDP AT FACTOR COST BY INDUSTRIAL ORIGIN (%)

Year	Agr.1	Min.2	Man.3	Con.4	Trade5	Tran.6	Fin.7	Pub.Ad.8
1961	58.9	2.8	3.4	3.0	11.4	4.4	4.3	10.6
1966	45.3	2.9	9.1	3.4	12.7	7.4	9.5	10.5
1971	39.4	1.3	11.7	5.6	12.4	9.0	10.5	11.5
1976	46.2	0.6	10.9	3.4	11.4	7.8	8.7	11.9
1981	46.3	0.7	11.2	3.6	12.4	7.1	10.3	10.8
1985	58.5	0.3	6.1	1.9	13.3	6.7	7.0	7.9
1988	46.6	0.5	8.1	2.8	12.0	6.1	12.6	12.0

1: Agriculture, 2: Mining, 3: Manufacturing, Electricity & Water Supply, 4: Construction, 5: Trade, 6: Transport/Communications, 7: Finance & Insurance, 8: Public Administration. Sources: BoT 1983/9, Bureau of Statistics 1986.

The rapid increase in both the relative and the absolute size of the manufacturing sector after independence was in part due to the extremely small starting size, but was mainly due to a concerted effort to develop this sector by the state, particularly after the Arusha Declaration of 1967 and subsequent nationalisations. Hence the share of the public sector in manufacturing value-added increased from 5% in 1966 to 39% in 1975. With declining terms of trade from the mid-seventies, the manufacturing sector contracted rapidly as increasing shortages of foreign currency for essential imported inputs cut back production, and expansion plans were shelved.

In 1986 a cautious liberalization policy was embarked upon with a massive devaluation of the Tanzanian Shilling (Tshs) of 54% in an attempt to stem the worsening balance on external trade. The economic reforms also included a lessening of controls on imports and of state control of agricultural marketing. The Economic Reform Programme (ERP) has caused a rapid increase in the cost of living, five-fold since 1981, which has not been compensated for in wage increases, particularly in the state sector. The ERP has clearly benefited the rural (peasant) population more than the urban sector, as prices for their products have kept up with inflation.

The Mining Sector

General

The minerals sector of Tanzania is amongst the smallest in the region, though not for a lack of mineral resources. In 1988 its mining sector contributed 0.5% of GDP and in 1987 eight-and-a-half thousand people were employed by the mining sector representing 1.1% of the total formal labour force. The percentage contribution of the mining sector to GDP has declined from being small at independence to insignificant today. Average wages in the mining sector rose 41% in current terms from 1980 to 1986, but fell by over seventy percent in real (deflated) terms.

In 1959, two years before independence, the total value of mineral production was 7 MUKP (140 MTshs) or just over 72 million 1988 US dollars, five times more than the 1988 value of output of 9.1 MUSD. In

that year diamond output contributed 62% of the total value. Up until 1945 the premier mineral in terms of value was gold, but in that year increasing output of diamonds from the operations of Williamson Diamonds Limited overtook gold in value. Since then diamonds have remained the principal mineral in terms of both the total value of mineral output and exports.

14.3 TANZANIA: BASIC MINERAL SECTOR DATA (TShs)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
GDP Mining	G	329	299	266	249	337	251	476	1137	1418
% GDP Mining	%	.9%	.7%	.5%	.4%	.4%	.3%	.4%	.6%	.5%
Mineral Prod.	M	370	207	221	273	346	363	549	815	899
Min.Prod/cap	USD	2.4	1.3	1.2	1.1	1.0	1.0	.6	.5	.4
Min.Exports	M	300	538	406	486	519	377	416	603	1632
% Mineral Exports		6.4%	11.2%	9.4%	11.5%	8.5%	6.6%	3.8%	3.3%	4.3%
Mining labour	k	4.3	4.3	7.2	7.6	8.3	8.6	8.9	8.5	
% mining labour		.8%	.7%	1.1%	1.1%	1.1%	1.1%	1.2%	1.1%	
Min.Prod/lab	USD	10515	5804	3214	2893	2544	2459	1636	1480	
avg wage/an'	k	9361	7873	7959	12321	12340	12600	13170		
avg REAL wage/an		9361	6266	4912	5985	4403	3373	2662		

Sources: Bank of Tanzania 1987/8/9, IMR SADCC Databank 1990.

Following the Arusha Declaration of 1967, it became policy for the state to control key sectors of the economy including mining. Accordingly, in the early seventies, activity specific parastatals were set up such as the State Mining Corporation (Stamico) as the state holding company in the minerals sector and to spearhead mineral development in Tanzania. It immediately had transferred to it the mineral related holdings of the National Development Corporation (NDC) and other state mineral holdings which gave it a controlling equity in Williamson Diamond Mine Ltd (50%), the Diamond Cutting Co. Ltd (100%), Nyanza Salt Mines Ltd (83%), Tanzania Gemstone Industries Ltd (100%), Tanganyika Meerscham Corporation (57%) and Tanzania Portland Cement Company (100%). The last was later transferred to another state company, Saruji Corporation. Since 1973 several new companies have been acquired or set up for new operations such as Buckreef Gold Mining Company, Minjinju Phosphate Company, Songwe-Kiwira Colliery, Kahama Gold Mines Ltd and Pugu Kaolin Mines Ltd.

In 1986 the only subsidiary to declare a dividend was the Tanzania Diamond Cutting Co. Ltd which made a profit of 26.4 MTshs on a turnover of 232.3 MTshs. The total turnover of Stamico's subsidiaries was 778.8 MTshs (20.6 MUSD) of which diamond mining and cutting constituted eighty-six percent, salt made up 6 percent and all the other activities a mere 8 percent.³ Stamico's impressive list of development projects appears to bode well for the future expansion of the Tanzanian minerals sector, except that many of them have been about to go into production for the last decade, and are unlikely to see the light of day in the next decade. In March 1981 Stamico published a list of six projects about to go into production which, by 1982, should have contributed 30-40 kg of new gold, 80 kt of salt, 100 kt of phosphate concentrate and an increase in gemstone output.⁴ Even by 1988, these increases had not even marginally been realised.

A UN report in 1988, which rounded up over twenty years of UN support to the Tanzanian minerals sector and fifteen years of working with and in Stamico, had as one of its recommendations the "disbanding" of Stamico in order to concentrate meagre manpower resources on a few viable projects,⁵ but even if Stamico is not capable of new minerals development projects, the state will still need some form of holding company to handle joint ventures with private capital and to monitor the operations, as is the function of the TPDC in the petroleum sector.

Tanzania is the host country to the Eastern and Southern African Minerals Resource Development Centre (ESAMRDC) based in Dodoma, but with new laboratories in Dar es Salaam. The centre will provide the region with advisory services on exploration, prospecting and mining. As it is a regional facility with international funding (EEC and UNDP) the scientists receive competitive "off-shore" salaries and it will therefore be more likely to retain skills and provide a good service, unlike the Tanzanian state bodies with the same function (geological survey and mines departments) which have virtually ceased to function.⁶

Economic Geology

The structural geology of Tanzania is dominated by the Tanzanian Shield bounded by mobile belts in the west and east and cut by the Great East African Rift Valleys. The oldest rocks are Archaean and can broadly be divided into the late Archaean (Usagaran and Ubendian) and the early Archaean (Dodoman and Nyanzian). The latter are situated on the shield, particularly around Lake Victoria and the Nyanzian rocks, which overlie the Dodoman, and constitute the well-known schist or greenstone belts which are the host rocks of most of the gold occurrences in Tanzania.

The conglomerates and quartzites of the Kavirondian System (Musoma district) rest unconformably on the Nyanzian rocks and are occasionally host rocks to gold mineralisation. The metamorphic rocks of the Usagaran System constitute a belt running north-south from Mozambique to Kenya in the centre-east of the country. This system is the source of limestones, graphite, kyanite and is cut by mica-bearing pegmatites, particularly in the Morogoro area. The highly metamorphosed sedimentary and igneous sequence of the Ubendian System are situated in a belt running north-west south-east in the south-west and west of the country and include the Mpanda Mineral Field in the centre-west of the country (Pb, Cu, Au/Ag), several titaniferous magnetite deposits (Liganga) and the Lupa Goldfield in the Rukwa Trough in the south-west of the country (Chunya).

The Proterozoic and Palaeozoic are represented by the slightly metamorphosed sediments of the Karagwe-Ankolean System in the north-east with associated mineralised pegmatites (Sn, W), followed in age by the unmetamorphosed sediments and lavas of the Bukoban System, also in the north-east. The mainly continental sediments of the Karoo System are preserved in grabens and troughs in the south-west of the country around Lake Nyasa and are economically important for their coal seams.

The Mesozoic is represented by the Jurassic and Cretaceous sediments of the coastal belt containing resources of limestone, clays, gypsum, anhydrite, evaporites (salt) and natural gas. Finally, the Quaternary sediments are important for their resources of limestone (coral), clays (kaolin), heavy mineral beach sands (Ti) and, in lake bed deposits, gypsite, phosphates, diatomite, meerschaum and soda ash.

The economically most important volcanic rocks are the diamondiferous kimberlite pipes in the Mwadui area and the carbonatites of Panda Hill (Mbeya), Oldoinyo Dili and Wigu Hill, the latter for their niobium, apatite and rare earth resources. The neogene volcanics of the Rift Valleys are of virtually no economic importance other than that they often form excellent soils for agriculture (Kilimanjaro).

Legislation

Following the spirit of the Arusha Declaration of 1967, the State progressively took over the national mining industry so that by the mid-seventies the private mining sector had all but disappeared. The collapse of the minerals sector from 1967 onwards amply demonstrated that the state was not able to develop or manage this sector, particularly by their complete failure to take advantage of the rapidly rising real price of both gold and tin in the seventies. The new 1979 Act was therefore designed to allow foreign mining companies to participate with the state in the development of the minerals sector, particularly for medium to large scale mining operations.

A new Model Gold Mining Agreement was applied in 1989 which superceded the Mining Law. In the Model Agreement all royalties and taxes are negotiable. Until 1987 the state had a monopoly over the marketing of all gemstones and gold. This led to a thriving parallel market at more than double the official price. In 1987 the marketing regulations were eased in that small mines may now sell to licensed private dealers. In addition authorised operations will be allowed to retain up to 70% of their export earnings to cover essential imports.

The 1979 Mining Act caters for three kinds of licences: a Reconnaissance Licence, a Prospecting Licence and a Mining Licence. A reconnaissance licence has a specified period (up to one year), usually covers large areas and does not allow any subsurface (drilling, pitting) exploration without prior approval. It may be renewed for a second year, but confers no rights to the holder for the obtaining of a prospecting licence. A prospecting licence allows the holder to prospect for specific minerals for an initial term of up to three years after which 50% of the area is forfeited for a further two year extension. The granting of a prospecting licence includes provision for the state to acquire a majority interest in any subsequent mining operations, but under the regulations an agreement may be drawn up in which the state may guarantee not to exercise its equity rights until after an agreed time period. The section of the Mining Law that deals with the right of the state to a majority interest in any mining operation is currently under review.

When the holder of a prospecting licence discovers an economic deposit the Act gives the holder first option for the obtaining of a mining licence, on condition that he submits an acceptable plan for the exploitation of the deposit. Only a company incorporated in Tanzania may obtain a mining licence.

Under Section 15 of the Act, the Minister has wide powers to consider other systems not covered by the Act. This flexibility allows for the tailoring of regulations to fit any given investment initiative.

Mineral Production

General

14.4 TANZANIA: MINERAL PRODUCTION

	Unit	1970	1975	1980	1985	1986	1987	1988	1989	70-80	80-89
Calcite	kt	.00	5.39	2.86	3.55	7.36	2.90	1.65	2.51		-12%
Coal	kt	2.7	.9	6.7	7.2	5.2	2.9	3.3	46.00	152%	585%
Diamonds	Mct	.637	.479	.256	.236	.161	.113	.082	.076	-60%	-70%
Steel	kt	73.5	18.5	17.3	11.3	8.0	16.6	15.0		-76%	-100%
Gemstones	t	1.07	.04	5.75	.65	.05	4.36	9.05	11.40	436%	98%
Gold	t	.244	.000	.002	.055	.085	.201	.164	.116	-99%	5342%
Gypsum	kt	20.7	12.8	9.7	14.4	14.1	24.6	19.6	5.9	-53%	-39%
Kaolin	kt	.46	1.00	5.38	1.64	2.27	1.45	.6	1.55	1060%	-71%
Limestone	Mt	.3		1.10		.37	.68	.79	.99	218%	-10%
Cement	kt	167	266	306	376	441	489	595		83%	*94%
Meerschaum	kt	.010	.000	.000	.000	.000	.003	.000	7.29	-100%	
P, Apatite	kt	.0	.0	.0	21.0	10.0	18.4	5.0	8.32		
Salt	kt	41.9	41.7	37.0	21.1	22.1	41.1	30.0	20.00	-12%	-46%
Tin conc	kt	.162	.023	.011	.002	.008	.005	.003	.001	-93%	-86%

* 1980-88. Source: IMR SADCC Mining Databank 1990.

In the mid-sixties Tanzania had a small but healthy minerals sector. There were numerous small mining companies and a few medium-sized ones. In 1967 there were six diamond mining concerns, 18 gold and silver mining companies which produced 2.7 tons of gold, 21 mica operations, 18 salt producers, 81 small

and medium scale tin mining operators who produced over 300 tons of concentrates, and numerous small gemstone mining operations. In that year the industry employed 9,500 people and the total value of mineral output was 183.3 MTshs or 78.5 million 1987 USD. Mineral production in terms of volume has either declined or stagnated for almost all minerals except for gold, but even gold has declined drastically compared to slightly earlier values (2.8 tons in 1965).

Diamonds

Diamonds are by far the most important mineral in terms of both gross and export value, since 1945 when they replaced gold. By 1959 diamonds contributed two-thirds of the total value of mineral production, and by 1989, 68 percent.

Diamonds were first exploited near the Mabuki kimberlite pipe south-east of Mwanza immediately following the First World War. Diamonds were also exploited from a variety of gravel deposits including Usongo (Nzega) and Kisumbi and Uduhe, near Shinyanga.⁷ In 1940 Dr J.T. Williamson started mining gravels at Mwadui, north of Shinyanga and in the fifties production from this operation averaged 350 kcarats/an increasing to 500 kcarats in 1959. Production peaked in 1971 at 971 kcarats and has steadily declined since then to 76 kcarats in 1989, down by 92 percent. A UN study on the diamond exploration potential of Tanzania, done in 1985, concluded that further kimberlite exploration would be justified and recommended that 25 known diamond-bearing kimberlite pipes in the Mwadui area should be re-sampled.⁸

All diamond production currently comes from Williamson Diamonds Ltd and its subsidiary, New Alamasani (1963) Ltd. The company is 50% owned by the State, through Stamico. The other half of the equity is held by Willcroft Company Ltd of Bermuda, a subsidiary of the South African diamond mining and trading giant, De Beers Consolidated Diamond Mines Ltd. The management is 100% Tanzanian, but the board is evidently 50% Willcroft nominees.

Since 1983 the Company has made a loss and by the end of 1987 the accumulated loss stood at - 251 MTshs. Recovery grades have also fallen, from 0.3099 carats/ton in 1966 to 0.0519 carats/ton in 1987, a decrease of 74%. Roughly 85% of output is gem grade. Its subsidiary, New Alamasani (1963) Ltd exploits what is essentially the same deposit at a much smaller scale (it typically produces between four and eight percent of its parent). The diamonds are sorted by the Tanzania Government Diamond Sorting Organisation (Tansort). All of the production is finally exported, but part is allocated to the Tanzania Diamond Cutting Company (Tancut) which is paid for in local currency (Tshs). All exports are done through the Diamond Corporation Tanzania Limited to the De Beer's marketing cartel, Central Selling Organisation (CSO).

A major problem is that of theft. It seems that the current diamond security structure which relies on Tanzania Government Police is inadequate and no longer effective to enforce the specialised security measures that are necessary for a diamond mine. Some diamonds therefore are lost through theft, the quantity of which is not known. In 1988 a delegation of Mwadui police was sent to Debswana in Botswana to study their security measures. The view of several outside observers is that Williamson Diamonds is the best run mining operation in the country due to good training programs in the sixties and early seventies and is now entirely managed by Tanzanians. Although Willcroft has received no return on their equity for several years, it continues to provide limited consultancy services.

In 1987 mineable reserves were estimated at 35 Mt containing 0.063 carats/t, good for only ten more years of production, and exploration for further reserves has thus far come up with nothing. The plant

is badly in need of rehabilitation, therefore the Government has exempted the company from selected taxes/royalties to allow it to invest in the rehabilitation which will allow production to continue at about 100 kcts/an.

Tancut (Iringa) was originally a joint venture between the NDC⁹ and Belgian interests and is now owned by Stamico. Only the smaller range of stones are cut and the installed capacity is for about 900,000 small stones per annum.

Limestone/cement

In 1972 Stamico inherited one operational cement plant which was later transferred to Tanzania Saruji Corporation (Saruji) in 1976 which is a parastatal specifically set up for the running and further development of the construction materials sector. There are three cement plants: One on the north coast (Tanga), one near Dar es Salaam (Wazo Hill) and one in the southern highlands (Mbeya). The total installed capacity of these three plants is 1.27 Mt/annum. All the plants use heavy fuel oil (HFO) except for Mbeya which also uses coal. It would not be viable for the Dar es Salaam and Tanga plants to convert to coal due to transport (rail) difficulties and the cost of transport. Saruji has been increasingly looking to export markets to cover their essential forex needs as they are allowed to retain 100% of forex earnings. Current export markets are Madagascar, Ruanda, Burundi, Comoros, Mauritius and, in future, Uganda. Their 1990 export target is 100 kt, out of a total production of 650 kt.

Other activities of the Saruji group include ceramics (Morogoro), sheet glass (Mbagala), container glass (Nyanza). A major constraint to glass production is the lack of a domestic supply of soda ash and cullet, which have to be imported.

Cement grade limestone deposits occur all along the coast in the belt of marine sedimentary rocks (corals) of Tertiary age and limestones of Jurassic and Cretaceous age. Suitable deposits also exist in the interior, but are much less frequent. There are three quarries under Saruji Corporation supplying a total of around 1.0 Mt/an of limestone to the cement plants at Wazo Hill, Tanga and Mbeya. A private company, Mwaweni, operates a small quarry for the production of lime in Tanga and there are artisanal lime producers (for paint, cement, agriculture) scattered throughout the country

Gypsum

Between 10 and 20 kt/an of gypsum is produced by small scale miners for the three cement plants. These operations are based around Mkomazi and Makanya (north-west of Tanga) where the small-scale operations exploit gypsite lacustrine deposits containing 60-80% gypsum. Other gypsite deposits are located at Msagali, Itigi and Mtegu. However a major rock gypsum and anhydrite resource is situated at Kilwa 20 km from the coast in the south near the Songo Songo gas field. It is a dome shaped structure penetrating limestones. The dome consists of gypsum at the top, underlain by a zone of anhydrite (to 100 m depth) followed by an unknown sequence of rock salt (to 10,000 ft). Proven reserves over a small area of the deposit were determined by Stamico to be 5 Mt containing 85% gypsum. Stamico also completed the pre-feasibility study, but currently the project is on ice. Local demand for gypsum runs at 60 to 80 kt/an, but there could also be other markets in the region.

Coal

Despite Tanzania's considerable coal resources there has been virtually no exploitation until recently. A major deterrent has been that the deposits are extremely isolated, mainly in the south-west of the country. The advent of the Tazara railway in 1975 linked this area to the coast (Dar es Salaam) and opened up possibilities for coal exploitation which are just beginning to be realised. The coalfields are all of Karoo age and tend to have fairly high ash contents. The following are the main areas: 1) Ruhuhu,

2) Songwe-Kiwira, 3) Galula, 4) Ufipa, 5) Mhukuru, 6) Mbamba Bay and 7) Njuga. The development of the Ruhuhu field has been considered in the context of the Liganga iron and steel plant.

The Songwe-Kiwira Coalfield, situated at the extreme north-western end of Lake Nyasa on the Malawi border, is the most accessible of all the fields and is the only field to have been exploited, albeit at an extremely low level, at Ilima Colliery, which has operated privately for many years (about 10 kt/an) and is undergoing expansion to 20 kt/an.

The Kiwira Colliery is a new mine that was developed with Chinese assistance and came on stream at the end of 1988 with an initial production of 150 kt/an for the Mbeya cement plant, the Southern Paper Mill and to generate power for the mine, but is experiencing difficulties in securing a market for all of its output. In 1989 46 kt were produced. Reserves in the area are estimated at 33 Mt containing high ash (25% to 40%).

Gold and Silver

Between 1930 and 1944 gold was the premier export worth 24 MTshs in 1940 (41 million 1987 USD). Production fell to less than half the 1941 peak of 4.4 t during the Second World War then recovered to a peak of 3.32 t in 1960 before falling off to virtually zero by the early seventies. The main reason for this decline was the fixed gold price of 35 USD/oz which in reality was declining at the rate of inflation in the United States. However, from 1971 gold went onto the open market and the price rose dramatically in real terms, almost nine-fold in the decade from 1970 to 1980 when it reached an all-time high of 27.4 1987 USD per gram.

It is apparent that gold production in Tanzania wholly failed to respond to the rapid increases in real price registered since 1970. In 1989, officially registered gold production was 116 kg. Before 1940, a significant proportion of gold production came from numerous small workers, but they could not survive the constantly falling real price of the forties, so by the fifties almost all of the production came from a few, medium scale, operations, namely Saza and Ntumbi (Lupa), Mukwamba (Mpanda), Geita and Mawe Meru (Mwanza) and Buhemba and Kiabakari (Musoma)¹⁰. Almost all of the production has come from seven well defined goldfields, namely: 1) Lupa, 2) Mpande, 3) Ruvu River, 4) Iramba-Sekenke, 5) South-west Mwanza, 6) Nzega and 7) Musoma. Areas 3) to 5) are also jointly called the Lake Victoria Goldfield.

After the closure of the mines in the Lupa field informal production took over and currently there are several thousand small-scale operators in well-established mining communities, but little of their production is registered. It is believed to be sold privately at two to three times the official price. However, from April 1990, the Bank of Tanzania started buying at the "parallel" price. One of the four proposals for funding by the UN Revolving Fund put forward in their recent study of the SADCC region was for an investigation of the Lupa Goldfield to determine reserves, at an estimated cost of 3.25 MUSD over three years.

The South-west Mwanza Goldfield (south Lake Victoria) used to be a major mining area and in the eighties the area around the old Geita and Lone Cone Mines was reappraised by UNDP which diamond drilled two prospects in the area and concluded that there were excellent possibilities for high grade mineralisation, particularly for open pit exploitation, and several mining companies have displayed interest in the area including Cluff Minerals (UK) who have open pit heap leaching operations in Zimbabwe. Several prospects in the Geita and Nzega greenstone belts will be reassessed with funding from the UN Revolving Fund for Natural Resources Exploration (UNRFNRE), which will be the first UNRFNRE funding in the SADCC.¹¹

The Stamico Buckreef Mine is also in this area and was rehabilitated with SIDA (Sweden) aid believed to be about 11 MUSD. According to some observers it was designed and built by non gold miners using inappropriate South African technology¹². Although the ore grades 5 to 8 g/t gold, much of it is in pyrite which goes to the tailings dump.

Also in the South-west Mwanza Field is the Bulyanhulu deposit, also known as Kahama, considered to be the most promising gold prospect in the country. Exploration and a feasibility study were done by Stamico in partnership with Finnish elevator manufacturer (Kone Oy). Reserves are estimated at 4.332 Mt containing 10.76 g/t Au, 12.05 g/t Ag and 0.66% Cu. The planned production rate of 150 kt of ore per annum would produce a matte containing 1.6 t of gold, 1.8 t of silver and 900 t of copper, worth, in 1988, 23.6 MUSD. Placer Dome (Canada) will invest 86 MUSD in the development of this choice prospect in 190/91 in which the state will receive an initial equity of 10% which can be increased to 35% after Placer Dome has recovered its investment, but only through the use of additional profits tax to buy equity.

The Musoma Goldfield was once the premier goldfield in the country (1930's). The main producers were, first the Buhemba Mine, and later the Kiabakari Mine. The only current operation is the retreatment of the old Buhemba dump by cyanide leaching of about 100 t/day, producing about 40 kg/annum. The reserves (dump) are estimated at about 1 Mt containing 1.5 g/t gold in pyrite. This is a demonstration operation and forms part of the Dar Tadine Tanzania (DTT) activities in Tanzania. DTT has also been involved in an experimental project with Stamico whereby DTT sends teams of purchasers into the illegal gold mining areas to buy the gold at open market prices, but this is now done by the Bank of Tanzania.

A 1988 UN assessment of the gold mining potential of Tanzania noted that one of the reasons why there had been little activity, since the new mining policy was brought into effect, was that...

“In 1984... (DTT) ...with no experience in mine development was given three year exclusive rights over areas which covered about 80% of the most attractive gold prospects of northern Tanzania. This effectively shut out other investors whilst... (DTT) ...made little effort to explore or develop its prospects”.¹³

Small scale miners are active on all of these gold fields and it is estimated that about six tonnes of gold (bullion) is smuggled out of the country annually¹⁴ as the official price is less than half the black market price. The gold is recovered by using mercury resulting in a thriving black market for mercury. In 1982/3 the Department of Mines installed two model plants to serve the small scale miners, one at Chunya (Lupa Field) and one at Buziba (Geita), but neither are operating. The idea would be for the small scale miners to bring ore to these plants for treatment.

Tanzania clearly has significant gold mining potential in all of the areas listed above. Operations ceased in most of them at a time when gold prices were at historically low levels and hence the cut-off grades that determined their closure were relatively high, in some cases as high as 6-8 g Au/t. Current gold prices are three times higher, in real terms, than the average for 1950 to 1960, and many of the closed operations would now be economically viable and warrant reassessment. The current small scale operations are only exploiting ore with visible gold. There therefore exists potential for exploiting the non-visible gold ore and refractory ore in the small scale zones. In some areas the small-scale miners' dumps run at 2-6 g/t and the rubble at 1-8 g/t and could supply the feed for a low-cost leach operation.

The new Bank of Tanzania's policy of buying directly from the miners and licenced dealers at “competitive” prices, and allowing a 70% forex retention for sellers with more than 100g¹⁵ should, with

time, eliminate the black market, stimulate micro scale and small scale mining and make available about 75 MUSD/an¹⁶ of forex for the further development of mining (70%) and for the nation (30%).

Phosphate

Phosphates occur in three broad types in Tanzania, a) apatite (Zizi marble and Mbeya, Ngualla and Mbalizi carbonatite), b) guano (bat and bird guano) and c) phosphate in lake beds (Minjinju).

The Minjingu deposit (Lake Manyara) was first assessed in the late fifties by New Consolidated Gold Fields Ltd who delineated approximately 10 Mt of ore with an average grade of 20% P₂O₅ occurring as two types, a friable (soft) phosphate containing 18.5% P₂O₅, and a hard siliceous phosphate containing 21.4% P₂O₅, in roughly equal proportions. The soft ore was readily amenable to upgrading to 28% P₂O₅ by dry screening, resulting in a product suitable for direct fertiliser application¹⁷. In 1966/7 the deposit was reassessed by the Japanese Consulting Institute on behalf of the NDC and it concluded that exploitation was indeed feasible. Further work carried out in 1981 estimated 2.2 Mt of soft ore reserves.

Stamico set up the Minjinju Phosphate Company Limited to exploit the deposit and the construction of the plant (100 kt/an of concentrate) was completed by Kone Oy (Finnish) in 1983, but production only commenced on a small scale in 1984 when 14.6 kt of phosphate was produced. In 1989 8.2 kt were produced and the drop in production was attributed to a shortage of railway wagons for the long haul to the Tanga Fertiliser Plant, 500 km away. In 1987 the company's liabilities exceeded its assets by 1.0 GShs and the auditors concluded that it could not continue without external financial support. A major limitation to operating at full capacity (100 kt/an) would be the currently low capacity of the Tanga Fertilizer plant which is in need of rehabilitation. A project to this end is in the pipeline, whereupon the Minjingu operation will be brought up to full capacity.

The Panda Hill carbonatite ring complex (Mbeya) has reserves, at less than 1450m depth, estimated at 91 Mt of ore containing 3.4% P₂O₅ and 0.35% Nb or 71 Mt at 4.0% P₂O₅ and 0.40% Nb, but there are no plans for its development.

Kaolin

There are numerous kaolin deposits in Tanzania, but most are impure and of no commercial value. The principal economic deposit is located at Pugu Hills, twenty km west of Dar es Salaam. The deposit was exploited for a few years in the early fifties by the Pugu China Clay Company Ltd (New Consolidated Gold Fields Ltd). Later, in the late seventies, it was investigated by Austroplan (Austria) funded by Austrian state aid. This study, completed in 1981, delineated 11.25 Mt of kaolin reserves in a small area. Stamico runs a small treatment plant at Pugu which was installed by a Japanese company in the early seventies as a pilot plant for the production of glass sand with kaolin as a byproduct (1.6 kt in 1989). The ADB will provide a loan for the development of Pugu Kaolin II with a capacity of 30 kt/an of high grade kaolin. The deposit is near the coast and rail, giving it good export possibilities.¹⁸

Tin

All production of tin and tungsten has come from the Karagwe Tinfield, in Bukoba district in the extreme north-west corner of the country, on the Rwanda border. The cassiterite placers from pegmatites have been mined by small workers since 1924 and peak production of concentrates was reached in 1966 when 482 tonnes worth 8.8 MTshs were produced. Tungsten production from the Karagwe field came from two operations, Karugu and Chamunyana, and production of wolframite concentrate peaked in 1950 at 42 tonnes. In 1982/3 the Mines Department set up a small-scale model plant in the Kyerwa area for the local small scale operators to bring their ore to for concentration, but the shortage of water for washing the pegmatitic material has limited the effectiveness of this facility and by 1986 no ore was treated.

Magnesite deposits are fairly common in Tanzania. Production peaked in 1966 at 4.5 kt mainly from the Chambogo mine, but since 1970 production has been low (less than 1 kt/an) and erratic. There are four main magnesite areas, Chambogo and Lobolosoit; Gelai; Merkerstein Hill and Haneti and Itiso.

Meerschaum

A meerschaum (sepiolite) deposit near Lake Amboseli in Masai district was discovered in 1953. The Tanganyika Meerschaum Corporation Ltd was formed to exploit the deposit and to manufacture smoking pipes. It is currently 57% owned by Stamico. From 1981 to 1989 there was no production due to the flooding of the quarry (rise of the water table) and imports of meerschaum from Somalia were resorted to in order to keep pipe manufacture going. However in 1989 7.3 kt were produced.

Gemstones

Most of the gemstone occurrences are in the highly metamorphosed late Archaean gneisses, schists, marbles, granulites and charnockites of the Mozambique Belt (Ubendian). There is a particular concentration of occurrences in the north-east, south of Moshi and Arusha at Merelani and Uмба. Historically a wide variety of semi-precious stones have been exploited including garnet (Namaputa, Uluguru & Ukaguru Mountains), ruby and sapphire (Uмба, Morogoro), chrysoprase and amethyst (Amani, Itosa, Kilosa), moonstone (south Pare Mountains, Zoissa), kornerupine (Mkata), zircon (Uмба, Singida), emerald (Lake Sereri), aquamarine (Olala-Serengeti) and tourmaline (Morogoro, Mpwapwa, Merelani). Of particular interest is a gem form of clinozoisite known as Tanzanite which occurs at Merelani near Moshi.

Tanzania Gemstone Industries Ltd (TGI) (100% Stamico) was set up to coordinate all gemstone activities in Tanzania. It used to operate several nationalised gemstone mines which have since stopped producing. In an attempt to revitalise the gold and gemstone industry, the new mining policy will allow nationalised mines to be put up on tender (for privatisation) and private dealers will now be able to obtain a licence to buy providing that they sell legally.

Iron and Steel

Traditional iron smelting generally used soft haematitic ores such as the bog ores at Ufipa, but these deposits are usually too small for modern exploitation. The main large resources are of titaniferous magnetite, of which there are several including Liganga, Chunya, Hundusi and Mbalala.

The Liganga is located in south-western Tanzania (Njombe district) near the Ruhuhu coal deposits and forms part of the Liganga-Mchuchuma project for steel production and as such comes under the NDC. The techno-economic evaluation study of the project was done by M/S Lurgi (FRG) in 1983/4 financed by a UNIDO grant and concluded that the project was technically and financially feasible. The project envisages that Liganga iron ore pellets will be fed into a SL/RN direct reduction plant using Mchuchuma coal to produce sponge iron with 92% metallisation, which will be rolled into steel products. Initial production capacity is planned at 0.5 Mt of steel per annum (mainly strips and plate) increasing to 1.0 Mt after the year 2000. The project will comprise: Liganga Iron Ore Mine, Beneficiation Plant, Pelletisation Plant, Mchuchuma Colliery, Coal Washing Plant, SL/RN Direct Reduction Plant, Ladle Furnace, Continuous Caster and Steel Rolling Mills. The 1987 cost of these facilities (for 0.5 Mt/an) was estimated at 715 MUS\$ and the supportive infrastructures at 1.1 GUSD comprising: 160 km of road (Madaba-Manda), 300 km of rail (Mlimba-Manda), thermal power plant (300 MW), townships, power transmission grid, telecommunications systems and "offsites". Over 16 years the project will save between 1154 MUS\$ and 1762 MUS\$ at 1988 prices.

Dolomitic limestone flux will come from the Msorwa/Msewe deposit which has estimated reserves of 100 Mt. The Liganga iron ore reserves are estimated at about 200 Mt with 45 Mt indicated by drilling

containing 51% Fe, 12.8% Ti, 0.67% V²⁰. However, the main obstacle to the realisation of this ambitious project is in the mobilising of the necessary finance which is difficult as, although the forex saving aspect is accepted, the project's ability to actually generate forex by exports is highly contentious, especially as there is already a steelworks in the region (Ziscosteel in Zimbabwe) with a capacity of 1 Mt and which is struggling to export. Another factor against this project is the relatively short life of the mine (16 years) due to the limited confirmed reserves.

Assessment of the Itewe iron ore deposit at Chunya (Mbeya) was done by a Chinese team at the same time as an assessment of the Kiwira coalfield for a proposed steelworks (1978). Reserves have been put at 50 Mt containing 32% Fe. Mainly due to the low grade, the prefeasibility study of the project was negative. The Hundisi (western Uluguru Mountains) was investigated in 1955 and inferred reserves were put at 8 Mt containing 40% Fe, 6% Ti in a seam 10m thick, dipping at 40°²¹. In addition to the titaniferous magnetite deposits there are also banded manganiferous ironstone occurrences in the Mpanda district. At one of these, Kansanga, reserves have been estimated at 1.5 Mt of low grade (30% Fe) per metre of depth.

Aluminium Africa (AlAf, NDC), located outside Dar es Salaam, is the sole steel producer in the country. The principal activity of the company is the transformation of imported aluminium ingots (mainly from Canada, financed by aid grants). They have an aluminium sheet mill, a foil mill and an extrusion plant, but the company also has a small 10 t arc ferrous furnace made in India with a 18 kt/an capacity. It runs on scrap and local limestone flux (coral, Wazo Hill). It produces billets for castings and sheet rolling.

The capacity of the casting unit is 40 kt/an and in order to fully utilise this facility it is planned to install a second 20 t arc furnace with an annual capacity of 40 kt. At the moment billets (raw steel) are imported to supplement the output of the furnace for the casting plant, but it still operates well under capacity due to forex limitations for the billet imports.

Salt

Salt has been produced from solar pans along the Tanzanian coast and from brine springs at Uvinza for centuries and, in modern times, has always been an important mineral in terms of value of output. In 1926 three thousand tonnes were sold with a value of 342 kTshs, fourth after diamonds, gold and mica, and by 1959 production had risen ten-fold to 30 kt worth 5 MTshs, fifth after diamonds, gold, lead and copper. Nyanza Salt Mines Limited (Stamico) is located at Uvinza in Kigoma District and the operation is based on the exploitation of underground brines. Sodium chloride constitutes about 91% of the dissolved solids, potassium chloride about 2.5% and the rest (about 6.5%) is made up of sulphates and chlorides of calcium and magnesium. The original capacity of the "grainer" operation was 18 kt/an. A new 60 kt/an vacuum plant built by IDECO SRL (Italy) for PVD refined salt came on stream in the second half of 1987. In addition there is a solar salt works with a capacity of 10 kt/an.

Small-scale salt panners operate all along the coastline at Bagamoyo, Dar es Salaam (Kunduchi, Temeke), Lindi and Mtwara, and are supported by the Commissioner for Mines via a team of experts who visit the villagers and advise on production methods, carry out feasibility studies and advise on purchase of equipment. The producers can get loans from the bank on the recommendation of the ministry. Production from these operations is approximately 10 kt/an.

Once all the current projects are fully operational the total national production capacity of salt should be in the order of 150 kt/an worth more than diamond production, half of which will be destined for

regional export markets (Zaire, Zambia, Malawi, Ruanda, Burundi and Uganda). The Sua Pan soda ash project in Botswana is projected to produce a surplus of 600 kt/ann of salt which will clearly limit Tanzania's development of a regional market to the south.

Other Minerals

Base metals (Cu, Ni, Zn, Pb) mainly occur in the Archaean and Bukoban rocks of Tanzania. Historically several base metals have been mined, principally from the Mpanda mineral field which is located in the centre-west of the country and from 1950 to 1960 the Mukwamba Mine, owned by Uruwira Minerals Ltd, produced about 94 kt of lead concentrates containing lead, copper, gold and silver, and was almost completely mined out by 1959. In the early seventies a Soviet team (Technoexport) reassessed this deposit and concluded that further reserves could still exist.

The Kabanga nickel deposit extends from Burundi into the Ngara district in the north-west. It is a nickel-cobalt deposit and was first surveyed by a UNDP team in the seventies. Preliminary reserves were estimated at 26 Mt at 0.7% Ni, 4.8 Mt at 1.12% Ni, and 6.0 Mt at 2.51% Ni. Thus far no interest has been shown by mining companies due to the low world market prices for these base metals until recently. At current prices this could be considered an attractive prospect for further exploration. The Zimbabwean nickel mines (Bindura Nickel Corporation) have an average grade of less than 0.7%.

Deposits of heavy mineral beach sands occur at various locations along most of the coastline containing ilmenite, rutile, zircon and kyanite. These deposits have been studied in several areas particularly the coastline between Bagamoyo and Dar es Salaam where reserves have been put at 664 kt. One of the four proposals for funding by the UN Revolving Fund put forward by their 1988 study was for an investigation of the coastal beach sands at an estimated cost of 630 kUSD.²²

Tanzania has numerous scattered mica-bearing pegmatites in the Usagaran and Ubendian systems of the Archaean. They have been exploited and exported since 1902 on a small scale. The workings are generally small labour intensive operations. The main area is Morogoro along the line of rail. The region is very hilly with isolated mica pegmatites.

Tanzania possesses substantial resources of sodium salts in the brine and salts crusts of the Central African Rift salt lakes and the main resources of this type are at Lake Natron on the Kenyan border where, in the mid-seventies, the Japan International Cooperation Agency (JICA) organised a team which investigated the deposit. They estimated soda reserves to be about 136 Mt converted to sodium carbonate and concluded that exploitation was viable with a purification plant at the lake and exports via the port of Tanga²³. At that time (1976) they estimated the total investment, for one million tonnes per annum, to be 320 MUSD (590 1987 USD), including plant (66%) and infrastructure (rail, port, storage, etc). Foreign exchange earnings in 1976 would have been 80 MUSD for exports of 1 Mt of purified natural soda, of which 66 MUSD would have been consumed by the operation for essential forex inputs, leaving a net forex earning of 14 MUSD. However, a SADCC study carried out in 1989 recommended that the Lake Natron deposit only be exploited on a small scale for the local market as it is extremely isolated and there are already large scale operations scheduled in Kenya and Botswana.²⁴

Tanzania has numerous other mineral occurrences that have not been exploited because they have yet to be assessed or because they have been determined to be uneconomic or merely because there has been no organisation with the will and ability to develop them.

Uranium deposits near Tukuyu in the south in Mbeya district were surveyed by Uranus (FRG) in the early eighties, but were not followed up due to the depressed market for uranium. Bauxites have been

reported in Usambara Mountains containing 57.7% Al_2O_3 and in the Western Uluguru Range. Large tonnages of good quality diatomaceous earths have been reported at Kagera in Bukoba district containing 75 to 77% silica while the development of a travertine marble deposit in Mbeya district is planned by Stamico. Scattered vermiculite deposits in pegmatites used to be worked by small scale miners in the Morogoro district, but all production has since ceased.

Tanzania possess several asbestos deposits, most of which are of the amphibole type (anthophyllite, tremolite and actinolite) rather than white, chrysotile, asbestos. Locations include Ikorongo (Musoma), Mbembe (Morogoro), Rubeho (Mpwapwa) and Haneti (Dodoma) but none have been developed due to the extremely weak market for asbestos. A low grade bentonite deposit located at the south-east end of Lake Natron was exploited in the late fifties by Industrial Minerals Ltd and there may be further resources in certain "mbugas" (wet lands) in volcanic terrains. Graphite deposits are widely distributed in metamorphosed Archaean rocks in Nachingwea District, Eastern Uluguru Mountains, Tanga District and Mpwapwa District and in the early eighties Afina Pencils Ltd mined graphite in Morogoro District for the manufacture of pencils.

One of the carbonitite complexes, at Wigu Hill south of Morogoro, is reported to have high levels of rare earth oxides and is one of the projects put forward by the recent UN Revolving Fund study for further investigation at a cost of just over one million USD.²⁵

Natural Gas and Petroleum

There is a natural gas deposit in the vicinity of Songo Songo Island, 20 km off Kilwa-Kivinje. It was surveyed during four exploration periods, from 1975 to 1985, by AGIP, the Oil and Natural Gas Commission of India and several contractors, financed by, TPDC²⁶, Norad, the Indian Government, the World Bank, the European Investment Bank and the OPEC Fund. Thus far nine holes have been sunk and the gas resources are estimated at 31.6 Gm³. The Kilwa Ammonia Company (Kilamco, 54% TPDC) has been set up to exploit the Songo Songo gas deposit using a standard ("off the shelf") Kellogg plant (Stamicarbon Process, NH_3/Urea). Semi-commercial pledges for the plant have thus far been secured from OPIC (USA, Overseas Private Investment Corp.), IFC (WB, International Finance Corp.) and the CDC (Commonwealth Development Corp.). Export credits of 334 MUSD, from several governments and organisations, have been secured. In 1986 the funders insisted on an endorsement of the project by the World Bank. An appraisal was done in 1986/7 and it concluded the project was viable even when using the most pessimistic technological and marketing forecasts.

The proposed Kilamco (at Kilwa Kivinje) plant will produce 1560 t/d of NH_3 from which 1725 t/d of urea will be made, resulting in annual sales of 180 kt of NH_3 and 530 kt of urea. The domestic market for urea is 10 kt/an which is expected to increase to 20 kt/an once urea is freely available (5% of Kilamco output). It is planned for the Tanga fertiliser company to expand into the production of compound fertilizers which will consume 20 kt/an of NH_3 . The regional NH_3 market has been estimated at 25 kt/an. The Kilamco plant should be on stream by 1993 if it goes ahead and work starts in the first quarter of 1990.

It is estimated that the Songo Songo reserves are large enough to supply the Kilamco plant as well as utilisation in Dar es Salaam and in this respect the Italian government has already committed funds (58 MUSD soft loan) for a pipeline from Songo Songo to Kilwa Kivinje to Kilwa Masoko and the contractor (Snamprogetti) has agreed to oversize the submarine section (Songo Songo - Kilwa Kivinje) so as to be able to cater for both the Kilamco and possible future supply to Dar es Salaam.

A second gas deposit is located at Mnazi Bay in the south near Mtwara. It was also discovered by AGIP, in 1982, who relinquished the concession in 1985. Possible reserves are estimated at 600 Gft³ (17 Gm³). At present there are no plans for its development.

Pre-independence (1950's) BP drilled four dry holes along the coast, but left in 1959. The first post-independence activity was 10 years later when AGIP came in to look at the coastal sedimentary basins. In the same year (1969) the Tanzania Petroleum Development Corporation (TPDC) was formed to monitor oil exploration and it also took a share in the Dar es Salaam refinery (TIPER).

In 1980 a new petroleum act was passed which more clearly established the framework for oil exploration and production. It also included safety clauses for the contractor with respect to nationalisation. All exploration by the oil majors is done on the basis of production sharing agreements (PSA's) with TPDC and government for any future production. Since the new act was passed there has been extensive exploration by Shell/Esso (Rufiji basin); the International Energy Development Corporation, BHP (Australia), Elf Aquitaine (France) and Kufpec (Kuwait Foreign Petroleum Exploration Company) all on the continental platform; Amoco (Lake Tanganyika); and Mobil Oil (Lake Nyasa). To date no oil has been struck in Tanzania. Even though most of the sedimentary basins have had some sort of exploration activity, only 19 deep holes (excluding Songo Songo) have been sunk over this vast area. There is therefore still the potential for hydrocarbon discoveries.

The Tanzanian and Italian Refinery (TIPER), located in Dar es Salaam, has a design capacity of 750 kt/ an of Iranian and/or Iraqi light crudes. Currently the refinery caters for about 60% of domestic demand for refined products and diesel and kerosene have to be imported.²⁷

Discussion

Unlike many of the ex British possessions to the south, Tanzania has never been a major mining country. Its potential always has, and for some time to come will, lie with its agricultural sector. Nevertheless the role that the minerals sector has played since the independence of the country in 1961 has been well below its potential, both in terms of forex generation and the production of mineral inputs to the domestic economy.

From 1961 through to the late seventies international prices for most base and industrial minerals kept pace with the terms of trade reflecting strong industrial growth and mineral demand in the OECD countries. During this period no new major mining operations opened up in Tanzania. On the contrary, many folded. From 1980 international prices fell reflecting the global capitalist crisis and possibilities for the development of new export minerals in Tanzania all but disappeared, but the recent revival of base metal prices, particularly nickel, has created new opportunities, particularly for the Mpanda and Kabanga deposits.

It is apparent that Stamico has displayed a marked inability to either keep nationalised operations running or to bring new mines into production, even during periods of buoyant prices such as those for tin from 1970 to 1985 and gold from 1972 to 1980 and, to a lesser degree, to the present. The principal problems experienced by Stamico and its subsidiaries appear to be a dearth of experienced and competent managerial personnel to both run existing operations and to get new projects operational. However, it is unclear why Stamico's performance was poor in comparison with other similar state companies such as Saruji and TPDC. How were they able to attract good managerial and professional personnel? It is possible that they were considered to be more important and were therefore allocated

better cadres (the current director of Saruji was the Stamico director for the first two years of its existence). When this question was put to the director of Saruji he emphasised the importance to Saruji of developing a strong technical and managerial support programme with a developed country (Sweden), which Stamico had not done. In addition, the national shortage of foreign currency affects Stamico's subsidiaries' ability to acquire essential operating inputs and to raise new capital for the initial investment in new projects. The new forex retention scheme for forex generators should particularly benefit the mining industry where most production is exported.

Stamico's performance for non-export (and therefore non-internationally priced) minerals for the domestic market is just as disappointing. Salt production has stagnated as has phosphate output, and although coal mining has got off the ground, markets were not secured in advance. Saruji Corporation's efforts have been much more successful and since its formation limestone and cement production have more than doubled.

The recent liberalisation policy is bound to also affect the mining sector, but to what extent the failure of the state in this sector will lead to the development of an indigenous mining sector or a TNC controlled industry (or both) is not as yet clear. Thus far the interest by TNCs has not been high, probably due to Tanzania's earlier "socialist" policies, but also Tanzania does not possess the type of large-scale, high return deposits that would interest the major mining houses, but it does have several attractive gold prospects. It also has substantial and varied resources of industrial and agricultural minerals that need to be developed to supply the local economy. But these appear to suffer from the "chicken and egg" problem in that the current demand is too low to justify investment in their development, yet at the same time demand is low precisely because of a lack of these minerals. The development of agriculture requires fertiliser minerals but the fertiliser minerals need greater demand for their development.

Tanzania also has significant gold resources and resources of various pegmatite minerals that lend themselves to micro to small scale exploitation, a scale that indigenous technology and managerial expertise can handle, possibly in partnership with small foreign concerns or, as in Zimbabwe, with support from a state technical and financial organisation.

In this regard it is hoped that the thousands of illegal gold and gemstone miners will be legalised now that the Bank of Tanzania is buying their gold at a competitive price, and by changing the mining law to give them some sort of legal tenure. Once legal, their efforts need to be supported by the state as they constitute a viable base for the development of an indigenous mining industry.

There is virtually no cooperation between the minerals sector of Tanzania and any of the other SADCC states, though several possibilities exist. The foremost would be if the Kilamco ammonia/urea plant got off the ground and started supplying the region's needs which constitute but a small proportion of its total projected output. Mozambican and Angolan natural gas resources are also being investigated for the production of ammonia/urea.

Tanzania's soda ash resources at Lake Natron could also supply certain regional imports, though the Sua Pan project in Botswana is more likely to become the regional source as plans for its development are well advanced. Tanzanian plans to penetrate the regional market for salt might also be dashed by the Sua Pan project in Botswana which will produce a byproduct of 600 kt of salt per annum, well above the regional demand.

The Pugu Kaolin deposit could substitute for current regional imports from South Africa and both Tanzania and Mozambique could supply the regional market for activated carbon from coconut shells for gold recovery.

The development of the Tanzanian gold resources could benefit from Zimbabwe's extensive experience in the mining of very similar deposits. Some of Stamico's setbacks in this regard, such as Buckreef, are partly attributable to the implementation of inappropriate technology. In this regard Tanzania could do well by first looking for partners for joint mining ventures in the region before considering foreign transnationals or dubious companies such as Dar Tadine of Switzerland/The Arabian Gulf. A Zimbabwean company has recently supplied a "low-tech" mill to a small Tanzanian gold mining company operating in the Lupa field.²⁸

The Zambian copper giant, ZCCM, should be considered as a possible market (refinery) for the Cu/Au/Ag matte that the Kahama prospect will eventually produce if it goes ahead. The ZCCM Pb/Zn refinery at Kabwe is fast running out of lead feed from its own operations and in this regard the Mpande deposits could be reassessed as a potential source of lead concentrates.

In conclusion, Tanzania has substantial mineral potential, both for forex generation and for domestic consumption, which it has thus far failed to develop, partly due to the state monopoly in the seventies. With the changes in the mining law, private and foreign investment is beginning to flow back into the mining sector and the large "illegal" gold mining sector is being legalised.

Footnotes to Chapter 14

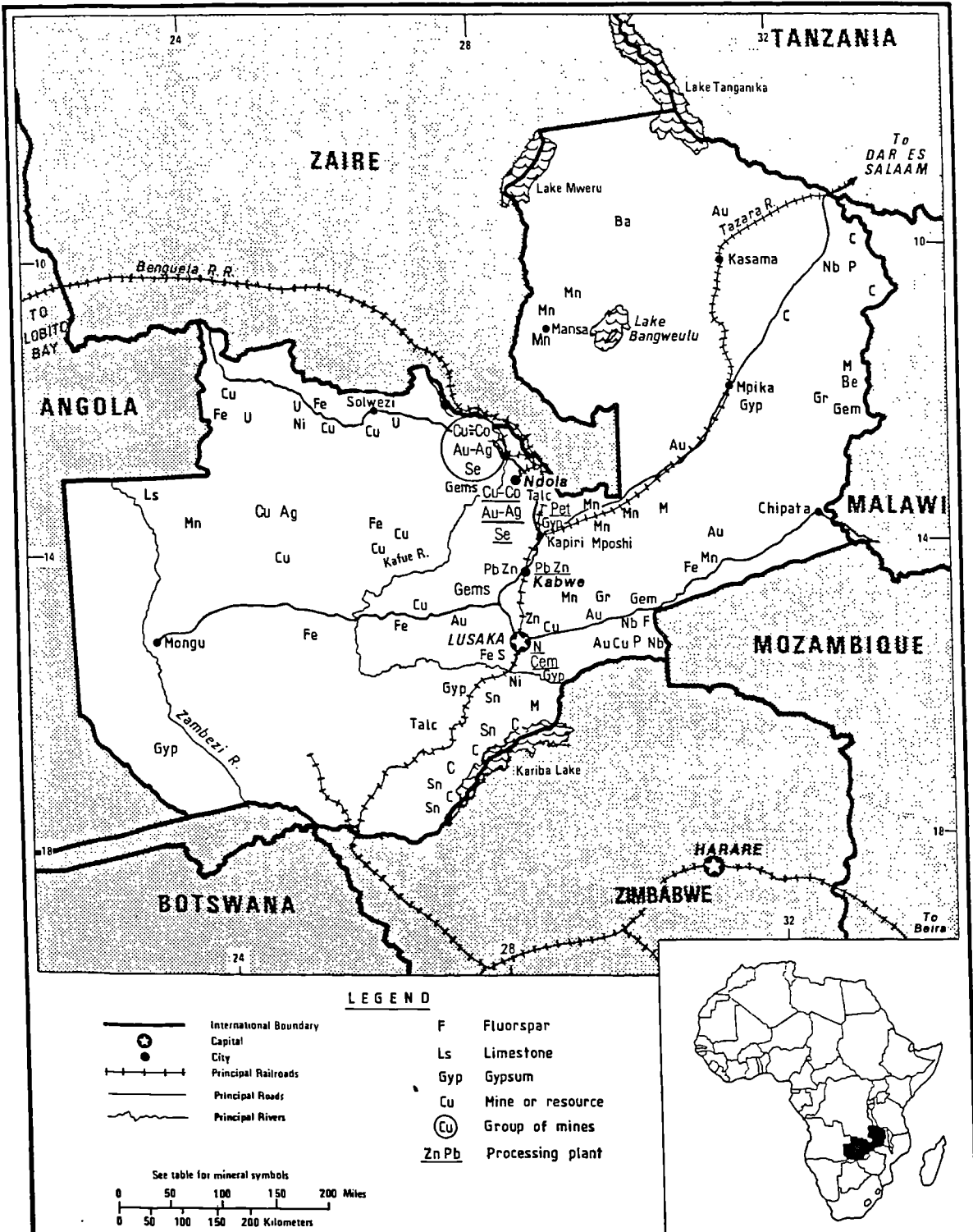
- 1 UNIDO 1982. 2 Skarstein 1986. 3 Stamico 1988. 4 UNIDO 1982.
 5 UNCTD 1988, page.
 6 However the geological division in Dodoma has more professionals (70) than any other survey department in the region.
 7 Harris 1961. 8 UNCTD 1988. 9 National Development Corporation.
 10 Harris 1961. 11 Mining Journal, 15 June 1990, page 472.
 12 John Hollaway & Associates, personal communication, 1988.
 13 UNCTD 1988, page 11) 14 Metal Bulletin, 9 April 1990, page 18.
 15 Mining Magazine, 162/6, June 1990, page 410. 16 6 tonnes at 12.5 USD/g.
 17 Harris 1961. 18 Jenko & Heikkila 1986. 19 NDC 1988. 20 Jones 1983.
 21 Jones 1983. 22 UNCTD 1988. 23 JICA 1976. 24 MDPA- Ingenierie 1989.
 25 UNCTD 1988. 26 Tanzania Petroleum Development Corporation.
 27 TPDC 1988.
 28 Peacocke, Simpson & Associates, a Zimbabwean mining support company, is aiding a small Tanzanian company, Damco, in developing gold prospects in the Lupa field.
-

ZAMBIA

Fig. 18

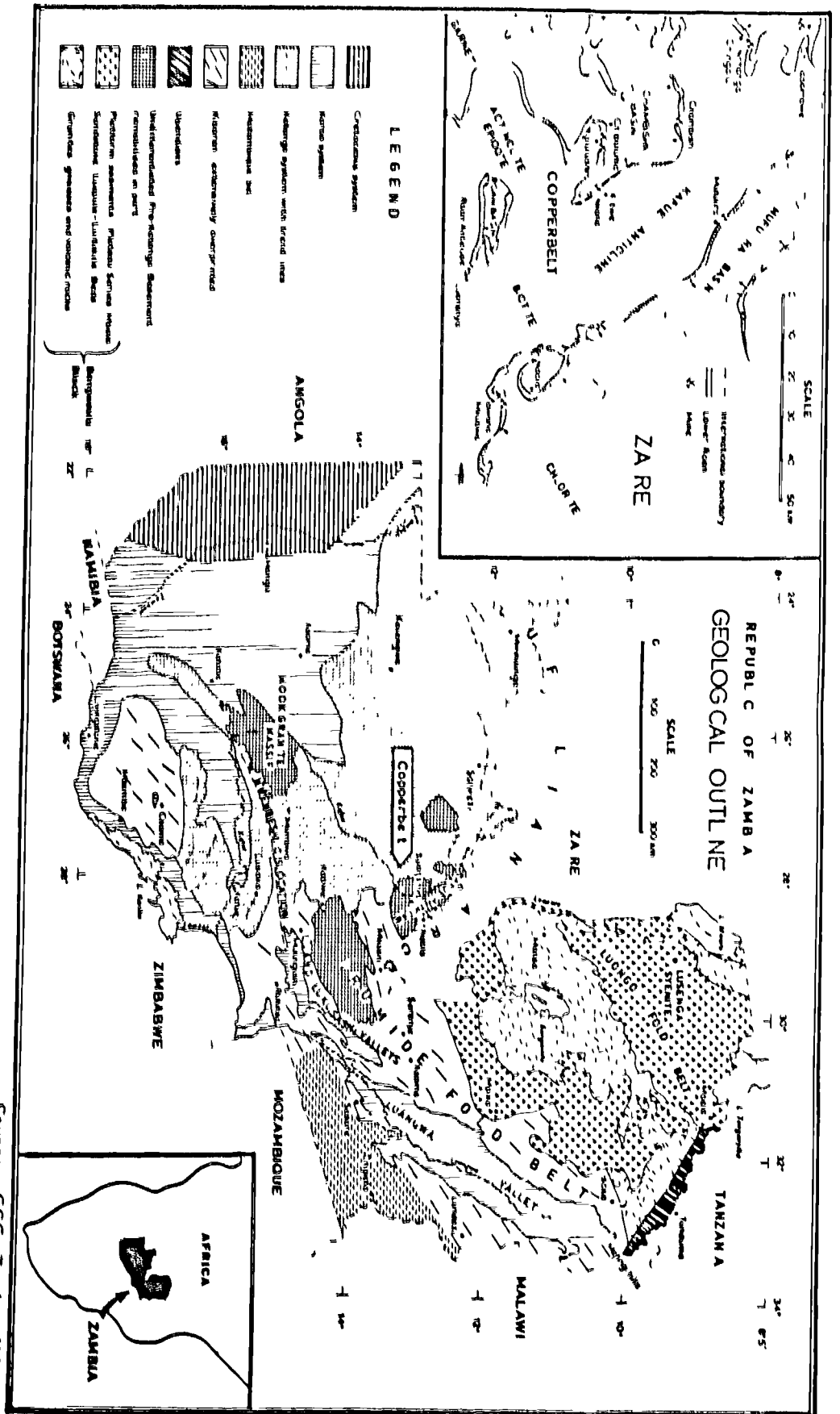
AREA 753,000 sq km

MINERALS



Source: USBM 1984

M155



Source: GSG Zambia 1986

Chapter 15: The Minerals Sector of Zambia

Introduction

History

Ancient iron smelting most probably began in Zambia at the beginning of the first millennium by the Bantu speaking iron-age peoples. Copper was mined and smelted in numerous locations as is borne out by the many ancient workings on oxidized deposits particularly in the Katanga (Shaba) area of Zaire. There are fewer ancient workings on the Zambian side of the Copperbelt as most of the outcrops were leached of copper. Kanshansi and Bwana Mkubwa had important ancient workings on oxide (usually malachite) deposits¹.

By the 16th Century copper was being extensively traded as ingots in the form of a St Andrews Cross. The first written reference to mining on the Copperbelt was in 1591 by Filippo Pigafetta in Rome based on information from a Portuguese traveller, Odoardo Lopez². The ingots were traded via the Arabs on the east coast who had trading outposts as far down as Sofala (Beira). This lucrative trade in copper, gold, ivory and slaves was later taken over by the Portuguese.

When the first Europeans arrived in the area at the end of the last century copper mining had almost ceased except for a few workings in Katanga. It is estimated that over 100 thousand tonnes of copper from one million tonnes of ore was produced from the ancient Katanga workings. The ancient mines were limited by the water table and because sulphide ores could not be smelted³.

Following the gold and diamond rushes in the 1870's and 1880's in South Africa, the principal mining magnate, Cecil John Rhodes, started looking north for further mineral deposits to finance his dream of a Cape to Cairo railway. To this end he obtained a charter from the British Government for the British South Africa Company (BSAC) to penetrate the interior and set about obtaining "agreements" from the traditional leaders for mineral rights.

In 1885 the border between the British and Belgian spheres of influence had been defined as the watershed between the Congo and Zambezi River basins, which runs through the middle of the Copperbelt. In the same year the BSAC obtained exclusive rights to minerals in the Rhodesias from Queen Victoria, valid until 1986.

The first colonial mining was at Kabwe on a lead/zinc deposit in 1905. In 1906 the railway reached this mine and concentrates were exported to Britain. Colonial copper mining started in 1908 with the first commercial production at Kansanshi, then in 1911 at Sable Antelope and in 1913 Bwana Mkubwa produced its first concentrate.

In 1922 company rule ended, but it retained its mineral rights and royalties, and granted exclusive prospecting rights over vast areas to large mining companies to undertake systematic exploration. In 1923 Copper Ventures Limited obtained a concession along the Katanga border. In the same year the Nkana sulphide deposit was discovered and by the late twenties development work was underway on several of the Copperbelt deposits. Rhodesian Selection Trust (RST) was formed in 1928 with British and American capital.

RST later became Roan Consolidated Mines (RCM) with a 20% shareholding by the American Metals Company which later became AMAX Inc. Nchanga Consolidated Copper mines was formed in 1926 as a subsidiary of the Anglo American Corporation of South Africa. RST and the AAC controlled Zambian copper mining via their subsidiaries RCM and NCCM for the next 40 years.

With the onset of the depression in 1929, copper mining and prospecting virtually ceased. In 1931 the companies agreed to cut production by 75% in an attempt to face the crisis and several mines were closed during this period. By 1935 copper prices had rallied and 146 kt of copper was produced. The build-up to and outbreak of World War II rapidly increased demand for copper and by 1940 production had reached 265 kt.

Northern Rhodesia (Zambia) became part of the settler controlled Central African Federation in 1953 and during the copper boom of the fifties it was the principal source of revenue for the grouping. The nationalist movement, the African National Congress (ANC) of Northern Rhodesia, was founded in 1948 and it split into two parties in 1958, the ZANC under Kenneth Kaunda and the ANC under Harry Nkumbula. The next year the ZANC was banned and the United National Independence Party (UNIP) was formed with Kaunda as its leader, which won the first general election in 1962.

Zambia gained independence from Britain in 1964, under UNIP, and it was only a few hours before independence that the state managed to acquire the mineral rights to the country from the BSAC, for four million UKP. But the BSAC had previously granted mining concessions to RCM and NCCM, in the best areas, in perpetuity.

In 1970 the mines were nationalised and the companies were reorganised into Nchanga Consolidated Copper Mines (NCCM) and Roan Consolidated Mines (RCM) with 51% of the shares being held by the wholly state-owned Zambia Mining and Industrial Corporation Limited (ZIMCO) which issued bonds worth 331 MUSD at 6% to the old owners for the 51% holding. The minority 49% of NCCM was held by Zambia Copper Investments (ZCI) owned by Minorco in Bermuda which is in turn owned by AAC and De Beers of South Africa. The 49% of RCM was held by RST International Inc., a subsidiary of AMAX Inc (20%), Security Nominees Limited (12%) and the public (16%).

In 1974 and 1975 the management agreements with AAC and AMAX were terminated and the state bought the issued bonds. NCCM and RCM were established as self-managing companies with Zambian managing directors. At the same time a subsidiary of ZIMCO was created, the Metal Marketing Corporation of Zambia (Memaco), to market all minerals produced in Zambia.

In 1979 the state converted part of its loans to NCCM and RCM into equity, thereby increasing its shareholding to 60% and 61% respectively. In 1982 ZCCM and RCM were merged to form Zambia Consolidated Copper Mines Ltd. (ZCCM) in which the state's holding is 60.3% via ZIMCO⁴. In 1987 the RST 9% holding was bought by a Greek businessman Mr A.S. Sardanis, who had been a government representative on the Boards of NCCM and RCM in the early seventies, after nationalisation.

For Anglo American (NCCM) the Zambian buyout was an important source of foreign currency and a major boost to its international operations. Profits generated in South Africa were difficult to transfer outside the country. In the early seventies Minorco was a "brass nameplate" company in Bermuda, but with the capital injection from the Zambian buyout it became the principal international subsidiary of the Anglo-De Beers group and by 1990 its market value was over 3 billion USD⁵ and it has operations across the globe. Shortly after the buyout, copper prices fell in 1971/2, rose in 1974/5, fell until 1978, rose in 1979/80 then went into the long decline of the eighties. It could be thus argued that the TNCs gave up their share ownership of Zambian copper at an extremely propitious time. In addition, during the mercurial prices of the seventies, they were receiving direct payment for technical and management services to the companies that did not depend on the vagaries of copper prices.

The Economy

Zambia covers 753,000 km² and has a population of about eight million resulting in a low density of only ten persons per km². During the eighties the Zambian economy was in crisis due to the collapse of copper prices. In 1988 it had a GDP/capita of about 344 USD, about half of the 1980 figure. The currency has been drastically devalued over the last decade from 1.26 USD to the Kwacha in 1980, to 25 Kwacha to the USD in 1989. This has also been reflected in the extremely high rate of inflation, 1500% from 1980 to 1989. Gross Fixed Capital Formation (GFCF) as a percentage of GDP is low, at less than 10% of GDP reflecting the economic crisis.

15.1 ZAMBIA, BASIC ECONOMIC INDICATORS

(Kwacha)	Unit	1980	1982	1984	1986	1988
Population	M	5.9	6.1	6.4	7.0	7.6
Pop.density	/km ²	7.8	8.1	8.5	9.2	10.1
Forex Rate	/USD	.79	.93	1.79	4.17	8.22
CPI (1)		100	128	183	381	847
GDP mp	G	3.1	3.6	4.9	13.0	21.5
GDP/cap	USD	659	635	428	447	344
GFCF (2)	M	558	618	623	1061	
GFCF/GDP	%	18.2%	17.2%	12.6%	8.2%	
Debt (3)	GUSD	2.38	2.63	2.78	5.64	6.50
Debt/GDP	%	61%	68%	101%	181%	305%
Labour Force	k	381	368	365	361	361
Govt Revenue	G	.77	.84	1.09	3.04	

Source: CSO 1989.

The national debt is the highest in the region at 6.9 billion USD in 1989 (204% of GDP), but debt service payments were only 14.2 of exports in 1988 due to a moratorium and rescheduling. But this means that at the present rate of repayment the debt grows without any further new borrowing.

15.2 ZAMBIA, GDP BY SECTOR (MZKw)

Year	Total GDP	Agriculture	Mining	Manufacturing
1965	649.9	8.2%	42.3%	7.3%
1970	1185.3	7.2%	36.8%	10.4%
1980	3063.6	14.2%	16.5%	18.5%
1985	6332.1	16.8%	9.1%	20.6%
1989	43637	13.6%	12.5%	34.7%

Source: CSO 1974 and 1989, EIU 1990.

The economy is heavily dependent on the mining industry. Although its contribution to GDP has decreased from 42% in 1965 to 9% in 1988 it still constitutes almost all exports. The manufacturing sector expanded rapidly in the sixties and seventies, from 7% of GDP in 1965 to 19% in 1980, but its share of GDP has remained fairly constant in the 1980's.

Declining copper prices have put severe strains on the economy. In real terms the average price of copper in the eighties was only half the average for the first ten years of independence. In addition production has been falling so that Zambia's average real earnings from copper in the eighties have fallen 55% since its independence (1964). Although prices rallied somewhat in 1988 and 1989, they fell again at the end of the year.

15.3 COPPER PRICES AND ZAMBIAN COPPER EARNINGS
AT CONSTANT 1964 VALUES

Year	US GNP deflator	Price US\$/t	Indexed Price	Export kt	Indexed Exports
1964	100.00	988	100.0	681.0	100
1965	102.19	1316	130.3	683.0	131
1966	105.56	1547	148.3	599.0	130
1967	108.66	1148	106.9	601.0	94
1968	113.54	1252	111.6	643.0	105
1969	119.26	1485	126.1	730.0	135
1970	125.76	1413	113.7	684.0	114
1971	132.03	1087	83.3	635.0	78
1972	134.68	1069	80.3	711.0	84
1973	145.43	1784	124.1	670.0	122
1974	158.25	2053	131.3	673.4	130
1975	172.98	1235	72.2	641.2	68
1976	181.99	1409	78.3	745.7	86
1977	192.59	1310	68.8	666.6	67
1978	206.87	1362	66.7	589.2	58
1979	224.74	1986	89.5	651.8	86
1980	245.65	2187	90.1	661.3	87
1981	268.85	1735	65.3	504.4	48
1982	284.98	1453	51.6	606.6	46
1983	296.10	1585	54.2	550.6	44
1984	306.93	1351	44.6	530.3	35
1985	316.04	1345	43.1	474.5	30
1986	324.31	1367	42.7	436.4	27
1987	334.57	1786	54.0	475.3	38
1988	366.02	2601	71.9	398.2	42
1989	381.11	2866	76.1	440e	49

Source: CSO 1970 and 1989, Shearson
Lehman Hutton 1989, Hugh Douglas 1983,
USGPO 1990.

The Zambian economy is now having to operate on about 40% of the foreign exchange (forex) that it had in 1970. In an attempt to counter the effects of declining terms of trade the local currency has been drastically devalued since 1982 when the Zambian Kwacha was worth about one US\$. This has resulted in massive price hikes for basic commodities causing high inflation and significant erosion of salaries and wages in the formal sector.

15.4 ZAMBIA, FOREIGN DEBT AND INDEX OF
WHOLESALE PRICES (selected years)

Year	Foreign Debt GUS\$	% GNP	Debt Service % of Exports	Wholesale Price Index
1970	0.63	37	5.9	100
1980	2.19	61	17.8	284
1982	2.38	66	17.4	320
1984	2.90	136	27.7	508
1987	4.35	228	13.5	2822

Sources: World Bank 1989, CSO 1989.

Since the onset of the decline in mineral export earnings Zambia's foreign indebtedness has increased considerably, from 60% of GDP in 1980 to a staggering 228% in 1987. Due to concessionary debt rescheduling, debt servicing has dropped from 28% of exports in 1984 to 14% in 1987. Foreign disbursed

debt in current USD increased 690% between 1970 and 1987. This was accompanied by rapid inflation reflected in the wholesale price index which increased from 100 in 1970 to 2822 in 1987.

Since 1984 Zambia has had a National Economic Diversification Programme (NEDP) to attempt to reduce the high dependency of the economy on the copper mining industry. The main other national resource is agriculture, but in the first seven years of the NEDP the role of agriculture has not expanded appreciably, particularly as a foreign exchange generator.

Under the IMF economic recovery programme Zambia instituted a foreign currency auctioning system in 1986 which was suspended in 1987 when the value of the Kwacha fell to 0.05 USD. After increases in basic commodity prices (maize meal) provoked riots on the Copperbelt in 1987, Zambia broke with the IMF and debt repayments were pegged at 10% of export earnings, but relations with the IMF were reestablished in 1989 and Zambia is now complying with a new IMF programme, including further devaluations of the currency, cuts in basic commodity subsidies and the lifting of price controls.

Zambia's dependence on South Africa is in general lower than for many SADCC states but is high for imports (15 to 20%), particularly for strategically important mining machinery and consumables, which are often significantly cheaper sourced from South Africa, with shorter delivery times. Less than one percent of exports go to South Africa, though a larger proportion (about 10%) are routed via South Africa. In 1988 the South African Chamber of Mines reported that there were no Zambian migrants on the South African gold and coal mines, and tourism from South Africa is insignificant.

However, some observers consider Zambia's relationship with South Africa to be "...the most complex and apparently contradictory one in the region"⁶ in that although Zambia is a member of the Front Line States, has always supported sanctions against South Africa and has hosted the ANC headquarters and SWAPO Office, South Africa has done comparatively little to directly⁷ destabilise Zambia. In addition South Africa has become Zambia's largest single source of imports. This is because, even more surprisingly, the South African government has been prepared to back exports through both credit and a range of export subsidies⁸.

One reason for this less aggressive stance by South Africa could be that it has used President Kaunda in the past as a mediator and as the South African internal situation worsens, there will be further need for outside mediation in negotiations with the South African democratic forces and that it is "...perhaps important not to antagonise Zambia any further by military action."⁹ A further reason is that, although the mining industry has been nationalised, the Zambian elite is committed to the capitalist system in contrast to Angola and Mozambique who have suffered the most from South African destabilisation.

The Mining Sector

General

Zambia is highly dependent on copper mining, and its by-product cobalt, to the extent that it is virtually a mono-mineral economy. The contribution of metals mining (copper, cobalt, zinc, lead and precious metals) to GDP has fallen from 38% in 1964 to 9% in 1988, while as a percentage of government revenue it has declined drastically from 53% at independence to 7% in 1987 (average 6% 1980-87). Its proportion of total formal employment has remained fairly constant at around 15%.

15.5 ZAMBIA, METALS MINING - CONTRIBUTION TO GDP,
REVENUE AND EMPLOYMENT (%)

Year	Contribution to GDP	Contribution to Govt. Revenue	Contribution to Employment
1964	38	53	18
1968	38	60	15
1972	24	22	14
1976	18	3	15
1980	16	5	15
1984	14	6	15e
1988	9e	7*	14e

e estimate, * 1987, Sources: CSO 1989, CISB 1970-80.

In US dollar terms, mineral production per capita, a crude reflection of the mineral intensity of a nation, has fallen from 253 in 1980 to 167 in 1988, while mineral production per miner fell from 24 thousand in 1980 to 15 thousand in 1984 before recovering to 23 thousand in 1988 (15.4 thousand 1980 USD). The contribution of minerals to total export receipts averaged 94% for the period 1980 to 1988 and is almost entirely made up of copper, but due to low mineral profits mining only contributed an average of 6% to government revenue during the eighties.

15.6 ZAMBIA, BASIC MINERAL SECTOR DATA (Kwacha)

	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	Avg ¹
GDP Mining	M	490	473	382	619	674	1102	2355	2689	2915	
% GDP Mining	%	16%	14%	11%	15%	14%	16%	18%	15%	14%	15%
Mineral Prod.	M	1179	960	861	1251	1527	2688	5793	8391	10425	
Min.Prod/cap	US	253	184	152	161	133	147	200	130	167	
Min.Exports	M	986	903	911	1001	1109	1343	4928	7462	9119	
% Min. Exports		96%	96%	96%	96%	93%	88%	92%	93%	93%	94%
Mining labour	k	63	61	60	58	58	57	57	56	55	
% mining labour		16%	16%	16%	16%	16%	16%	16%	15%	15%	16%
Min.Prod/lab.kUS		23.7	18.1	15.5	17.3	14.6	17.2	24.5	16.9	23.0	
Mining Revenue	M	42	11	0	53	94	129	405	207		
% Mining Revenue		5%	1%	0%	5%	9%	8%	13%	7%		6%

¹Average. Sources: CSO 1989.

Economic Geology

Zambia is located between the Zairean (Congo) and Zimbabwean (Rhodesian) cratons and hence contains both mobile belt and ancient craton features. Precambrian rocks underlie more than two thirds of the land area, which have been affected by several tectono-thermal events resulting in a complex geology¹⁰. Seven structural-stratigraphic domains have been proposed:

1. The Bangweulu Block in the north-east
2. The Kibaran Belt running NE-SW in the east
3. The Katangan Sediments and the Lufilian Arc in the centre north-west
4. The Mozambique Belt in the extreme east
5. The Lower Palaeozoic Sediments
6. The Karoo System in the west and the rift valleys
7. The Barotse Basin in the extreme west.

The oldest rocks are those of the Precambrian Basement Complex underlying the Bengweulu Block, consisting of gneisses, granites and volcanics and contain mineral occurrences of gold, nickel, asbestos, copper, iron and manganese.

These are followed by rocks of the Katangan Complex of late Precambrian age consisting of a sedimentary sequence of shales, sandstones, dolomites, limestones, quartzites and conglomerates which have undergone only slight structural deformation in comparison to the basement complex. These rocks occur in the centre, the north-west and the south-west and host significant copper/cobalt and uranium deposits in the lower part of the sequence in the well-known Lufilian Arc of the Zambia/Zaire Copperbelt. The Katangan Complex is also the source of the Kabwe lead/zinc deposit in the centre of the country and contains iron and gold as well as industrial minerals such as limestone and graphite.

The Katangan sediments are overlain by quartzites, shales and arkoses of Lower Palaeozoic age in western Zambia and in the mid-Zambezi Valley. Sediments of the Karoo Supergroup comprise a Lower sequence of fine clastics and an Upper sequence of coarser clastics and occur in the Zambezi and Luangwa rift valleys and in western Zambia. The Lower Karoo hosts a substantial coal resource and the Upper Karoo has several uranium occurrences.

The Karoo sediments and volcanics are overlain by micaceous shales of Lower Cretaceous age in western Zambia. Pleistocene to Recent aeolian windblown Kalahari sands mantle much of the Western Province and extensive deposits of alluvium occur in river valleys.

The carbonatite complexes of Rufunsa and Isoka are sources of phosphate rocks and niobium deposits. The numerous gabbro intrusions host a significant nickel mineralisation at Munali, south of Lusaka. The younger Hook granite intrudes the Katangan System and contains a variety of copper-gold-silver deposits and magnetite contact metamorphic deposits.

There are numerous pegmatites which in the Kibaran in the south contain tin, tantalum and niobium. The Mozambique Mobile Belt in the east contains occurrences of gold, graphite and semi-precious stones.

Legislation

The laws governing exploration for and exploitation of minerals are contained in Chapter 329 of the Laws of Zambia, namely the Mines and Minerals Act of 1976. The right of searching for and mining of all minerals is vested in the President, in terms of this Act. To prospect, a reconnaissance or prospecting licence must be obtained. It is valid over a defined area, for a limited time period and for the defined mineral/s only and from this right stems the right to demarcate a proposed exploration area not exceeding 26 km² in size and to acquire an exploration licence for the specific mineral deposit which is initially valid for three years.

To mine the deposit a mining licence must be obtained for the mineral/s within the prospecting or exploration area and is initially valid for a maximum of 25 years, after which it may be extended. For building or industrial minerals a mineral permit must be obtained and is renewable every 12 months. The Act also has extensive regulations pertaining to the safety of mining operations. All of these regulations are administered by the Chief Mining Engineer's Department.

The above Act was principally drafted for large scale base metal mining. In 1984 the Act was amended specifically for small mining operations of industrial, precious and semi-precious minerals to include area charges (on prospecting and mining), utilisation fees (on industrial mineral mining) and licence fees (flat fee per mineral mined).

The Mines and Minerals Act does not cover hydrocarbons and radioactive (nuclear) minerals which have separate acts, the Petroleum Exploration and Production Act and the Prescribed Minerals Act. The main difference between the former and the Mines and Minerals Act is that it makes provision for

a Petroleum committee, chaired by the Minister of Mines, to oversee all policy issues concerning hydrocarbon exploration.

Mining companies are liable for income tax at the company tax rate of 45% of their taxable income. All the normal adjustments apply and only the mining specific deductions will be considered here. Prospecting and exploration expenditure is deductible in the year in which it is spent or carried over to income from the subsequent mining operations. Capital expenditure is deductible immediately and the balance over ten years for a lead/zinc mine or twenty years for any other mine, in equal amounts. Mining losses can be carried back against profits for the previous year and any remaining losses are carried forward against future profits.

Mineral tax is not payable for the first five years of operation; after that it operates at the following percentages of taxable income: copper 51%; cobalt, lead and zinc, 20%; amethyst and beryl, 15% and, gold, selenium, silver, bismuth and cadmium, 10%. Mineral tax itself is an allowable deduction in determining the taxable income for income tax. Mineral export tax is set at 10% of the value of exported minerals and since 1985 is deductible for calculating taxable income.

Repatriation of dividends to foreign shareholders is allowed, after the payment of with-holding tax, at the rate of 50% of after tax profits accruing to non-resident shareholders or 15% of external paid up capital, whichever is the lesser. Foreign companies may borrow locally up to the amount that was brought into the country.

Minerals Marketing

Since 1975, all metals marketing has been carried out by the parastatal, the Metal Marketing Corporation of Zambia Limited (Memaco), a subsidiary of ZIMCO. Memaco has two subsidiaries in London, Memaco Services Ltd. and Memaco Trading Ltd. which deal with their trading in Europe. The transportation of metals is carried out by the ZCCM subsidiary Zamcargo Limited. The reason for setting up a state minerals marketing authority when the state already controls the mining industry is unclear, except to save on forex commissions for agents. But firstly, copper is a known commodity, traded on the LME, with low commissions and secondly, it is by no means clear that the forex costs of running Memaco, including their overseas offices, is less than what would have been paid in commissions. However, in the seventies the old owners were making huge profits from marketing the copper, particularly Amax¹¹, and thus the government may have thought that setting up its own marketing authority was the only alternative.

Zambia, as a land-locked country, regularly has problems in transporting its minerals to ports for shipment overseas. The western route along the Benguela Railway to Lobito Bay in Angola has been out of action since 1975 due to South African sabotage and sabotage by the RSA and USA backed UNITA bandits. Since 1974 the new Tazara Railway to Dar es Salaam has been used but this line has had major maintenance problems over the last few years so that the southern route through the RSA to the port of East London has also been used. A small amount of metal is also transported to Dar es Salaam by road by the Zambia Tanzania Road Services (ZTRS), but at a very high cost. It generally takes about three months for the copper to travel from the refinery to the warehouses in Europe. The high value metals are airfreighted (gold and silver).

The majority of Memaco's sales are for copper which is traded at the LME price plus the high grade premium (about 20 UKP). Wirebar production and sales have been on the decline due to a decrease in the demand for this form. The principal markets for Zambian copper are Japan, France, the UK, Italy,

West Germany and Sweden. ZCCM owns 50% of a copper rod (CCR) manufacturing company, Societe de Coulee Continue de Cuivre (SCCC), in France which sells about 170 kt/an of wire rod, produced from Zambian copper.

Memaco appears to be an experienced trader of copper on the world markets and has managed to build up a core of personnel in the difficult field of metals trading who have over the years acquired the confidence of several international customers for the Zambian high grade product. They have a major disadvantage with regard to their competitors due to their long delivery times (about 3 months to Europe) but they appear to have overcome this via copper exchanges to facilitate timely deliveries. Given their experience and overseas infrastructure they could save the other (small) copper producers in other countries of the region much needed forex if they were to market their production for them.

Zambia is a member of CIPEC but this body has never been an effective producer organisation in terms of stemming the declining price of copper mainly due to the large proportion of supply coming from developed countries and their companies¹², and the renegade policies of some third world producers such as Chile since 1973¹³. The 1985 demise of the last effective metal producer body, the ITC, does not augur well for the establishment of CIPEC as an active producer cartel.

Labour

The expatriate mining labour force was 16% of the total in 1964 then steadily declined to 1.5% in 1988 and has further declined since then. This reduction has come about principally due to a rapid increase in mining company in-house training programmes since independence. In 1989 there were 181 ZCCM employees on sponsorship and a further 210 Zambian students on company scholarships in Zambia and overseas¹⁴. The creation of the School of Mines at the University of Zambia in 1971 has also increased the number of Zambian professionals in the mining industry.

15.7 ZAMBIA, MINING EMPLOYMENT

Year	Copper (cobalt)		Lead/zinc		Total		% Expat	
	Zambian	Expat. %	Zambian	Expat. %				
1964	39203	7326	15.7	1828	490	21.1	48847	16.0
1968	43198	4845	10.1	2118	366	14.7	50527	10.3
1972	46245	4600	9.1	2175	295	11.9	53315	9.1
1976	53082	4060	7.1	2744	224	7.6	60110	7.1
1980	55258	2485	4.3	2593	123	4.5	60459	4.3
1984	na	na		na	na		58104	3.1
1988	na	na		na	na		55000e	1.5

Sources: CISB 1968-80, ZCCM 1989, CSO 1989

In 1983 the average earnings in the mining industry were 4129 ZK per year, 43% more than for industry as a whole, but due to the crisis in mining the gap has since narrowed. Within the mining industry the ratio of Zambian to expatriate earnings was 1:2.7, compared to 1:4.7 in 1970, mainly due to a significant increase of Zambians in professional and managerial positions rather than a relative increase in the wages of workers. From 1970 to 1983 average annual earnings of Zambian miners increased by 269% in current terms but as inflation was about 410% over the same period, earnings fell by 45% in real terms. Since then wage increases have lagged well behind inflation so that in real terms earnings have fallen substantially, especially since forex auctioning was introduced at the end of 1985 which provoked a massive devaluation of the currency and runaway inflation.

Fatalities per thousand workers fell steadily from 1956 to 1974 by 50%, but since then have remained fairly static at around one death per 2000 workers. Serious injuries per thousand workers dropped by

47% from 1964 to 1982. From 1982 the rate has remained constant at about 32 per 1000 workers. The two principal causes of fatalities were the handling of equipment and rock falls. With increasing production from opencast and tailings retreatment, the incidence of accidents is likely to fall.

In the early years of copper mining, most of the labour was migrant and unskilled¹⁵, and mining was labour-intensive and unmechanised. The “white” expatriate labour was permanent and held all the skilled (artisanal), professional and managerial positions while the “black” labour was migrant and filled only unskilled and semi-skilled positions. However, from the 1960's there was an increasing tendency towards a more settled labour force with concomitant increase of skill levels and mechanised mining methods. Foreign migrant labour peaked in the 1955-59 period at 16 thousand/annum (mainly Tanzanian and Malawian) representing 27% of the total labour force¹⁶ of 57 thousand. By 1980 the labour force was 63 thousand and almost all permanent.

The first miners strikes took place in 1935 in response to a unilateral increase in taxation by the colonial government and was not broken before six miners had been killed. In 1937 a white miners union was formed to attempt to maintain white privileges and to stem the advancement of the black workers into “white” jobs.

The first African trade union was formed in 1948 and by 1949 the Northern Rhodesia African Mineworkers Trade Union had branches across the Copperbelt. Its main focus was on removing the racist job barriers which were supported by the white union and instituting a non-racial system of equal pay for equal work. In 1955 the African union went on strike on the issue of wage increases and the demand for a closed shop. The turnout was virtually 100% and the strike lasted 58 days before the companies agreed to their demands.

The racist job barriers were only dismantled in 1963, a year before independence. The last racial union, the Zambia Expatriate Mineworkers Union, was dissolved in 1969. The Mineworkers Union of Zambia (MUZ) was formed in 1967 by a merger of the old union with the staff and mine police associations.

During the period of high copper prices up to 1975, MUZ made significant advances in improving the real wages and working conditions of its members, but since 1975 the mining companies have had negligible surpluses due to the falling real price of copper and the MUZ has been unable to halt the steady decline of the living standards of its members.

In 1985 there was an unofficial strike over the deduction at source of pensions. The strike only had a turnout of about 30% after the first day and was essentially a failure. especially in terms of the Union as, after government intervention, membership was made voluntary rather than automatic resulting in a 25% loss of union dues.

Given the fact of the declining profitability of copper mining and that miners are still substantially better off than workers in general (300% better than agricultural workers in 1983), it is unlikely that MUZ will be able to halt the declining real earnings of its members.

ZCCM

Zambia Consolidated Copper Mines (ZCCM) accounts for all of Zambia's copper, cobalt, lead, zinc and pyrites production. The company is 60% state owned via the state holding company Zambia Mining and Industrial Corporation (ZIMCO). The only significant minority shareholding is 27% held by Zambia Copper Investment Ltd. which is owned by Anglo American and De Beers of South Africa via their subsidiary Minorco in Luxemburg.

In 1982 Nchanga Consolidated Copper Mines and Roan Consolidated Mines were merged to form ZCCM. RCM and NCCM had been the major companies from the beginning of large scale copper mining in the early 1930's.

In 1971 long-term debt represented 7% of total capital employed but with the fall in copper prices in 1975 this proportion rose to 20% and the debt became increasingly foreign denominated. By 1989 98% of the long-term debt was foreign, most of it in US\$ (50%) and had increased to 35% of capital employed¹⁷.

Profits have also reflected the value of copper on the world market and have slumped since 1975 except for 1980 when the price of cobalt (a major by-product of copper production) shot up and in 1988/9 when the price copper improved. Profits as a proportion of sales averaged 36% between 1971 and 1975 but had fallen to 2% over the period 1982 to 1989 and were only 6% of capital employed for the entire period (1971 to 1989)¹⁸.

15.8 ZCCM: FINANCIAL PROFILE (constant 1981 MUSD)

	Sales	Capital	Profit ¹	Tax	P/C ²	Div ³	Debt	Int ⁴	Cost ⁵
1971	935	757	404	200	27%	102	50	1	84
1972	755	882	224	60	19%	80	111	3	84
1973	936	1095	285	81	19%	105	153	9	78
1974	1493	1217	775	477	24%	172	183	11	71
1975	1161	1497	277	136	9%	37	285	12	77
1976	859	1750	-90	-84	-0%	0	360	39	81
1977	1028	1511	83	54	2%	0	314	42	67
1978	808	1296	-75	-48	-2%	0	244	40	60
1979	1116	1688	126	13	7%	6	267	48	61
1980	1329	1715	284	112	10%	29	234	39	68
1981 ⁵	1312	1852	42	-26	4%	11	337	50	83
1982	1001	1505	-145	3	-10%	0	494	48	85
1983	739	1284	-93	3	-8%	0	477	45	62
1984	771	1012	52	52	0%	0	438	61	52
1985	673	1467	52	52	0%	0	410	53	46
1986	492	1819	36	43	-0%	0	495	38	34
1987	633	2001	19	70	-3%	0	563	72	49
1988	1091 ⁶	1457	59	25	2%	0	501	62	62
1989	1228 ⁶	1173	184	60	11%	9	408	51	58

¹ pre tax, ² final profit/capital, ³ dividends, ⁴ interest payments, ⁵ real US cents per lb Cu (cost of own sales/copper production), ⁶ For 1971-81 the US\$ Manufacturing Unit Value Index deflator was used and from 1982-89 the US GNP deflator was used, ⁶ including sales of metals bought-in and delivered to its customers by an associated company. Sources: Radetzki, 1985 (1971-82); ZCCM, 1989 (1983-9).

The low real costs per pound of copper produced from 1977 to 1980 are principally due to the devaluation of the Kwacha in 1976¹⁹. Unit costs then rose for 1981 and 1982 before falling to an all-time low in 1986 due to rapid devaluations of the currency from 1981, but then rose slightly in 1988 and 1989. This rise is partly due to the fact that the cost/lb is calculated by dividing the total cost of sales by copper production only. If the cost of producing cobalt, lead, zinc and other by-products was included, the unit cost for copper would be substantially lower. In 1985 the cost of copper production made up 92% of the total cost of all production.

ZCCM has managed to remain profitable in the face of falling real copper prices by drastically reducing the real wages of workers which have not kept up with the high inflation rate in part caused by the devaluation of the national currency.

Metals brought-in and delivered to customers by an associated company have become a major proportion of sales and in 1988/9 constituted 34%, up from 22% in 1987/8. This is done to fulfil prior contracted supply commitments.

From 1983 a Mineral Export Tax was introduced and is charged on the gross amount received from sales of all minerals exported, irrespective of the company's profits. Initially this levy was 4% of exports but was increased to 8%. This system meant that ZCCM would have had to pay taxes in excess of profits unless the net profit before tax exceeded 30% of turnover. After representations to government the Income Tax Act was amended in 1985 so that the Mineral Export Tax was allowed as a deduction in the calculation of mineral and income taxes, but at the increased rate of 13% of exports²⁰. In an attempt to rehabilitate the company, it has been exempt from Mineral Export Tax from January 1988²¹.

In January 1986 the company announced a "survival plan" which entailed the closure of Kansanshi mine, Chambishi mine, number 3 shaft at Konkola, the Luanshya smelter, the Ndola refinery tank-house and two concentrators. These closures will result in the laying-off of about 3000 workers. This plan arose out of the results of two studies done by outside consultants in 1985 on ZCCM. According to these studies ZCCM is a viable enterprise if it is allocated the foreign exchange it requires to operate and if it is allowed to trim unprofitable operations²².

Since the late seventies the company has not been able to get the necessary foreign currency to operate efficiently, resulting in the deterioration of plant and machinery and higher operating costs. The government is unable to give the company the foreign exchange that it needs (about 40% of earnings) due to the requirements of the rest of the economy. It appears that the company has decided to drop the more costly operations and to concentrate its limited forex on the most viable operations in order to bring itself back to profitability. In this manner overall output will remain constant by increasing the production of the remaining operations.

The company plans to keep cobalt and copper production steady at about 4-4.5 kt/an and 450-470 kt/an respectively and to reduce staff levels to 53,000 with 800 expatriates²³.

Mineral Production

General

15.9 ZAMBIA: METAL PRODUCTION & EXPORTS, AVERAGES FOR 1964-88.

Metal	Cu	Zn	Pb	Co	Coal
Avg. Production kt	617	41.0	16.3	2.54	601
% mineral prod.	88%	2.4%	0.7%	4.1%	1.3%
Avg. Exports kt	613	39.4	13.6	2.25	nap
% tot. exports	90%	2.5%	0.7%	2.6%	nap

Source: CSO 1974, 1989

Over the twenty-five years 1964 to 1988, minerals averaged 96% of total exports. Over the same period copper averaged 90%, zinc 2.5%, lead 0.7% and cobalt 2.6%. Copper exports peaked in 1976 at 746

kt and have steadily fallen since then to 398 kt in 1988. Zinc and lead exports both peaked in 1972 at 60.6 and 26.7 kt respectively. By 1988 zinc exports had fallen to 19.2 kt and lead exports had dropped to 3.7 kt. Cobalt exports on the other hand have been increasing and in 1988 5171 tonnes left the country, accounting for 6% of total exports.

Zambia's share of world copper output has fallen steadily since 1960, by 64% from 13.6% to 4.9%. It was never a world league producer of either zinc or lead, but is a major world producer of cobalt. In 1988 Zambian cobalt production constituted 16% of world output, and with neighbouring Zaire, about half of global production.

15.10 ZAMBIA: SHARE OF WORLD MINE PRODUCTION.

Year	Copper			Zinc			Lead		
	World	Zambia	%	World	Zambia	%	World	Zambia	%
1960	4243	576	13.6	3351	34	1.0	2376	16	0.7
1964	4859	632	13.1	3987	52	1.3	2570	15	0.6
1968	5476	685	12.5	5120	59	1.2	3034	24	0.8
1972	7045	718	10.2	5822	56	1.0	3556	26	0.7
1976	7873	709	9.0	6222	37	0.6	3475	14	0.4
1980	7837	596	7.6	6213	33	0.5	3566	10	0.3
1984	8130e	521	6.4	6742	29	0.4	3386	9	0.3
1988	8700e	422	4.9	7100	20	0.3	3400	6	0.2

Sources: CSO 1970 & 1989, BGS 1989.

Although the Zambian minerals industry is dominated by copper, a variety of other minerals are produced. The main by-products or co-products of copper mining are cobalt, selenium and gold while silver and, in the past, cadmium are by-products of lead/zinc mining. In addition several other minerals are produced for copper mining and refining such as coal, pyrite and lime. Finally there is some small scale mining independent of the copper industry such as manganese, talc, emeralds, beryl, feldspar and phyllite.

15.11 ZAMBIA: SELECTED MINERAL PRODUCTION.

Mineral	Unit	1970	1975	1980	1985	1986	1987	1988	1989	%Chg ¹
Cassiterite	t	na	na	na	na	3.1	24.1	1.9	1.8	
Coal	kt	623	898	569	511	557	463	524	395	-37%
Cobalt	kt	2.05	1.84	3.31	4.42	4.34	4.48	5.03	4.49	119%
Copper	kt	683	640	610	480	460	483	422	451	-34%
Emeralds	t	na	na	na	.12	.41	.99	1.04	.33	
Feldspar	kt	na	1.17	.48	.19	.21	.05	.12	.02	
Gold	t	.170	.501	.329	.350	.058	.350	.262	.149	-12%
Lead	kt	27.3	19.1	10.0	8.0	6.6	8.0	6.4	3.9	-86%
Limestone	Mt	na	.755	.698	.702	.705	.720	.999	.775	
Cement	kt	na	na	310	316	334	375	405	386	
Lime	kt	na	na	182	256	243	235	239	230	
Manganese	kt	na	na	.38	.98	.55	.00	.50	.35	
Pyrite	kt	na	19.0	3.2	28.3	19.2	45.4	67.5	60.1	
Selenium	kt	na	36.5	22.7	19.5	22.1	27.1	24.4	21.4	
Silver	t	47.8	31.1	23.8	18.9	26.8	29.9	29.3	19.8	-59%
Talc	kt	1.3	.0	.0	9.5	.3	.3	.1	.1	-89%
Zinc	kt	53.5	46.9	32.7	22.9	22.5	21.0	20.2	12.9	-77%

¹ % change 1970-89.

Source: Ministry of Mines 1990.

Copper (Cobalt)

From the commencement of large scale mining in the 1930's to 1988 about 1,1 Gt of ore grading roughly 2.7% Cu have been treated yielding about 25 Mt of copper and 89 kt of cobalt. In 1985 reserves and resources were estimated at 1.6 Gtonnes grading on average 2.55% Cu and in 1989 proven reserves were estimated at 421 Mt grading 3.17% Cu, which means that the average grade treated over the next 18 years will be roughly 2.2% Cu, assuming a dilution factor of 30%²⁴. However, in 1975 reserves stood at 828 Mt grading 3.1% Cu and by 1989 half (48%) had been mined leaving a balance of 421 Mt grading 3.2% Cu which will last until the year 2005, assuming an annual depletion rate of 25 Mt. Since 1975 407 Mt of ore have been extracted which would leave a theoretical balance of 422 Mt in 1989. As the actual balance is 421 Mt, it would appear that there has been no delineation of new reserves in the last 14 years.

15.12 ZCCM: COPPER & COBALT RESERVES ²⁵

Mine	31 March 1975				31 March 1989				% Change ²
	Ore Mt	%Cu	ore x grade	%Co	Ore Mt	%Cu	ore x grade	%Co	
Nchanga	252.3 ³	3.42	8.63	na	118.46	4.00	4.74	.58	-45% ⁴
Mufulira	143.9	3.15	4.53		67.95	3.17	2.15		-52%
Nkana	119.9 ³	2.44	2.93	na	100.73	2.34	2.36	.14	-19% ⁴
Luanshya	72.1	2.56	1.85		33.68	2.47	.83		-55%
Baluba	64.4	2.62	1.69	.16	42.47	2.50	1.06	.17	-37%
Chibuluma	8.4	4.58	.38		8.81	3.29	.29		-25%
Chambishi	42.3	2.91	1.23		shut				-100%
Konkola	125.1 ³	3.55	4.44	na	48.59	3.90	1.90	.07	-57% ⁴
Total:	828.4	3.10	25.68		420.69	3.17	13.33		-48%

¹ total reserves, ² Cu metal content, ³ as at 31 Dec 1974.

⁴ The old NCCM definition of reserves is different to that of ZCCM. Sources: NCCM 1975, RCM 1975, ZCCM 1989.

In addition to the above reserves, ZCCM geologists have estimated that resources of copper amount to a further 30 million tonnes of metal within the company's existing Copperbelt Mining Licence areas, but these are generally deep and/or low grade and/or in difficult ground and/or are difficult to treat. Thus much of the resources may not be economic to mine, depending on prices and technological improvements. Nevertheless they would add at least 5 to 10 years to the 15 to 20 year life of the reserves. In addition there are a few, smaller, copper deposits away from the Copperbelt, particularly in the north-west.

In general about 25 Mt of ore grading on average about 2.2% copper are mined annually from both open pit and underground operations. The ore then goes to the concentrators where it is crushed and milled before going to flotation cells to produce several concentrates. The sulphide concentrate (25 to 45% Cu) is then mixed with limestone and smelted in reverberatory or electric furnaces producing a matte which goes into converters to remove the iron and sulphur, resulting in blister copper (about 99.8% Cu) which is then cast into anodes ready for electro-refining.

The cobalt concentrate is sent to the Cobalt Plants at Nkana or Chambishi for refining into pure cobalt. The high grade oxide concentrates (12% Cu) are acid leached at the Nchanga High Grade Leach Plant (HGLP) where the copper is recovered by electro-winning. The tailings leach plants (TLP) treat current and old tailings and low grade liquor from the HGLP. The copper is recovered by electro-winning, producing cathodes which are then further refined by poling to remove the oxygen before being cast into high grade wirebars.

The blister anodes from the smelters are electro-refined onto copper starter sheets producing high grade cathodes ready for export. Sulphur is recovered from the converter chimneys at Nkana and Chambishi for the production of acid for electro-refining and leaching, but the lower concentration sulphur emissions from the reveratory furnaces are released into the atmosphere.

15.13 ZCCM, COPPER ORE TREATED AND GRADE

Year	Nchanga ¹		Mufulira		Nkana		Luanshya ²		Other		TOTAL	
	Mt	% ³	Mt	% ³	Mt	% ³	Mt	% ³	Mt	% ³	Mt	% ³
1972	10.2	3.72	5.9	2.15	5.6	1.78	6.3	1.55	5.2	3.36	33.2	2.65
1974	9.8	3.45	7.1	2.17	5.5	1.66	7.1	1.38	6.4	3.04	35.9	2.46
1976	9.6	3.61	6.6	2.36	4.8	1.61	6.1	1.45	5.7	3.08	33.1	2.57
1978	9.1	3.34	6.3	2.31	4.2	1.55	5.7	1.55	5.9	2.78	31.2	2.46
1980	9.1	3.33	5.7	2.10	4.2	1.53	5.9	1.44	6.4	2.27	31.2	2.29
1982	9.8	2.85	5.7	1.86	4.1	1.47	6.0	1.41	6.4	2.29	31.9	2.18
1984	10.4	2.84	4.4	2.13	3.9	1.61	5.5	1.44	5.3	1.93	29.5	2.15
1986	9.7	2.60	4.0	2.10	3.5	1.40	4.9	1.40	3.9	2.20	26.0	2.09
1988e	8.9	3.09	4.8	1.97	3.3	1.38	4.4	1.57	1.7	2.60	23.1	2.19
	% ⁴	39%	21%	14%	19%	7%	100%					

¹ including Chambishi, ² including Baluba, ³ % metal content, ⁴ % total production in 1988. Source: CSO 1989, ZCCM 1989.

The average grade treated has steadily fallen from 2.65% in 1972 to 2.19% in 1988, representing a drop of 17% over 13 years. The gross tonnage of ore milled has also fallen, by 11% over the same period.

Before 1985 ZCCM had seven operating divisions, namely Nkana, Nchanga, Mufulira, Luanshya, Kalulushi, Konkola and Kabwe and in that year Kalulushi Division was dissolved and its mines were incorporated into Nkana and Nchanga divisions and in 1986 Konkola Division was incorporated into Nchanga. Hence there are now five divisions, namely Nchanga (Nchanga, Konkola and Chambishi mine), Nkana (Nkana, Chibuluma and Chambishi cobalt and acid plants), Luanshya (Luanshya and Baluba), Mufulira and Kabwe (Kabwe and Nampundwe). This reduction of divisions is a reflection of the overall reduction in copper output (down 40% from 1976 to 1989).

15.14 ZCCM, COPPER SMELTER AND LEACH PLANT PRODUCTION

Smelter/Plant	1972/3		1988/9	
	Copper (kt)	% Recovery	Copper (kt)	% Recovery
Mufulira Smelter	156.8 ¹	94.6	159.7	96.6
Nkana Smelter	308.9 ²	94.0	149.2	94.6
Luanshya Smelter	117.5 ¹	94.1	nap	-
Nchanga HGLP	104.4 ²	82.7	20.0	48.3
Nchanga TLP	nap	-	97.7	61.5

¹ Year ended 30:06:73, ² Year ended 31:03:73.

Sources: NCCM, 1973; RCM, 1973; ZCCM, 1989.

The copper refineries are located at Mufulira and Nkana and the cobalt plants at Nkana and Chambishi. In addition there is a Precious Metals Plant at Ndola which is administered by Mufulira Division. The Precious Metals Plant produces selenium (about 25 t/an), silver (about 25 t/an) and gold (about 300 kg/an), all of which is exported. The plant could also treat the slimes from other refineries in the region such as Alaska and Eiffel Flats in Zimbabwe, but these are currently being sent outside the region.

The proportion of copper production from the leaching of tailings has steadily increased from zero in 1970 to 20% in 1981/2, to 28% in 1988/9 and is expected to rise even further. Excess refining capacity is being used to treat blister from Zaire, and the Mufulira smelter has treated Zairean concentrates on a toll basis. Small quantities of concentrate are also toll treated for small scale operators. There is also the possibility of ZCCM treating the future gold/silver/copper matte from the Kahama deposit in Tanzania, if its development goes ahead.

15.15 ZCCM, COPPER REFINERY, COBALT PLANT AND PRECIOUS METALS PLANT PRODUCTION

	1972/3	1982/3	1988/9	% Change ¹
Copper (kt)				
Mufulira	274.1 ²	220.5	198.0 ³	-28%
Nkana	315.9 ²	156.1	155.3	-51%
Ndola	133.2	106.2	shut	-100%
Cobalt (tonnes)				
Nkana	2137	419	2373	+11%
Chambishi	789	1793	2498	+217%
Precious Metals Plant				
Selenium (t)	na	22.1	24.1	+9%
Silver (t)	na	27.5	24.1	-12%
Gold (kg)	na	371	227	-39%

¹ % change from 1972/3 to 1988/9, except for precious metals (1983-89), ² year ended 30/06, ³ including 28.9 kt toll-refined.
Sources: RCM 1973, NCCM 1973, ZCCM 1983 & 1989

Lead & Zinc

Kabwe mine comes under Kabwe Division and used to be known as Broken Hill due to its similarity to the Australian deposit and once was one of the highest grade lead/zinc mines in the world. Mining started in 1906 making it the oldest operating mine in Zambia. Lead and zinc are produced with silver and, in the past, cadmium as by-products.

In the concentrator the sulphide ores are floated off and go to the Imperial Smelting Furnace (ISF) and the oxide tailings are dumped and later batch leached. The ISF produces low grade zinc (Zn4) and lead bullion which is further refined in dressing kettles resulting in high grade lead (99.9999%) and a small amount of silver. The old dumps grading 12% to 15% Pb plus Zn are processed in two Waelz Kilns and lead and zinc clinker are extracted from the fumes. The lead goes to the ISF and the zinc is leached then electro-won with the leached concentrator tailings to produce high grade zinc (Zn2) for export.

15.16 KABWE DIVISION LEAD & ZINC, PRODUCTION PROFILE

Production	1972/3	1982/3	1988/9	%Change
Ore Milled (kt)	355	210	133	-63%
Grade (% Zn)	21.8	25.0	9.0	-59%
Grade (% Pb)	11.1	11.0	18.9	+70%
ISF ¹ Lead Bullion	34.2	21.3	11.7	-66%
ISF ¹ Zinc (Zn4 kt)	32.0	28.4	12.4	-61%
EZP ² Zinc (Zn2 kt)	23.8	11.7	6.1	-74%
Refined Lead (kt)	30.3	15.2	9.1	-70%
Silver (t)	0.0	3.06	3.43	nap
Cadmium (t)	16.24	0.0	0.0	-100%

¹ Imperial Smelting Furnace, ² Electrolytic Zinc Plant. Sources: NCCM 1973, ZCCM 1983 and 1989.

The main ore body is almost mined out and the possibility of treating the dumps using Australian Sirosmelt technology to produce 2 kt/an of lead for the local market is being investigated²⁶. A project to identify possible sources of lead/zinc from deposits in neighbouring countries was not fruitful. There are known deposits at Mpande in Tanzania and Copper Queen in Zimbabwe. Alternative industries to replace mining are also being considered including the possibility of setting up an aluminium refinery based on cheap local energy and imported alumina and a small iron and steel works has also been proposed.

Coal

The coal mining company, Maamba Collieries, is a wholly-owned subsidiary of the State holding company, ZIMCO. It is an opencast operation working the coal seams of the Karoo System on the Zambezi Valley (graben) in the south-east of the country. Mining started in 1966, but production has declined since 1973 when 940 kt were produced, due to falling demand from its main customer, ZCCM. Current production is at the rate of about 400 kt/an of which a small amount is exported to customers in the region (Malawi, Tanzania and Zaire).

The deposits only contain steam coal with almost no coking properties, making it necessary for ZCCM to import coke from Wankie Colliery in Zimbabwe. A comprehensive techno-economic study of the operation was been undertaken by outside consultants²⁷ funded by the World Bank and a rehabilitation project, with assistance from the African Development Bank, has been implemented to restore productive capacity. Proved coal reserves at Maamba are estimated at 70 Mt with a further 18 Mt classified as probable, adequate at current exploitation rates for 150 years.

Sulphur (Pyrites)

Kabwe Division also runs the Nampundwe pyrites mine west of Lusaka. The pyrites is used for the production of acid at the Nkana Acid Plant and some (about 3 kt/m) is sold to Nitrogen Chemicals of Zambia (NCZ) for the same purpose. Reserves are estimated at 8.6 Mt grading 16.3% sulphur. The mine produces about 75 kt/an of pyrite concentrate from about 300 kt/an of ore. A small amount of copper concentrate is also produced.

However, the bulk of sulphur production comes from the chimneys of the copper converters on the Copperbelt. The Nkana Acid Plant produces about 200 kt/an of acid and the Chambishi Acid Plant about 80 kt/an. The installation of a new Chilean (El Teniente) converter at Nkana plus the rehabilitation of the Nkana Acid plant should increase production to 250 kt/an. All the acid is used by ZCCM, principally for tailings leaching.

There is an overall acid shortage in the region and it is hoped that Zambia will be in a position to export once the Nkana Plant is refurbished. Zimbabwe has an acid shortage and the development of the Kanyemba uranium/vanadium deposit in the Zambezi Valley would require a cheap source of large quantities of sulphuric acid to treat the ore.

Tin

A small quantity of tin is mined in the Choma Tin Belt of southern Zambia from pegmatites and related eluvial placers. Reserves are estimated at 215 tonnes of cassiterite in widely scattered small deposits. It has been mined since 1935 and in 1989 production was 1.75 tonnes of cassiterite concentrate. Non Ferrous Metal Works in Ndola produces a small amount of low grade tin metal for the manufacture of solder, but the quality is not high enough for tin plating.

In addition to cassiterite (tin), the pegmatites also contain columbite (niobium) and tantalite (tantalum). The Kamativi Tin Mine across the border in Zimbabwe, is also based on a pegmatite, but in

addition to its own production its smelter takes cassiterite/tantalite feed from small operators on surrounding pegmatites and is running below capacity. The possibility of sourcing feed from the Choma Tin Belt would therefore appear to warrant further investigation.

Other Minerals

Several other minerals are exploited in Zambia, the principal ones being limestone, manganese, magnetite, feldspar, talc, phyllite, emeralds, beryl and other semi-precious stones. In 1988 there were fifty-five companies and cooperatives holding eighty-two Mining Licences and twenty-one Building Licences (for stone, sand, limestone and clay).

Manganese ore was produced until 1968 at the rate of roughly 50 kt/a and is still exploited on a small scale in the north of the country for the manufacture of batteries by Mansa Batteries Ltd. Reserves in Luapula and Central Province are estimated at some 1.5 Mt grading from 45% to 86% MnO₂ scattered over nine deposits. The other main area is the Kabwe-Mkushi area, but unsurveyed deposits occur over most of the country. Trial shipments have been made to Zim-alloys (an AAC company) in Zimbabwe for the manufacture of ferromanganese for the steelworks (Zisco). Zimbabwe currently imports manganese ore from South Africa.

Amethyst is mined by Mindeco Small Mines Ltd, International DGC Mining Company and Lonrho on small operations in the Southern Province near Kariba and Kalomo. Production in 1989 was 6275 kg. Emeralds are mined by Kagem limited from several small-scale operations. Official production was 1214 kg in 1989, but large quantities are mined illicitly and smuggled out of the country.

Feldspar is also mined by Mindeco Small Mines at Namukombo who are also small scale producers of limestone (Michinga), tourmaline (Nyimba) and magnetite (Namatobwe).

In 1989 775 ktonnes of limestone was quarried from which 239 kt of lime and 405 kt of cement were produced by Ndola Cement and Chilanga Cement, for the local construction and metallurgical industries. Ndola lime was tested by Zim-alloys in Zimbabwe for suitability as a flux for ferrochrome manufacture, to replace burnt lime imports from South Africa, but the phosphorus content of the Zambian product was too high.

Interest has recently been shown in the Munali nickel deposit south-east of Lusaka by Outokumpu Oy (Finland) and also by Bindura Nickel Corporation (BNC, an AAC company) in Zimbabwe. BNC's is facing a future shortage of ore, due to the depletion of reserves at its own mines, and is looking for alternative sources of ore or concentrate. The Munali copper/nickel sulphide deposit was assessed by Zamanglo in the early seventies when the geological reserves were estimated at 11.7 Mt averaging 1.04% nickel and 0.15% copper²⁸. The mining lease is currently held by Apollo Mining, a local earth-moving company.

A substantial high grade fluorapatite deposit at Sianyolo on Lake Kariba has been explored by Agip (Italy). Reserves are estimated at 2 Mt and exploitation would be viable for exports if the project did not have to carry the high infrastructural costs (road and power line)²⁹.

Agip have also carried out extensive exploration of a vast low grade uranium deposit with associated copper in the Malundwe and Chimiwungo areas west of Solwezi in the north-west. Copper reserves of about one billion tonnes grading 0.8% Cu with appreciable gold (about 0.2 g/t) have been estimated. Further development is dependent on an improvement in the international uranium price.

Kanshanshi Mine was closed in 1986 but has been reopened to be worked by small scale operators who sell their ore to a ZCCM run concentrator. The ore grades about 3% Cu and has significant gold (about 2g/t) which in fact represents Zambia's largest gold resource. Zambia has many other gold occurrences, particularly in the Lufira gold belt where ZCCM has several dump retreatment operations and the old Matala Mine is being rehabilitated. ZCCM's Small Mines Development Unit reopened the Dunrobin Mine near Mumbwa in 1989 with reserves of 58 kg of contained gold in old dumps.

Zambia has no large high grade iron deposits, but there are numerous small occurrences of ore and there have been projects for the establishment of an iron and steel industry since the early seventies. Studies have been carried out on the Sanje deposit near Lusaka and the Chisasa deposit west of Solwezi. There are also deposits at Pamba Hills, Mutombe, Nagaibwa, Chongwe, Chisama, Nampundwe, Cheta, Shimyoka, Nambala, Kampumba and Chitindulu Hills.

In 1989 an agreement was signed with a Soviet company to investigate the feasibility of setting up a small, 100 kt/ann, steel plant³⁰. The ore will come from Nambala, near Mumbwa, and be trucked 280 km by road to a proposed iron and steel plant at Kabwe, in an attempt to avoid the death of the town when the lead/zinc mine finally closes. However, a UNIDO study³¹ on iron and steel in the SADCC/PTA region concluded that basic billet production capacity at Zisco in Zimbabwe was adequate for the whole region, but considering that these would have to be purchased in scarce foreign currency, it may make economic sense for Zambia to develop its own capacity, even though the initial capital costs would also be in foreign currency.

Scaw Foundries of Kitwe smelts scrap in an electric furnace for the production of grinding media for ZCCM, but has regular problems in obtaining adequate feed. The company was purchased by ZCCM from Anglo American in 1988³² and is under rehabilitation.

There are low grade phosphate deposits in carbonatite complexes at Nkombwa Hill at the north-western end of the Luangwa Valley and a group of ring complexes in the Rufunsa area, west of the confluence of the Luangwa and Zambezi rivers (Kaluwe, Nachomba, Mwambuto and Chasweta), which also contain resources of niobium and tantalum. Exploitation of the latter group, for the production of phosphate fertilizer, is still under consideration, particularly Kaluwe which has 6.6 Mt in soils at 5.7% P₂O₅ and 207 Mt in rock at 2.6% P₂O₅. A syenite deposit near Mumbwe containing apatite is also being assessed as a phosphate source.

As is the case with Dorowa in Zimbabwe, the exploitation of low grade carbonatite deposits only makes sense in strictly national terms, as the final product is likely to cost well above the world market price, but would be available to farmers in local currency. Regional logic would however favour the development of the vast high grade phosphate deposits of Angola (Kindonacaxe and Mongo Tando), Tanzania (Minjinju) and, to a lesser extent, Mozambique (Ebate).

Zambia has no hydrocarbons, but interest has been shown in the sedimentary basins. Placid Oil (Hunt Petroleum) drilled in the northern Luangwa Valley in 1987/8, but without result. Mobil Oil did a seismic survey of the south Luangwa valley, but with no follow up drilling, and they plan to survey the southern part of the mid-Zambezi Valley in Zimbabwe, which is shared with Zambia. There is an oil refinery at Indeni outside Ndola which receives crude via the Tazama pipeline from Dar es Salaam.

A United Nations study³³ to determine exploration requirements in 1988 isolated seven areas warranting further work. These were:

- The Nkombwa Hill Carbonatite
- The Mumbwa North Apatite
- Peat (as a soil conditioner)
- Serenje Pegmatites
- Lusaka Marble
- Kabwe West Pb/Zn
- Chinyunyu Polymetallics

Infrastructure

The infrastructure along the central spine, going from Livingstone in the south, through Lusaka to the Copperbelt, is good, with rail, road and power lines running all the way. But the vast western and eastern areas are poorly served and the roads that do exist are generally in a bad state of repair. There are international rail connections to Zimbabwe in the south (and on to Botswana, Mozambique and South Africa), Zaire in the north (and on to Angola) and Tanzania in the north-east along the Tazara railroad. Most imports and exports are via Dar es Salaam in Tanzania as the Benguela line to Lobito in Angola is out of action due to South African and UNITA sabotage.

Zambia has hydro power stations at Victoria Falls, Kariba and Kafue Gorge with a capacity greater than national demand. Exports have been made to Zimbabwe, but in 1989 power was imported from Zimbabwe and Zaire due to a fire at the Kafue station. The cost of electricity is one of the lowest in the world.

Any mineral development off the Line-of-Rail would probably require a high initial capital outlay for infrastructure and in fact some viable projects remain undeveloped due to the poor road, rail and power links, such as the Sianyolo fluorspar project and, to some extent, the vast low grade copper and uranium deposits in the north-west.

Several international banks are represented in the country, but in general the financial sector is not well developed and has been severely weakened by the collapse of the national currency and the severe restrictions on foreign exchange. There is no stock exchange.

Local production of inputs to the mining industry is fairly diversified with many of the enterprises coming under the ZCCM. In general there exists a significant ability to manufacture locally a wide range of spares and equipment for the mining industry. The major constraint faced by the companies concerned is the shortage of foreign currency to import the necessary raw materials, especially the various grades of steels.

ZCCM has extensive in-house repair and maintenance capabilities in the divisional workshops and several of the raw materials consumed by ZCCM are produced within the company, by a subsidiary of the company or by a subsidiary of its mother company ZIMCO.

In 1984 ZES (Zambi Engineering Services) carried out a feasibility study for ZCCM on the creation of a factory (Parts Manufacturing Facility) for the manufacture of spares for the mining industry which are presently imported. This new facility will manufacture roughly 800 items that have a large turnover and are of medium to high value. The cost of establishing the factory in 1984 was 127 MZKw (17 MUKP in forex) and it is planned that it will save about 28 MUKP (1984) of forex per annum. The buildings are 90% completed and foreign finance for the equipment is now being sought.

It is apparent that there exists a substantial local capacity for supplying the necessary inputs to mining, but that this resource is under-utilised due to the shortage of imported inputs to these industries, caused by the national shortage of forex which is in turn caused by the rapid decline in the real value of copper over the last decade.

The inability of the mining inputs industries to supply the mining industry with a substantial proportion of its needs has resulted in the ZCCM needing to retain a large part of their forex earnings (about 40%) to finance imports of mining inputs in order to operate efficiently, but due to the forex shortage at the national level the company has only been able to retain about 30% of its export earnings which has resulted in the running down of plant and machinery and lower efficiency and output. This downward spiral has been described by the company as a “self-reinforcing negative process” and the rationalisation plan currently being implemented is apparently an attempt to break out of it, but at the cost of shutting down a significant part of their productive capacity.

Downstream Metal Transformation

The only significant refined copper consumer in the country is Metal Fabricators of Zambia Limited (Zamefa). This company is based in Luanshya and started operations in 1970. It is 51% owned by INDECO (state), 15% by Phelps Dodge (US), 5% by Svenska Metallverken (Swedish), 9.8% by Amax Zambia (US), 9.8% by ZAMIC (AAC) and 9.4% by Contipental Ore Resources Limited (local). Both Phelps Dodge and Svenska Metallverken provide management and technical services to the company, the former on the extrusion and rod section and the latter on the wire and cable section.

Zamefa's copper consumption is planned to reach ten kt/ann of cathodes and 80 tonnes of billets, representing about 2% of Zambian refined copper production. They pay ZCCM the high grade LME price for copper minus the transport costs to Europe, estimated at roughly 140 UKP/tonne. They also consume about 300 tonnes per annum of aluminium billets and rod. Small amounts of tin are imported from Zimbabwe after local tin produced by Non-Ferrous Metal Works proved to be unsuitable due to its low quality.

The bulk of their production is continuous cast copper rod (CCR) mainly for export. For this an Outokumpu continuous caster was acquired in 1983, which replaced the previous extruded rod process. Other products include copper cable and wire including telephone cable. Power cable is manufactured up to a limit of 3 kV, but the company is installing plant to produce 11 kV cable.

Almost all of their non-rod output is for the domestic market, although there is some export of telephone cables to the regional market, mainly to Malawi. CCR constitutes 98% of their exports and about 60% of their turnover. The CCR is sold at between 40 and 80 UKP above the LME price for high grade copper. Their main obstacle to increasing exports is in acquiring long term customers. Due to a worldwide CCR excess capacity, customers prefer to shop around rather than to go for long term contracts. It also will take some time before they can become accepted as a reliable supplier.

Their main imports are PVC (Zimbabwe and RSA), armour wire (RSA), plastics (UK), tin (RSA and Zimbabwe), aluminium (RSA), aluminium tapes (Sweden), aluminium casts (UK), jelly fill (Belgium) and graphite (Zimbabwe). Zambia has graphite deposits but these are not being considered as a source at present.

Due to the exports retention scheme (50%) they do not have a problem in getting their forex, but if in fact they use up their full 50% and export CCR at 40 to 80 UKP above the price that ZCCM could obtain

for the cathodes, this would make them a net forex consumer in lieu of the forex lost on the cathodes they consume.

The company has been trying to penetrate the regional (SADCC/PTA) market but with very little success. The main reason for this is that many of the cable consuming power projects in the region are financed by tied aid, but they have also lost open tenders to western countries, partly due the inability of the Bank of Zambia to offer competitive credit facilities. The regional market for copper semis was estimated at 21 kt in 1984³⁴. This would seem to indicate that there is substantial scope for expansion into this market, but it is limited due to the factors mentioned, plus the fact that several of the other states in the region have some copper semis manufacturing capability, especially Zimbabwe where the capacity is possibly superior to that of Zambia³⁵. In addition it appears that both countries are at present expanding their capacity with the regional market in mind. It would therefore be in the interest of regional integration if an organisation like the SADCC were to attempt to rationalise the production of copper semis and manufactures in the region.

A study on the "Production and Exports of Copper Semis in Zambia and South Eastern Africa"³⁶ concluded that Zamefa CCR plant was viable, but that the regional production capacity for extruded products far exceeded demand making it difficult for any one of the companies to operate at a profit and that the regional market for flat-rolled products would only justify a small plant in Zambia if the already existing second-hand mill in Zimbabwe (Radiator & Tinning of Bulawayo) was not able to produce products of sufficient quality.

ZCCM owns 50% of Societe de Coulee Continue de Cuivre (SCCC) in France, a CCR producer, via its wholly-owned subsidiary in the UK, ZAL Holdings Ltd. which also owns ZES. The other 50% of SCCC is held by Thomson Brandt SA of France. The total issued share capital of SCCC is 36 MFF and it produces about 170 kt/an of CCR most of which is sold in France.

The logic of this joint north-south venture which generates MVA for a developed country is not immediately apparent, especially as MEMACO's Annual Report for 1985 mentions that SCCC managed to export 40% of its sales "...in spite of the competition from...plants in developing countries"³⁷. Surely then ZAMEFA is one of these plants. There also do not appear to be any benefits by way of acquiring technology as ZAMEFA is receiving technological services from Swedish and American companies rather than Thomson Brandt of France. In addition it does not seem to be a major customer as ZCCM's copper sales to France were only 48% of the tonnage sold by SCCC and only 14% of ZCCM's sales worldwide. One reason for this investment could be to avoid EEC tariffs on copper semis by manufacturing them in Europe.

Discussion

The paramount role of the mining industry of Zambia has been as the capital generator and foreign exchange earner for the development of the rest of the economy. It has provoked virtually no downstream development of metal-based manufacturing industries in its 85 years of existence. Over 98% of refined copper production is exported, while less than two percent is further transformed in the country, of which about half is exported. The national and regional off-take of lead has been increasing over the the last decade, but the lead reserves are almost exhausted. Local consumption of zinc is low and reserves are limited.

From 1964 to 1974, during the period of relatively high copper prices, non-ferrous mining supplied the capital to support a rapid expansion in the manufacturing sector principally for import substitution. It

also generated the forex for the imported intermediate goods and raw materials for these new industries. Due to the high copper earnings between 1965 and 1973 copper mining was able to support an average annual real growth rate of GDP of 3% and real per capita incomes increased by about 20% over the same period³⁸. Manufacturing grew from 6.1% of GDP in 1964 to over 13% in 1974³⁹.

From 1975 copper earnings began to fall and the average annual growth of GDP from 1973 to 1983 was only 0.2%, a decrease of 93% on the preceding decade. The average annual growth of GNP/capita from 1965 to 1987 was negative at -2.1% and the average annual growth of gross domestic investment from 1965 to 1973 was 6.2% but had fallen to minus 12.5% for the period 1973 to 1983 and -9.3 for 1980-87⁴⁰.

Falling terms of trade for copper over the last fifteen years have caused the whole economy to stagnate, bringing into sharp focus the dangers of a development strategy based on raw material exports and the vagaries of the world market. The mining industry of Zambia is vertically integrated into the developed market economies rather than supplying the raw materials for local and regional industry.

An alternative role for the non-ferrous sector would be to provide the basis for a resource-based industrialisation strategy. The local and regional markets are clearly not large enough to absorb Zambia's total copper production even if all imported copper-based products were manufactured in the region, but a significant increase in the production of copper semis and manufactures for export onto the world market would appear to be feasible based on the significant transport cost discount on the LME price for the copper inputs, that would apply. The world market for finished copper-based products is more stable than that for copper.

A resource-based industrialisation strategy would therefore entail firstly the production of metal based products for the local market, secondly to supply the metal inputs to the regional industries, thirdly to export metal based products onto the world market and finally to export the remaining production onto the world markets still in the form of metal. For copper, the local market could absorb about 2% of production, the regional market about 10% and if a further 40% of production could be transformed before export, it would leave only half of production to be exported as metal with declining terms of trade. For lead and zinc, a regional resource based industrialization programme would enable the absorption of the bulk of production, especially after the planned production cut backs.

In fact the story of Zambian lead is an excellent example of the dangers of a mineral-export-based industrialisation strategy: From 1915 to 1988 eight hundred thousand tonnes of high grade lead was exported to the developed countries in exchange for their manufactured goods, some of which contained lead. At the same time the lead consumption by Zambian industry slowly increased to about 2,000 t/an, only to be confronted with the end of lead supplies as the Kabwe mine was exhausted. Hence by the time that Zambian industry was developed enough to consume some of the country's lead, all that was left was a hole in the ground.

Over the last decade there has been an alarming stagnation of the Zambian agricultural sector and the resultant drift to the urban areas of peasant farmers. In 1974 cereal imports amounted to 93 kt, but by 1983 this had risen to 247 kt and then fell to 150 kt in 1987⁴¹. Maize was exported until 1976 (61 kt), but since then imports have generally had to be made to make up the shortfall. At independence in 1964 Zambia exported 12 kt of tobacco, but exports steadily fell to a low of 0.7 kt in 1986 before recovering somewhat to 2.5 kt in 1988 (0.2% of exports)⁴², an example of the small success of the export diversification programme.

Average food production per capita decreased by 26% from 1974-76 to 1981-83, though admittedly the country was in the throes of a drought in the latter period⁴³. The decline in agriculture has resulted in a movement of the rural population to the urban areas. By 1987 the urban population was estimated at almost 50% of the total, while at the same time earnings and employment in the urban areas has been declined.

The deterioration of the agricultural sector has been in part due to the fall in export earnings provoking a shortage of agricultural inputs, but it is also the result of low producer prices for agricultural commodities. Over the last three years producer prices have increased substantially in an effort to encourage production and at the same time real earnings of urban workers have been falling. Hopefully the combination of these two factors will halt and eventually reverse the drift to the urban areas.

Due to the extremely high dependence of the Zambian economy on metals mining, the restructuring of its economy must not only attempt to restructure the mining sector itself in terms of downstream processing, but must develop the country's other major resource, agriculture, to balance what is presently a lopsided copper economy. Doing this within the present situation of chronic foreign exchange shortages and a massive foreign debt burden is going to be extremely difficult.

A regionally integrated approach to the problem could well have a higher chance of success. The countries of the SADCC as a group do not have the same dependence on mining for export earnings (about 50% excluding oil). In addition many of the products presently imported by Zambia are produced elsewhere in the region (particularly Zimbabwe), while Zambia has both surplus power (HEP) and land.

Limited regional cooperation in metal refining has already taken place in the case of copper-nickel matte from Botswana being refined in Zimbabwe. Possibilities also exist for the refining in Zambia of the precious metal slimes from copper refining in Zimbabwe and the refining in Zimbabwe of any future nickel concentrate production from Munali in Zambia and cassiterite/tantalite/microlite/columbite concentrates from the Choma Tin belt. The SADCC Mining Coordinating Unit has an expatriate mining engineer to facilitate the regional sharing of processing facilities, but thus far all initiatives have been completely independent of the Unit, directly between the producer and refiner.

At present both Zambia and Zimbabwe are attempting to penetrate the same, fairly limited, regional market for copper and copper alloy semis and finished goods. In addition Zambia is planning an integrated iron and steel market that would compete with the already existing plant in Zimbabwe. Regional integration of the transformation of metals would necessitate the planning of the location of manufacturing plants to achieve an equitable distribution of the benefits and to avoid costly duplication. A possible partial solution to an efficient and equitable division, in the case of Zambia and Zimbabwe, would be for Zimbabwe to concentrate on ferrous products and Zambia to concentrate on non-ferrous products, instead of the current duplication and low capacity utilisation.

Such a division would also be based on each country's resources and experience in that the Zimbabwean copper mines are nearing the end of their life, it has no zinc production and almost no lead production, while Zambia has substantial copper reserves and limited reserves of lead and zinc. Neither country has significant aluminium occurrences. On the ferrous side, Zimbabwe has a well-established iron and steel plant and is a producer of ferrochrome, ferrosilicon chrome, ferrosilicon, ferromanganese, nickel and several other steel alloy metals.

The main obstacle to a rationalisation along these lines would be that it would require the transfer of recently installed non-ferrous plant from Zimbabwe to Zambia, which the Zimbabweans would not be

keen to do as they would not trust the Zambians to be capable of producing a product of sufficient quality and to be able to effect prompt delivery. It would also be extremely difficult to get the Reserve Bank of Zimbabwe to agree to the transfer.

On the Zambian side, however, it is quite likely that they would agree to shelve their iron and steel plant if they were sure that they could pay for all the ferrous products they need from Zimbabwe with their exports of non-ferrous products and semis to Zimbabwe.

In conclusion, the Zambian economy is highly dependent on copper mining and displays all the typical ailments of a mineral-based peripheral economy with a huge, unpayable, debt burden, in part contracted because the lenders relied on future mineral earnings for repayment. The main other resource, agriculture, received almost none of the mineral surpluses in the fifties and sixties and contracted until the improvement in prices for agricultural produce in the eighties. However, Zambia still has significant mineral resources, particularly of industrial, fertiliser and construction minerals for local development, and is thus likely to remain a mineral economy for some time, albeit at a lower level. The enormous investment in human resources for the mining industry over the last two decades will be wasted if alternative minerals are not developed.

With regard to regional integration in mining, Zambia, with the largest mining industry, could be a major beneficiary as it already produces many of the mining inputs imported by other countries in the region and it imports many items already produced in the region. It also imports several mineral and mineral-based items from the region, particularly iron and steel. However, the level of its copper and cobalt output is such that the region will not constitute a significant market in the short to medium term. The apparent low priority given by the Zambian government to its SADCC sectoral coordination responsibility is surprising given the advantages that could be gained by Zambia through regional integration in mining.

Footnotes to Chapter 15

- 1 Freeman 1983. 2 RCM 1978 3 Freeman 1983. 4 Alabert 1985
5 AAC 1990, page 67. 6 Hanlon 1986 p243.
7 Significant indirect destabilisation was effected through the sabotage by RSA/
UNITA of the Benguela line in Angola. 8 Hanlon 1986 p252
9 Hanlon 1986 p254. 10 This section draws substantially on GSD 1986.
11 Mezger 1980, 159.
12 In 1988 the developed countries produced about 38% of non-socialist copper (BGS
1990, page 70)
13 Mezger 1980, page 119. 14 ZCCM 1989.
15 Ohadike 1969 and Burawoy 1972 16 Ohadike 1969.
17 ZCCM 1989 18 See table "ZCCM: Financial Profile"
19 Radetzki 1985. 20 Deloitte 1983. 21 ZCCM 1989.
22 Conversation with ZCCM Director, Len Mabson, 1986.
23 Metal Bulletin No.7469, 26 March 1990, p10. 24 Alabert 1985
25 Note that in 1975 the NCCM definition of reserves was different to that used today
by ZCCM, making an absolute comparison difficult.
26 Metal Bulletin, No.7469, 26 March 1990, p10.
27 British Mining Consultants Limited. 28 Mining Journal, No.8053, 1990.
29 Mining Journal, No.8057, p105, 1990.
30 Mining Journal, No.8007, 17/02/89, p122. 31 UNIDO 1986
32 Metal Bulletin, No.7469, 26/03/90, p10. 33 UNRFRNRE 1988.
34 Vingerhoets 1985. 35 Jourdan 1985. 36 Vingerhoets 1987.
37 Memaco 1985 p6. 38 World Bank, 1985 39 CSO 1974 and Vingerhoets 1985
40 World Bank 1985 and 1989. 41 World Bank 1985 & 1989. 42 CSO 1974 & 1989.
43 World Bank 1985.
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Chapter 16: The Minerals Sector of Zimbabwe

Introduction

History

The early San (“Bushman”) hunter-gatherers did not possess smelting technology but did exploit fine-grained, glassy, rocks such as obsidian and chalcedony for the manufacture of stone implements and weapons. Various iron oxide ochres were also used for painting. It was not until the arrival of the Bantu-speaking iron age cultures that the mining and smelting of iron began. Ancient smelting sites, usually identified by slag heaps and tuyer shards, are to be found right across Zimbabwe, the earliest of which has been dated as the 2nd Century¹.

By the 11th Century these people had developed more elaborate forms of social organisation that also included a substantial mining and smelting industry based on other metals such as gold, copper and tin. An Arab traveller, Al Masudi of Baghdad, visited Sofala, on the Mozambican coast, and reported a large trade in gold and ivory coming from a kingdom in the interior (Zimbabwe) at that time already². From the 11th Century onwards, gold from Zimbabwe was carried by Arab and Swahili traders from the southern African coast to the Arab world and on to the Indian and Asian markets.

The construction of the spectacular stone buildings of Great Zimbabwe, at the time the largest city in sub-Saharan Africa, which took place from the 13th to the 15th Centuries, could well have been related to the dramatic increase in wealth from the thriving gold mining industry at this time. It has been estimated that there exist about 4000 ancient gold workings and about 500 ancient copper workings in Zimbabwe, Mozambique and Botswana, mainly in Zimbabwe on the Archaean schistbelts, principally dating from this period.

Under a Rozvi chief called Mutota, the Munhumutapa (meaning “pillager”) Empire was built in the first half of the 15th Century and it split into two at the end of the 15th Century: the Munhumutapa in the north and the Changamire in the south. Both of these groupings controlled numerous shallow gold mines principally in the schistbelts (goldbelts) which occur right across the country.

The rise of mercantile capitalism in Europe brought the Portuguese in the 16th Century, in search of gold, copper and slaves, who sought to replace the lucrative Arab trade that had been in existence since the 10th Century. The Munhumutapa allowed their penetration in the north, but the Changamire refused them entry to the southern region.

In 1573 the Munhumutapa granted the Portuguese mining rights, for gold and other minerals, in northern Zimbabwe and Mozambique. In the late 1620's the Portuguese launched two military campaigns against the Munhumutapa state and installed a puppet Munhumutapa. At the end of the 17th Century the Changamires managed to throw the Portuguese and their puppet Munhumutapa off the Plateau and install a northern vassal kingdom³. The Changamires dominated the gold mining industry and gold trade, via the Sabi/Save valley to the coast, until they were routed by the Nguni (Ndebele) invasion under Mzilikazi in the 1840's, fleeing the Boer expansion into the Transvaal.

The 19th Century European explorers such as David Livingstone and Karl Mauch encountered wide evidence of the earlier thriving gold mining industry. In the 1880's the Cape diamond and gold mining magnate, Cecil John Rhodes, sent representatives to the Ndebele capital, Bulawayo, to obtain mineral concessions. In 1889 Rhodes floated the British South African Company (BSAC) and obtained a Royal Charter to install an administration over the Zambezi territories. This was done to contain the Boers south of the Limpopo and because the reputation of the Munhumutapa gold fields had led Rhodes to believe that present day Zimbabwe contained gold deposits to rival the Witwatersrand.

“The most important single element determining the nature of economic and political development in Southern Rhodesia was the British South African Company’s overestimation at the end of the nineteenth century of its mineral resources, and the persistence of this overestimation for roughly fifteen years.”⁴

The enormous costs that were incurred by the BSAC in bringing the railway to Bulawayo and in colonising the country were not repaid by the expected mineral profits. This led the company to encourage the formation of a white rural bourgeoisie to develop the agricultural potential and thereby raise the value of the company’s assets, particularly the land⁵. In the early days the BSAC demanded a 50% equity of any mining company set up to exploit the minerals.

Rhodes’ settler column travelled up to the Shona speaking area in the north-east in 1890, carefully avoiding the Ndebele controlled part of the country in the south-west. After disappointing mineral discoveries in the Shona area the colonialists invaded the Ndebele area in 1893 in the hope of discovering gold deposits there, but the much vaunted mineral riches of Zimbabwe continued to elude them. In 1896 the settlers were nearly wiped out when the Shona and Ndebele rose up together in rebellion at being dispossessed of their land. The first “chimurenga” (liberation war) was finally put down in 1897.

When the BSAC charter expired in 1923 there was a settler referendum to decide on whether or not to incorporate with the Union of South Africa which had been formed in 1910. The result was a clear rejection and in that year the country was renamed Southern Rhodesia and it became a British Crown Colony with “Responsible Government”. From then on the country was effectively ruled by the settlers and in 1953, in an attempt to create an economic block to counter the Union of South Africa, the settler-supported Central African Federation of the Rhodesias and Nyasaland was created. This gave the Southern Rhodesian settlers access to the enormous copper mining revenues from Northern Rhodesia, plentiful labour from Nyasaland and the markets of both.

The nationalist movements in Northern Rhodesia and Nyasaland were clearly opposed to the Federation which they rightly saw as being settler dominated (the federal legislature had twenty-nine settler seats and six black seats) and were able to bring about its dissolution in 1963. Soon after they both achieved independence as Zambia and Malawi.

The main nationalist movements, ZANU and ZAPU were banned in the early sixties and in 1965 the settler regime declared unilateral independence (UDI) from Britain and changed the name of the country to Rhodesia. The United Nations responded with economic sanctions against Rhodesia which were not particularly effective as they were never applied by its southern ally, South Africa. The nationalists in exile launched a guerilla war in 1966 which escalated rapidly with the defeat of the Portuguese in neighbouring Mozambique in 1974.

By 1979 most of the country was under martial law and late that year the settlers capitulated at the Lancaster House Conference to majority rule. Independence was gained in 1980 under the Shona-based ZANU party and in 1988 it merged with the Ndebele-based ZAPU party.

The Economy

As effective economic independence was gained from Britain as early as 1923, the country was able to proceed with a more balanced economic development in the thirties and forties than other African colonies. During this period a substantial metallurgical and engineering capacity was installed which was further strengthened during Federation. It was this basic capacity that, with UDI and sanctions,

enabled a wide ranging import substitution development program in the sixties and seventies. In 1987 Zimbabwe had the fourth highest GNP per capita of all sub-Saharan African countries with populations greater than two million (after South Africa, Camerouns and Ivory Coast) and in 1986 it had the highest manufacturing value-added per capita in the whole of independent Black Africa⁶.

Due to the global recession, particularly the fall in primary commodity prices, Zimbabwe's GDP has hardly grown in real terms in the 1980's and GDP per capita has actually shrunk over this period. The currency has been devalued from 1.6 USD to the ZD in 1980 to over two ZD to the USD in 1989 in an attempt to compensate for the falling real unit value of exports. This has in part been the cause of the high rate of inflation, about 200% during the eighties, as imported inflation.

16.1 ZIMBABWE, BASIC INDICATORS

(ZD)	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
Population	M	7.4	7.6	7.6	7.7	8.0	8.2	8.4	8.6	8.9
Pop.density	/km ²	18.8	19.5	19.5	19.8	20.4	20.9	21.5	22.1	22.7
Forex Rate	/USD	.63	.72	.77	1.01	1.31	1.61	1.67	1.67	1.80
CPI		100	113	125	154	185	201	230	266	288
GDP mp	G	3.44	4.43	5.20	6.31	6.40	7.02	7.73	8.08	9.22
GDP/cap	USD	741	813	893	804	616	535	550	561	576
Exports fob	G	.91	.97	.97	1.15	1.45	1.80	2.17	2.37	
Imports cif	G	.81	1.02	1.08	1.06	1.20	1.45	1.64	1.74	
Trade Balance	M	100	(46)	(113)	89	252	349	530	630	
GFCF	G	.53	.83	1.04	1.24	1.19	1.13	1.32	1.39	
GFCF/GDP	%	15%	19%	20%	20%	19%	16%	17%	17%	
Debt	GUSD	.70	.79	1.22	1.50	1.52	1.53	1.76	2.04	
Debt/GDP	%	13%	13%	18%	24%	31%	35%	38%	42%	
Labour Force	k	1010	1038	1046	1033	1036	1062	1094	1114	1129
Govt Revenue	G+		.95	1.36	1.79	2.21	2.62	3.06	3.63	

 Area: 391 k.km², Currency: Z Dollar, GFCF gross fixed capital formation. Sources: CSO 1987/8/9, Reserve Bank 1988/9.
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The rate of investment has been low as the country has generally failed to attract new foreign investment and domestic investment has not been adequate. The investment quotient (GDP/GFCF) has averaged less than 20% during the last decade. National debt, mainly for major investment projects such as the Hwange Power Station, has increased considerably, from 13% to 42% of GDP, but is still manageable (debt servicing constituted about 23% of exports in 1987⁷).

16.2 ZIMBABWE, TRADE (ZD)

(ZD)		1981	1982	1983	1984	1985	1986	1987
Exports fob	M	972	968	1150	1453	1796	2170	2371
SADCC	M	91	89	108	142	171	200	258
% SADCC		9%	9%	9%	10%	10%	9%	11%
RSA	M	192	138	192	232	167	211	185
% RSA		20%	14%	17%	16%	9%	10%	8%
Imports cif	M	1018	1082	1062	1201	1447	1640	1742
SADCC'	M	76	79	68	65	75	120	131
% SADCC'		7%	7%	6%	5%	5%	7%	8%
RSA'	M	280	239	260	232	273	351	361
% RSA'		27%	22%	24%	19%	19%	21%	21%
% SADCC of Trade		8%	8%	8%	8%	8%	8%	9%
% RSA of Trade		24%	18%	20%	17%	14%	15%	13%

 Source: CSO, 1989
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During UDI/sanctions the Rhodesian economy became closely linked to that of its much larger ally, South Africa, via a series of trade and transport agreements. The main export market for Zimbabwe's expanding manufacturing sector was South Africa. Since independence the government has attempted to reduce this dependency and from 1981 to 1987, South Africa's proportion of total trade fell substantially, from 24% to 13%. This delinking with South Africa did not lead to an increase in trade with fellow members of the SADCC, which stayed constant, but rather a shift to the developed countries.

Before Mozambique applied sanctions against Rhodesia in 1976, the bulk of the country's foreign trade went via the ports of Beira and Maputo, but after 1976 almost all trade went via South Africa. After independence Zimbabwe attempted to shift its trade routes away from South Africa back to Beira and Maputo and to this end Zimbabwe has maintained a large contingent of troops in Mozambique to guard the Beira corridor from attacks by the South African sponsored MNR. In 1989, troops were sent to reopen the Limpopo line to Maputo. This has been the single most important reason for the large proportion of government expenditure allocated to defence, funds that otherwise could well have been better invested elsewhere, in productive sectors, but the maintenance of alternative export routes is seen by government as being strategically essential.

The contribution of the main sectors to GDP has not changed much since independence. Manufacturing is the largest of the productive sectors followed by agriculture and mining, though it should be noted that the smelting and refining of certain metals (ferrochrome, iron and steel) is classed as manufacturing rather than mining and if all mineral beneficiation is included, the contribution of mining would be closer to 10%.

16.3 ZIMBABWE, STRUCTURE OF PRODUCTION

	1982		1985		1988	
	MZD	%	MZD	%	MZD	%
GDP factor cost	4657	100%	6227	100%	8295	100%
Agriculture	669	14%	1038	17%	1203	15%
Mining	217	5%	335	5%	529	6%
Manufacturing	1121	24%	1488	24%	2197	26%

Source: CSO 1989.

The Mining Sector⁸

General

The period of settler government with the sanctions that were imposed by the UN in the seventies produced a mining industry that developed in an essentially different way to that of other colonies. Zimbabwe was not developed purely in the interests of the colonising country as a source for raw materials and a market for manufactured goods, but was developed in the interests of a national bourgeoisie, albeit a minority settler one.

The settlers had effective control of government from 1923 which resulted in a type of development more similar to that of South Africa than, say, Zambia or Zaire. The imposition of sanctions also had a profound effect on the mode of development by way of forcing national self-sufficiency in a large variety of products.

These factors resulted in several strategies regarding the mining industry both in terms of upstream and downstream development. The shortage of foreign exchange, sanctions and the land-locked position of the country provoked a downstream development of the mining industry in the sixties and seventies⁹ in

order to increase value and decrease weight/volume. Most of the major metals currently produced are reduced to their pure form. Examples are copper cathodes, nickel cathodes, ferrochrome, pure tin, iron and steel.

Processing and refining of minerals was also necessary for import substitution for the metal inputs to industry as a whole (eg. copper for wire and cables). Also, several minerals are mined purely as inputs for local industry (generally on a small scale) such as pyrites (for sulphur), apatite (for phosphates) and clay (for ceramics and refractories), but also on a large scale such as limestone (for cement and lime) and coal (for energy and metallurgy). On the upstream side, a wide variety of inputs to the mining industry are manufactured locally. Mining equipment such as ball mills, conveyors, rail and rolling stock, pumps, headgear, ventilation ducting and electrical equipment are made in the country and an increasing variety of mining chemicals and explosives are also locally manufactured.

Another effect of sanctions was that during UDI the TNC's had difficulty in repatriating their profits which meant that surplus generated by the mining industry was often reinvested in the industry or other parts of the economy. This also had the effect of increasing the overall control of the TNC's over the economy as a whole.

The major transnational mining houses today have significant holdings in other sectors of the economy. For instance, the AAC has interests in manufacturing, farming, services and finance, Lonrho also has holdings in vehicle manufacture, forestry and textiles, while RTZ plc has a local engineering subsidiary manufacturing agricultural equipment (Tinto Industries). The original capital generally came from abroad¹⁰ but later investment was mainly raised locally, except for RTZ's 1980 investment of 6 MUKP in Renco gold mine.

Today Zimbabwe mines a wide variety of minerals (over forty). The total value of mineral production in 1989 was 1.2 GZD (about 570 MUSD) excluding the value of ferrochrome, pig iron, steel, cement, ceramics and coke. In the same year the principal minerals produced, by value, were gold, nickel, asbestos, coal, copper, chromite, iron ore, tin, limestone and phosphate rock, in that order.

16.4 ZIMBABWE, BASIC MINERAL SECTOR DATA

(ZD)	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988
GDP Mining	M	285	252	217	393	320	335	446	529	629
% GDP Mining		8%	6%	4%	6%	5%	5%	6%	7%	7%
GFCF, Mining	M	83	133	94	86	81	30	55		
% Mining GFCF		16%	16%	9%	7%	7%	3%	4%		
Mineral Prod.	M	415	394	383	470	546	630	699	816	986
Min.Prod/cap	USD	89	72	66	60	53	48	50	57	62
Min.Exports	M	429	354	410	482	585	702	932	1039	
% Mineral Exports		47%	36%	42%	42%	40%	39%	43%	44%	
Mining labour	k	66	68	64	60	55	55	55	58	59
% mining labour		6.6%	6.6%	6.1%	5.8%	5.3%	5.2%	5.0%	5.2%	5.2%
Min.Prod/lab	kUSD	9.9	8.0	7.9	7.7	7.7	7.1	7.7	8.5	9.3
average wage	k/an	1.8	2.3	2.8	3.1	3.6	4.1	4.3	4.7	5.2
avg REAL*wage	k/an	1.8	2.0	2.2	2.0	1.9	2.0	1.9	1.8	1.8

*deflated using CPI. Sources: CSO 1989; EIU 1989.

Mineral exports in 1987 totalled 1,032 MZD representing 43.5% of total exports and averaged 42% for the period 1980-87, roughly the same percentage as agricultural exports. The principal foreign exchange earners in 1987 were gold (19% of total exports), ferrochrome (11%), asbestos (4%), nickel (4%), raw steel (2%) and copper (2%). Mining and quarrying contributed 9.6% of the GDP in 1975 but had fallen to 6% by 1987, a slight increase on the low of 4% in 1982 during the height of the recession.

The mining sector's contribution to gross fixed capital formation (GFCF) fell from 16% in 1980 to 4% in 1986 reflecting falling returns from mining ventures due to depressed demand and low world market prices. Investment has since picked up in line with improved mineral prices. Mineral output per miner has remained constant at about 9 kUSD throughout the decade while mining as a proportion of the total formal labour force fell from 6.6% in 1980 to 5.2% in 1988 and has fallen absolutely from 66 thousand to 59 thousand. In real (deflated) terms average mining wages remained constant throughout the decade.

The mining industry is largely in the hands of the transnational mining companies, the most important being Anglo American Corporation of South Africa (nickel, ferrochrome and pyrite), Union Carbide (ferrochrome and gold), RTZ plc (gold), Lonrho (gold) and Turner Newall (asbestos). Since independence state participation has been on the increase. The state has the largest share holding in coal mining, the iron and steel industry (Zisco), tin mining (Kamativi) and in 1984 the newly formed state enterprise, the Zimbabwe Mining Development Corporation (ZMDC) bought out the ailing local mining interests of Messina of South Africa giving it control over most of the national copper and silver production. The state has also set up the Minerals Marketing Corporation of Zimbabwe (MMCZ) which handles all mineral and metal trade with the exception of gold which is bought by the Reserve Bank of Zimbabwe.

Economic Geology

The structural geology of Zimbabwe is dominated by the Zimbabwean Craton, cut by the Great Dyke and surrounded by rift valleys in the north and north-west (Zambezi Rift) and mobile belts in the north (Zambezi Belt), east (Mozambique Belt) and south (Limpopo Belt). In fact the only geological border that does not coincide with a political border is in the south-west where the border with Botswana runs across the Zimbabwean Craton. The craton is overlain in the north, north-west and east by Proterozoic and Phanerozoic sedimentary basins.

This uncanny coincidence of political and geological divisions has sometimes been attributed to foreknowledge of the geology on the part of Cecil John Rhodes during the final delimitation of the region's frontiers in the 1880's and early 1890's, but it is more likely that the BSAC had a vague idea of the distribution of the fabled Munhumutapa gold fields, from explorers such as Karl Mauch, and that the settlers, who in many ways determined the land which they wanted to expropriate, preferred the malaria free, more temperate highlands of the Craton.

The Craton was formed during the early Archaean (3.6 to 2.5 billion years ago) and consists of granites and gneisses which contain few economic minerals except for vein (pegmatite) deposits near contacts, but the Craton also contains the economically important schistbelts also known as the greenstone or gold belts which comprise a volcano-sedimentary sequence containing most of the mineral deposits currently exploited. These include, in order of current value of output, the vast majority of gold deposits, the nickel-copper-cobalt deposits (Trojan, Shangani and Epoch), the asbestos deposits (Shabanie, Gaths and King), the podiform chromite deposits (Shurugwi, Valley and Inyala), the iron ore deposits (Buchwa, Ripple Creek and Mwanzi), numerous limestone deposits (Sternblick, Cleveland, Zisco and Early Worm), the lithium pegmatite of Bikita, the Sandawana emeralds, pyrites (Iron Duke), the Barton Farm magnesite and numerous minor deposits of lead, zinc, antimony, tungsten, tin, barytes and corundum.

The Limpopo Mobile Belt runs SSW-NNE in the south of the country, divides the Zimbabwean and Kaapvaal Cratons and consists of metamorphosed cratonic rocks containing gold deposits (Renco), corundum and magnesite occurrences. It has a complex polyphase history spanning the early Archaean (greater than 3.2 billion years) to the mid-Proterozoic.

The Proterozoic is represented by two major sedimentary basins, in the north-west (Deweras, Lomagundi and Piriwiri Groups) and on the eastern margins of the craton (Umkondo Group). The former consists of metasediments and volcanics and are economically important for their copper deposits (Miriam, Norah, Shackleton and Angwa) and also contain important resources of copper-lead-zinc (Copper Queen and King), dolomite (Springbok), gold, tin (the Kamativi pegmatite), graphite (Lynx), kyanite, tantalum (tantalite pegmatites) and gemstones. The Umkondo Group on the eastern border is relatively unimportant economically, but has limestone and copper occurrences.

By far the most spectacular igneous body is the Great Dyke, also of Proterozoic age (2.5 billion years ago), stretching over 500 km NNE to SSW in the centre of the country. This layered intrusive contains enormous reserves of stratiform chromite all along its length (Lalapanzi, Mutoroshanga, Great Dyke and Vanad) and also contains large, presently unexploited, reserves of platinum, palladium, nickel, copper and gold in the four norite complexes of Musengezi, Hartley, Shurugwi and Wedza.

The other Proterozoic igneous event was the intrusion of the numerous Mashonaland dolerite sills and dykes about 1.9 billion years ago right across the craton, but with a concentration of sills in the north-east. These contain resources of nickel and copper (Madziwa) and are currently exploited for ornamental stone, the so-called "black granite" of Mutoko.

The Proterozoic Mobile Belts flanking the Craton on its northern and eastern sides consist of metamorphic rocks in the Mozambique Belt (east) and the Zambezi Belt (north) with mineral occurrences of kyanite (Ky) pegmatites with tungsten, tantalum, mica, beryllium and gemstones.

The Karoo System sediments and volcanics of the Phanerozoic were laid down in three main basins, the middle and lower Zambezi basins in the west and north and the Save-Limpopo basin in the south and south-east, and contain all of Zimbabwe's large coal resources, mainly in the sandstones and shales of the Ecca Series, and also has resources of fireclay, limestone, diaspore, and a significant uranium and vanadium sandstone deposit has recently been delineated at Kanyemba in the Zambezi Valley. After the Karoo volcanics the post-Karoo Libombo, Limpopo and Botswana dolerite dyke swarms were implaced, but contain no mineral occurrences.

The Mesozoic intrusive alkali carbonate ring complexes of Dorowa, Shawa and Chishanya, in the centre-east of the country, are important for their resources of phosphate rock (apatite) and vermiculite. The intrusive kimberlite pipes north of Bulawayo and near Beitbridge are pre-Karoo while those near the start of Lake Kariba are post-Triassic (Sebungwe), but none are particularly rich in diamonds. The Mutandawhe granitic intrusion in the south-east is thought to be late Jurassic and contains a significant low grade molybdenum resource and tungsten deposits.

During the late Jurassic to early Cretaceous, sandy sediments were deposited in various places and are of no economic importance, not indeed are the Tertiary Kalahari aeolian sands covering the south-east of Zimbabwe, but a minor Tertiary-Quaternary diatomaceous earth deposit has recently been identified in the Zambezi Valley near Chirundu in the north-east.

Legislation

The right of searching for and mining of all minerals is vested in the President, in terms of the Mines and Minerals Act. To prospect a prospecting licence (about 1 USD) or an Exclusive Prospecting Order (EPO) must be obtained. An EPO is valid over a defined area, for a limited time period and for the defined mineral/s only. From this right stems the right to peg a claim and dispose of the minerals won. Unlike other countries in the SADCC no special mining licence is required. The land owner is recompensed for the loss of the land use at a nominal rate by government.

In terms of tax, repatriation of profits and other fiscal matters, the mining companies fall under the general laws governing these aspects for the whole of the economy. However, in 1989, with the launching of the New Investment Code, it was announced that a new tax regime specifically for mining was to be formulated that would take into account the high risk nature of the mining industry.

Income tax is 50% of the taxable income of the company. In terms of mining companies the following allowances apply: They can deduct the initial capital expenditure as it is incurred or over a number of years over the life of the mine up to a maximum of ten years; expenditure incurred in exploration can be deducted immediately or carried forward and allowed against subsequent mining income; a depletion allowance of 5% of the value of mineral production and a replacement allowance for later capital expenditure are both deductible.

Other general, not mining specific, allowances also apply, such as the Growth Point Allowance for investments in depressed rural areas, and the Training Investment Allowance. Companies incorporated outside Zimbabwe are subject to a branch profits tax of 8.4% but a locally incorporated subsidiary of a foreign company is not liable. Legislation exists for the payment of royalties by mining companies at the rate of 4% of output value but was suspended in the seventies in an arrangement to encourage the companies to install local beneficiation plants (the Alaska copper refinery was built under this scheme) and has apparently not been reapplied due to the depressed metal markets in the eighties. However it was not reintroduced with the upturn in prices in the late eighties, in part due to the fact that the state is now the principal producer of two of the three base minerals (copper and tin).

New foreign venture capital may be fully repatriated after two years after deducting amounts already remitted. The balance can then be remitted over six years in equal amounts with the interest accrued. Under the new Foreign Investment Code of 1989 investments accorded Venture Capital status will have a minimum remittability of 50%, negotiable to 100%, of after tax profits as dividends which are then subjected to a non-residents shareholders tax of 20%, unless there is a tax agreement with the country of origin of the investment, such as exists with the United Kingdom (5%) and the Federal Republic of Germany (10%). In addition to being a signatory to the UNCITRA and International Chamber of Commerce agreements, in 1989 Zimbabwe agreed to subscribe to the MIGA system for the protection of foreign investments and for arbitration to be settled under the Convention on the Settlement of Investments Disputes between States and Nationals of other States.

Zimbabwe dollars can be purchased for new investment for approved projects at a discount rate (about 65%) through the purchase of blocked funds held in Zimbabwe by foreigners or foreign companies, on a willing buyer - willing seller basis, similar to the financial rand system in South Africa.

Mining companies with more than 25% foreign ownership may not borrow locally more than 35% of the shareholders funds plus the ratio of the local share interest to the foreign share interest multiplied by the 35% of the shareholders funds, or they lose the right to repatriate profits (for other companies 25%). This formula is to encourage foreign concerns to bring new, foreign, capital into the country for new capital investment. It also encourages locally incorporated foreign companies to raise capital for local expansion by increasing the equity base locally, thereby diluting the foreign holding.

The Zimbabwean government is currently reviewing its whole trade strategy with a view to implementing a tariff rather than quota based import regime, which should eliminate the present bottlenecks in the importation of essential mining inputs and has decided to allow the mining sector 5% retention of forex as earnings from October 1990.

Since independence there has been virtually no new foreign investment in mining other than RTZ plc (Renco gold mine, 6 MUKP in 1980) and Cluff Minerals plc 5 (MUSD in the Freda-Rebecca gold mine in 1987/8), though several new projects are at the decision stage. The reasons for this have been the depressed outlook for base metals over most of the decade, the low proportion of profits that could be repatriated (35% until 1989) and the perceived regional instability arising from the South African regime's erstwhile policy of destabilisation of neighbouring states.

Minerals Marketing

Before 1983 marketing was done by the companies, usually through agents in the OECD countries. Up until the beginning of 1980 sanctions were applied to the then Rhodesia, so the marketing methods tended to be devious and clandestine. Since 1983 all mineral exports, except gold, have been controlled by the Minerals Marketing Corporation of Zimbabwe (MMCZ) which was set up by government in 1982 officially to rationalise selling arrangements, remove restraints on minerals trade and to reduce costs to producers, but unofficially to eliminate transfer pricing.

It was initially received by the industry, especially the TNC's, with great foreboding and they fought unsuccessfully against its establishment¹¹. Over the last decade they seem to have come to terms with it, particularly as, in some instances, higher prices have been obtained and middlemen have been eliminated and, more importantly, in many cases the old agents and channels are still being used. There have however been well-documented instances where the old agents have been receiving inflated commissions and have not always managed to obtain the optimal world market price for the minerals sold.

In 1989 the MMCZ bought into two of its principal agencies in Switzerland, Salg and Gencom of Zurich, for over one million Francs, and formed a new company called MMCZ Sales AG in which it holds 50% of the equity with an option to increase the holding to 100%. The main reason for buying these Swiss agencies rather than setting up a new company, was to acquire the skilled personnel in the two agencies, but as they in turn sell through sub-agents, there does not appear to be much expertise to be acquired. Half of all profits coming from commissions on Zimbabwean minerals sold will now accrue to MMCZ.

Recently, the industry has called for the removal of the MMCZ on the grounds that it is losing money through less than optimal sales contracts (substantial sums were lost in the nickel boom in 1988 due agents selling ahead at low prices). Although the initial establishment of the MMCZ has been seen as a victory of the government's "socialist" policies immediately after independence¹², there appears to be good evidence that the inefficiency of the MMCZ may be more expensive than the losses through transfer pricing. A confidential assessment of the MMCZ concluded that millions of dollars were being lost, not only through inefficiency and the use of old TNC agents, but also possibly through corruption, but the issue was not taken up by the Attorney General's Office¹³. The range of Zimbabwe's mineral exports and the generally small quantities of any one mineral make it difficult for the MMCZ to have people proficient in all aspects of all minerals traded. A minerals marketing monitoring commission could possibly be a more appropriate strategy given the skills constraints of the MMCZ, where spot checks were made on random deals, possibly using outside consultants, with heavy penalties for transfer pricing.

Labour

Workers committees were instituted shortly after independence in 1980. The principal workers union is the Associated Mine Workers of Zimbabwe (AMWZ), which is affiliated to the Zimbabwe Congress of Trade Unions (ZCTU). Minimum wages are set by government in consultation with the companies and the union, but since 1980 the minimum has only barely kept pace with inflation. There have been

extremely few work stoppages or strikes over the last decade, and most that have occurred have been over specific mine related problems rather than the national minimum wage rates or rights of workers. A large proportion of mine labour used to be foreign (60% in 1965 and 47% in 1972¹⁴), mainly Malawians and Mozambicans, but since independence most of them have been naturalised. The slump in metal prices in the mid-eighties had a severe effect on the union; membership fell from roughly 30,000 in 1980 to 20,000 in 1985 then grew to 31,000 in 1989, representing over half of the workforce. Since 1980 permission from the Ministry of Labour has been necessary in order to fire or lay-off a worker.

The new labour legislation (The Labour Relations Act) that came out in 1985 got a mixed response from both workers and management. From the workers' point of view, the positive aspects of the Act are the right to join a union, protection from discrimination, protection of union officials from victimisation and that the employer will in future send union dues direct to the union and non-members may be levied. On the negative side are severe controls on the right to strike and the wide discretionary powers given to the Minister of Labour who can now nullify union congress election results and control the use of union funds. In the opinion of the union the Act attempts to limit union struggle to economic objectives only thereby depoliticising union activity.

Other legislation affecting mine labour is the Emergency Powers Act, the Pneumoconosis Act, the Workers Compensation Act and the Mines and Minerals Act which has Health and Sanitation Regulations.

The frequency of expatriates on foreign contracts is extremely low, about 1% of skilled labour in 1986¹⁵, but the number of professional and managerial staff from the "settler" section of the population is extremely high at over 60%. Very few indigenous professionals and managers were produced for the mining industry during the colonial/settler period. This has improved over the last 15 years, especially through mining company in-house training, but it will still be a long time before the mining industry has a majority of indigenous professionals and managers.

In the 1980's a Department of Mining Engineering and a Department of Metallurgical Engineering were opened at the University of Zimbabwe with West German aid, and their first batches of graduates have already entered the industry. According to a study done in 1986¹⁶ the output is adequate for current demand but not enough to make up for the number of engineers leaving the country. The University also has a long-standing Department of Geology, a geophysics section under the Physics Department, and an Institute of Mining Research. At a technical level, there is a School of Mines in Bulawayo for the training of mining and mineral processing technicians, but due to falling real wages, it has not been able to attract suitably qualified instructors and a proposal to make it a parastatal under the Ministry of Mines with salary "top-ups" from the Chamber of Mines, is currently under consideration.

Mineral Production

General

Due to depressed real prices for most minerals in the first half of the decade, there has been little expansion in mineral production since 1980 except for coal, gold and graphite. In USD terms the total value of mineral production fell by 13% from 1980 to 1989, from 660 to 574 MUSD, against a three-fold increase in ZD terms, 415 to 1195 MZD.

Low world market prices, particularly in the first half of the decade, also provoked serious financial difficulties for the mining companies concerned, several of which registered substantial losses and incurred heavy debts, particularly in the mid-eighties. Although this situation improved 1987 and 1988, real prices for most minerals continued their downward drift in 1989. During the worst of the recession,

in the early eighties, the state stepped in by supplying loans, with an option of converting their value into equity, on the condition that production continued.

16.5 ZIMBABWE, SELECT MINERAL PRODUCTION

		1970	1975	1980	1985	1989	Avg ¹	70-89	80-89
Asbestos	kt	188	262	251	174	187	218	-0%	-25%
Chromite	kt	504	876	552	526	627	606	25%	14%
Coal	kt	3520	3300	3134	3030	4680	3446	33%	49%
Copper	kt	30.0	47.6	26.9	20.4	15.7	30.4	-48%	-42%
Gold	t	13.6	11.0	11.4	14.7	16.0	12.9	17%	39%
Graphite	kt	5.7	6.5	7.4	10.4	16.9	9.5	198%	129%
Iron Ore	kt	813	1246	1622	1100	1143	1051	41%	-30%
Limestone	Mt	1.06	1.37	1.22	1.32	1.37	1.27	30%	12%
Lithium mins	kt	16.7	.9	21.0	27.9	20.6	18.7	24%	-2%
Magnesite	kt	120	99	78	19	33	65	-72%	-57%
Nickel	kt	8.6	9.1	15.1	9.9	11.6	11.8	36%	-23%
P (Apatite)	kt	108	151	130	135	134	127	24%	3%
Pyrite	kt	70	67	68	57	48	57	-32%	-30%
Quartz	kt	114	193	166	74	62	111	-46%	-63%
Silver	t	6.8	7.5	29.7	24.9	22.3	19.4	226%	-25%
Tin	kt	1.09	1.00	.93	1.21	.85	1.05	-22%	-9%

¹average for 1970-89, Source: IMR SADCC Database.

Gold

In the 1,200 years preceding European colonization, it is estimated that about 4000 ancient mines produced between 600 and 800 tonnes of gold "...with a normal production during their heyday of about 20,000 oz. a year"¹⁷ and "the gold trade was directly responsible for the rise of the Zimbabwe state"¹⁸. Gold output peaked in 1916 at 28.94 tonnes and in the last one hundred years (1890-1989) of modern mining 1530.5 tonnes have been produced. In 1979 gold replaced asbestos as Zimbabwe's most valuable mineral produced and it competes with ferrochromium as the premier mineral export.

Gold is still produced by numerous small mines, but the bulk of production comes from a few medium sized mines. In 1988 17 producers of over 300 kg/annum produced 72% of the total national output of 14.3 tonnes, 11 producers between 150 and 300 kg produced 19%, while 655 producers of less than 150 kg/annum contributed the other 9%. Due to the large number of producers involved in gold mining only the larger ones will be described here.

The state gives comprehensive aid to the numerous small-scale gold mines by providing expertise, assaying, loans, hire of equipment, and by guaranteeing a fixed gold price (900 ZD/oz. in 1990). In addition the state roasting plant in Kwe Kwe custom treats refractory ores. In 1988 the state gold refinery was opened in Msasa with a capacity of 90 tonnes of Au/annum, well above the foreseeable national needs, to cater for refining from other states in the region.

Gold mining employed 26,377 people in 1988 constituting 45% of the total mining industry workforce and the value of gold output in 1989, 412 MZD, represented 35% of total mineral production. Production per worker fell from 21.8 oz. in 1975 to 19.5 oz. in 1989 and gold exports contributed 19% of total exports in 1987.

Lonrho plc of the UK produced 4.4 tonnes of gold in Zimbabwe in 1989 from eight mines. In 1985 the company announced an investment program that would have increased production to 6 tonnes by 1988, but overall output has remained roughly constant (4.5 tonnes in 1985). Five of the mines are owned via

its subsidiary in Zimbabwe, Independence Mining (Pvt) Ltd. (Athens, How, Shamva, Tiger Reef and Redwing/Old West mines). It also owns another three gold mines via its holding company Willoughby's of the UK which in turn owns Corsyn Consolidated Mines Limited in Zimbabwe (Arcturus, Mazowe and Muriel mines). Corsyn used to be owned via Lonrho's South African subsidiary, Coronation Syndicate, until 1986. Lonrho Zimbabwe (Pvt) Ltd. is the local holding company and Homestake Mining and Technical Services (Pvt) Ltd. provides financial and technical services to all of these mines.

16. 6 ZIMBABWE, GOLD PRODUCTION,
1989 (tonnes, estimates)

Lonrho Zimbabwe	4.4	27%
RTZimbabwe	2.7	17%
Cluff Zimbabwe	2.2	14%
Falcon Mines	1.4	9%
Forbes & Thomp.	1.0	6%
Falconbridge	.8	5%
ZMDC	.5	3%
Union Carbide	.4	2%
Golden Valley	.3	2%
Boulder Mining	.3	2%
Olympus Mining	.3	2%
Others	1.9	12%

Total:	15.94	100%

Source: IMR Database 1990		

RTZ plc of the UK has a local subsidiary, Rio Tinto Zimbabwe Ltd., which operates the second largest gold mine, Renco, in the south-east of the country. In 1989 1.43 tonnes of gold were produced from 237 ktonnes of ore grading 6.02 g/t. At the end of 1989 reserves stood at 5.4 tonnes contained gold, compared to 3.1 tonnes in 1979 when it was operating as a small-scale plant. After independence in 1980, the parent company in London invested five million UKP in its local subsidiary and operations were expanded considerably. Rio Tinto also owns two smaller operations: Patchway/Brompton (639 kg of gold in 1989) and Cam dump retreatment plant (323 kg of gold in 1989). Reserves at the former stood at 1.7 tonnes contained gold in 1988 and a major 15 MZD expansion project is underway at the latter which will increase output four-fold to 650 kg/annum.

One of the few post-Independence investors is Cluff Minerals of the UK who started out with a dump retreatment operation at the Royal Family mine (His Majesty) in the south-east near Filabuzi. In 1988 Cluff invested a further 5 MUSD for the development of the large Freda-Rebecca (Dandadzi) operation near Bindura. By 1989 this was the largest producer in the country, with an output of 1.9 tonnes of gold from about one million tonnes of ore. Zimbabwe is the main source of revenue for Cluff plc of the UK.

This is the first Zimbabwean operation treating large tonnages of low grade ore by heap leach. This type of operation was the main source of new gold in Western Australia's spectacular ten-fold expansion during the eighties and it would appear that Zimbabwe has substantial potential for many more of these operations.

Falcon Mines plc operates three gold mines (Dalny, Venice and What Cheer) which in 1989 produced 1.42 tonnes of gold. For the last few years though this company has made a loss (-2.5 MZD for the year ending 31:3:89) due to a series of problems at its main producer, Dalny, where the management is attempting to retrench some of the workforce. Although Falcon Mines is registered in the UK, its only

mines are in Zimbabwe and its Annual Financial Statements are presented in Zimbabwe dollars. Falcon is also the principal shareholder (40%) in Olympus Gold Mines which operates two mines, Old Nic and Dawn which produced just under 0.3 tonnes of gold in 1988.

Forbes and Thompson (Pvt) Limited is a local mining company with two mines in the south-east of the country (Gwanda), Vubachikwe and Freda, which together produced about 81 tonne of gold in 1989. This company is the largest locally-owned gold mining concern in the country. Another local gold mining company is Boulder Mining of Bulawayo who bought the Indarama mine and the Broomstock prospect, near Kwe Kwe from Norman Levin Gold Mines in 1986. They also own the "C" mine in Mberengwa and their total gold production was about 300 kg of gold and 160 kg of antimony in 1989. Broomstock is being developed as a high tonnage low grade heap leach operation and is expected to treat about 50 kt/month of ore grading about 1.5 gm/tonne in 1991 (about 0.9 tonnes of gold). Norman Levin Gold Mines continues to produce about 190 kg/ann from their Joyce/Roma property.

Falconbridge Nickel Corporation of Canada has gold mining interests in Zimbabwe via its subsidiary Falconbridge Investments Zimbabwe (Pvt) Ltd. which owns Blanket Mines (1983) (Pvt) Ltd. which runs two gold mines (Golden Kopje and Blanket mines). Golden Kopje was acquired at the end of 1983 after having been closed for 40 years and in 1988 these two mines together produced about 750 kg of gold.

The state mining holding company, the Zimbabwe Mining Development Corporation (ZMDC), owns the Jena, Sabi and Bar-20 mines and is bringing the Elvington mine into production. In 1988 the ZMDC group produced about 0.45 tonnes of gold.

Union Carbide Corporation of the USA has a wholly-owned local subsidiary, Union Carbide Zimbabwe (Pvt) Ltd., and it in turn has a wholly-owned gold mining subsidiary in Zimbabwe: Mopane Mines (Pvt) Ltd. which operates three mines (Lennox, Camperdown and Gaika). These mines together mill about 240 kton of ore per year, producing roughly 340 kg of gold annually.

All gold bullion is bought by the Reserves Bank and refined by the new state refinery, Fidelity Printers and Refiners, built with assistance from the Perth Refinery in Australia.

The second half of the decade has seen renewed gold exploration activities by both new and established companies. New companies have been African Gold of Ireland, Sons of Gwalia (SOG) and Delta Gold of Australia and Plateau Minerals (Robertson) of the UK. The Zimbabwean SOG subsidiary, Chase Minerals (Pvt) Limited, has been assessing the Connemara deposit near Kwekwe, and Delta's Masasa Mines has been looking at several gold properties. Two established companies that have stepped up their gold exploration activities are Anglo American Corporation (AAC) and Union Carbide Corporation, through their subsidiary, Mimosa Mines. AAC commissioned its Isabella Mine, near Bulawayo, in 1989 and several dump retreatment operations are under development.

Nickel

Due the price recovery at the end of the decade, in 1989 nickel was the second mineral both in terms of production (11.6 kt, worth 284 MZD) and exports. In 1987 exports of 15.8 kt, including toll-refined production, were worth 93 MZD. Exports stood at 3.6% of total exports in 1975 and rose to 4.0 in 1987. Production was 1.3% of world output in 1988. Nickel mining employed 4154 people in 1988, 7% of the total mining labour force and production per employee rose from 1.7 tonnes in 1980 and 2.8 tonnes in 1988.

Anglo American Corporation of South Africa (AAC of SA) has a majority share in Bindura Nickel Corporation (BNC) of Zimbabwe. BNC is managed by AAC Services of Zimbabwe.

BNC operates two nickel mines in the north-east of the country, namely Trojan and Madziwa, and two in the south-west, Shangani and Epoch. They also operate a nickel smelter and refinery, BSR, at Bindura. In 1988 these mines produced 11.43 kt of nickel, 0.9 kt of copper and 117 tonnes of cobalt in cake, from 2.7 Mt of ore milled. The average mill head grade was 0.62%, one of the lowest in the world for a sulphide deposit, and the average final recovery was 68%. In addition, 2.1 kt of nickel and 2.2 kt of copper were toll refined from BCL (Botswana) copper-nickel sulphide matte.

16.7 BINDURA NICKEL CORP. FINANCIAL PROFILE

	1982	1983	1984	1985	1986	1987	1988	1989
Capital Employed	131.2	163.6	178.6	169.0	178.9	185.0	224.4	364.9
Assets	75.1	116.6	116.9	117.7	118.4	119.3	121.6	177.5
Debt	39.8	53.0	56.6	46.0	42.6	17.0	0	0
Turnover	37.1	73.7	76.9	95.2	80.0	101.2	250.9	327.4
Operating Profit	.7	-1.7	12.5	22.5	-6.7	5.9	116.8	179.0
Tax	0	0	0	0	0	0	4.7	77.1
Final Profit	-6.4	-9.6	5.3	12.8	-16.9	-4.4	107.7	104.6
Dividend	0	0	0	0	0	0	41.1	70.7
Debt/Capital	30%	32%	32%	27%	24%	9%	0%	0%
Op.Profit/Sales	2%	-2%	16%	24%	-8%	6%	47%	55%
F.Profit/Capital	-5%	-6%	3%	8%	-9%	-2%	48%	29%

Source: BNC Annual Reports, 1983-90

At the end of 1988 proved ore reserves of contained nickel stood at: Trojan, 15.0 kt; Shangani, 5.8 kt; Madziwa, 2.6 kt and Epoch, 4.5 kt, but total reserves (including probable and possible) are estimated at 181 kt in 24.7 Mt of ore with an average grade of 0.73% Ni. Due to reserve depletion AAC is assessing the Damba nickel deposit north-east of Bulawayo to replace concentrate from Madziwa and Epoch mines when their reserves run out. The Munali Hills deposit in Zambia has also been considered as an alternative source of feed for the smelter.

After making low profits or losses from 1983 to 1987 when the company almost went bankrupt, the group made an after tax profit of 107 MZD in 1988 and 105 MZD in 1989, due to the spectacular improvement in nickel prices. Average return on capital, after tax, for the period 1982 to 1989 was a meagre 7.2%; however in 1988 the return was 48% and 29% in 1989. During the worst financial period (1987) BNC was offered for sale to the government, which was not interested at that time, as depressed prices were expected to continue.

Until 1982 nickel was produced by Rio Tinto Zimbabwe Ltd., but in that year the Empress Nickel Mine was shut down due to a combination of falling grades, depleted reserves and depressed prices. The refinery at Eiffel Flats started processing Cu-Ni matte from BCL's Selebi Phikwe mine in Botswana in the second half of 1985 after having been closed for two years. The matte is refined on a toll basis at the rate of about 10 kt/annum for Centametal of Switzerland who purchase the matte from BCL, Botswana. Falconbridge Nickel of Canada have the rest of the contract of roughly 40 kt/annum which they refine at their plant at Kristiansand in Norway.

Marketing is done by the MMCZ in much the same way as for copper except that the nickel commands a premium over the LME price due to its high quality (99.98% Ni). As the toll-refined nickel is not mined in Zimbabwe, it is not marketed by the MMCZ.

Asbestos

In 1989 Zimbabwe produced 187 kt of chrysotile asbestos, a fall of 36% from the peak of 281.4 tonnes in 1976. Between 1965 and 1978 asbestos was the country's principal mineral in terms of the value of production but fell to second place behind gold from 1979 on. Due to falling world demand and prices production has fallen substantially since 1979 and from 1975 to 1987 asbestos exports fell from 9.2% to 3.8% of total exports and production fell from 6.2% to 4.7% of world output. Asbestos mining employs about 7,200 people, 16% of the total mining industry workforce, and production per worker was 27 tonnes in 1975 and 26 tonnes in 1988.

Turner Newall PLC of the UK controls all of the country's asbestos production via its wholly-owned subsidiary Shabanie and Mashaba Mines (Pvt) Ltd. which has three mines in the south of the country (Shabanie, Gaths and King mines). All data relating to asbestos mining in fact refers to this company as it is the only operator. Asbestos has not only suffered falling demand caused by the world recession but is increasingly being substituted for due to its perception as a health hazard in the west, but over the last few years the long fibre chrysotile (white asbestos) has been recognised as being a less dangerous variety.

All production is exported by the MMCZ via South Africa ports to buyers world-wide. A small proportion of production is consumed locally for the manufacture of asbestos cement products, also by a Turner Newall subsidiary, and in 1987 5.7 kt of asbestos-cement articles were exported. The possibility of local asbestos spinning for the manufacture of fire-proof material is under investigation.

Coal

Coal production over the 20 years 1965 to 1985 remained fairly static between 3.0 and 3.5 Mt; however, production was substantially expanded in 1986 with the commissioning of an opencast operation to supply the new Hwange Power Station, and about 5 Mt is now produced annually. Coal mining employed 9% of the total mining work force in 1988 and coal sales of 119 MZD in 1989 were 10% of total mineral production. In 1987 57.7 kt of coal and 25 kt of coke were exported, but the latter was below normal that year due to refurbishment of the coke ovens (normal coke exports are about 100 kt of coke/annum mainly to Zambia and Zaire).

Wankie Colliery Company Ltd. is a quoted company and is 40% owned by the state and 20% by AAC of SA who still provide limited technical and management services. Nearly all coal production is for the local market (95%) and in 1988/9, 45% was consumed by Hwange Power Station (HPS), 6% was consumed by the company, of which almost all was for coke production (93%), 15% was sold as coking coal, mainly to Zisco, and the rest was sold to the other thermal power stations, to farmers (tobacco curing), cement companies and households. The company has experienced severe difficulties over the past few years in supplying the local market due to inefficiencies in the national railway company in transporting the coal across the country.

Most of Wankie's coke production is exported. Zisco, who produce about 500 kt of coke per annum, consume all of their production. Byproducts from coke production are tar and benzole. A new 60 MZD distillation plant is being constructed in Kwekwe which will in future take all tar and benzole from both the Wankie and Zisco coking plants, for the production of a variety of chemical products including benzene, toluene, xylenes, naphthalene, solvents and pitches, saving and generating 25 MZD of forex per year.

The company's sales for the year ended 28 Feb 1989 were 127 MZD and capital employed was 189 MZD. The average return on capital employed for 1983 to 1989 was low at 7.4%. The ratio of debt to capital

was high in the mid eighties due to the large borrowings (85 MZD) to finance the opencast expansion to supply the HPS, but has since fallen to 31% as the loans are paid off.

16.8 WANKIE COLLIERY, FINANCIAL PROFILE

Year end 28:02	1983	1984	1985	1986	1987	1988	1989
Capital Employed	103.0	147.7	152.8	147.8	161.8	185.4	188.9
Assets	25.7	134.5	145.3	138.3	149.2	168.2	170.8
Debt	42.5	82.0	85.5	62.8	62.4	73.2	58.1
Turnover	47.5	56.9	74.4	93.4	113.1	108.3	126.8
Operating Profit	.8	3.8	0	17.7	21.5	17.5	18.6
Tax	0	0	0	0	0	0	0
Final Profit	2.0	3.8	4.5	17.7	21.5	17.5	18.6
Dividend	1.6	0	2.2	2.3	5.7	6.0	0
Debt/Capital	41%	56%	56%	43%	39%	39%	31%
Op.Profit/Sales	2%	7%	0%	19%	19%	16%	15%
F.Profit/Capital	2%	3%	3%	12%	13%	9%	10%

Source: Wankie Colliery Co. Ltd., Annual Reports, 1983-89

Wankie is the only coal producer at present, but as low phosphorus and sulphur coal is currently imported to supply the ferrochrome smelters, a coal deposit of this type in Sengwa is being developed by RTZ to supply 100 to 120 kt/ann of coal to Zimasco in Kwekwe by a new 20 MZD road to the coalfield, financed by the government, which should be completed by the end of 1990. In addition, the National Railways of Zimbabwe (NRZ) has plans for a spur from Kadoma to Sengwa via Sanyati.

Oil-fom-coal projects have been considered on and off since the 1950's and are once again under investigation, as are possibilities for coal gasification of Zimbabwe's substantial coal reserves for production of ammonia for fertilizers.

Low phosphorus and sulphur coke is also imported from South Africa for ferrochrome smelting as a suitable quality coking coal does not exist in the country. However Mozambique has a suitable coal and there is a SADCC project underway to consider the feasibility of constructing coking ovens at Moatize to supply the Zimbabwe market.

The total in situ coal reserves of Zimbabwe stand at roughly 11.1 Gtonnes. Reserves of opencast coal are estimated at 2.5 Gtonnes and reserves of underground coal at 8.6 Gtonnes. The major resource areas are: 1) the Mid-Zambezi basin: Hwange (1900 Mtonnes), Gwai River Valley (3675 Mtonnes), Binga (3604 Mtonnes), Gokwe (1150 Mtonnes) and 2) the Sabi-Limpopo basin: Sabi-Lundi (379 ktonnes), Bubyee (291 ktonnes) and Tuli (127 ktonnes)¹⁹.

Copper

Copper peaked in 1973 at 52 kt, but since then it has steadily declined to a low in 1989 of 15.7 ktonnes (-70%). Copper exports in 1987 stood at 20.9 ktonnes worth 49 MZD and in 1988 employment in copper mining was just under 4,000, 6.8% of total mining.

The large majority is produced by companies under the parastatal ZMDC, namely, MCM (Mhangura Copper Mines) and Lomagundi Smelting & Mining (LSM), with smaller amounts produced as a byproduct from the AAC nickel mines (Bindura). The Alaska smelter also takes gold rich copper concentrated from gold mines (Renco-RTZ, Jena-MTD) and about one kt/annum of copper concentrate is purchased from the Mundunguara operation in Mozambique, containing about 200 tonnes of copper.

The Zimbabwe Mining Development Corporation (ZMDC) took over the interests of the Messina group of South Africa in 1982. The main reason for this intervention on the part of the state appears to have been the depressed price of copper causing Messina to want to shut down some of the poorer mines or, failing that, to withdraw completely. The acquired copper interests fall under two local companies: MCM (ZMDC: 55%) and LSM (ZMDC: 65%). The MCM mines are Miriam and Norah and the LSM ones are Angwa and Shackleton. The Alaska smelter and refinery come under MCM. All the mines are in the centre-north part of the country in the Lomagundi district near Chinhoyi.

The original investment in the fifties was about 10 MUKP, mainly from South Africa, with small amounts from the UK and local sources. Later investment, 5 MZD for the refinery in 1980, was locally generated. The mines are nearing the end of their life and current production is partly from pillar reclamation at Miriam.

The total cathode copper production of the group was 15.88 kt for the year ended 30 June 1988. Sales of gold and silver were 259 kg and 18.95 tonnes for the same period, in copper slimes from the refinery which also contain platinum, palladium and selenium. These are air-freighted to Johnson Matthey in the UK. Separation of the precious metals was attempted at the refinery but the recovery was significantly lower than the content paid for by Johnson Matthey. The possibility of sending the slimes to Zambia where some of these metals are presently recovered by ZCCM does not appear to have been considered.

The main operating company, MCM, has not declared a dividend since its formation due to low copper prices and low grade ores. The debt to capital ratio is high, at 26%, and return on capital employed averaged a paltry 6.3% for the period 1983 to 1989, though it was a respectable 28% for the year ended 30 June 1989.

16.9 MCM, FINANCIAL PROFILE

(year ended 30/6)	1983	1984	1985	1986	1987	1988	1989
Capital Employed	37.1	34.3	35.2	36.2	28.6	35.9	49.7
Assets	30.4	33.6	33.5	34.1	36.0	39.4	44.0
Debt	12.2	10	9.2	8.4	7.6	13	13
Turnover	41.0	46.2	36.3	51.2	47.3	71.2	105.9
Operating Profit	3.4	1.9	3.2	3.9	-4.6	6.1	17.5
Tax	0	0	0	0	0	.2	.2
Final Profit	3.4	-.6	1.6	1.8	-6.5	2.7	13.8
Dividend	0	0	0	0	0	0	0
Debt/Capital	33%	29%	26%	23%	27%	36%	26%
Op.Profit/Sales	8%	4%	9%	8%	-10%	9%	16%
F.Profit/Capital	9%	-2%	5%	5%	-23%	7%	28%

Source: MCM Annual Reports 1983-89

ZMDC is in the process of considering a new mine, Copper Queen, 90 km WSW of Alaska. The ore grades at 1.3% Cu, 1% Pb and 3.4% Zn, with significant amounts of silver. Geological reserves stand at 8 million tonnes of sulphide ore and the cost of bringing the mine into production was estimated at 32 MZD in 1985, with a three year lead time. This would make the country self-sufficient in lead and zinc which are presently imported from Kabwe in Zambia. As yet, no final decision has been taken on whether to go ahead with the project; the main problems appear to be the complex mineralogy and in raising the capital.

Lonrho used to own a small copper mine, smelter and refinery via Corsyn Consolidated Mines, called Inyati, which ceased production in 1988. AAC of SA's subsidiary, Bindura Nickel Corporation, produces a small amount of copper at their refinery BSR at Bindura. In 1988 951 tonnes of cathode copper were produced as a byproduct from 2.7 Mtonnes of nickel ore milled and 1.3 kt were produced from toll-refined matte from BCL in Botswana. The RTZim Base Metals Refinery at Eiffel Flats also toll-refined about 5 kt of copper from BCL matte owned by their subsidiary, Centametal of Switzerland.

All copper and Cu slimes are marketed by the MMCZ. The price is "LME related" and selling is done mainly through agents in the OECD countries though some copper is sold direct to end users. A very small quantity is sold on the LME. The cathodes are railed to the South African ports of Durban and Port Elizabeth (a small amount goes through the Mozambican ports of Beira and Maputo) and from there they are shipped to Europe and Japan. About 3,000 tonnes/an. of cathode copper is consumed locally by Cafca (wire and cables), Almin Industries, various copper alloy foundries and by a copper chemicals manufacturer (Cecon).

Chromite

Chrome ore was first mined in 1906 and first exported in 1907. Production peaked in 1975 at 875.7 ktonnes before falling to a 20 year low of 431.4 ktonnes in 1983, a drop of 51%. Since then it has recovered somewhat to 627 kt in 1989, with the recovery of the world stainless steel industry. Exports of ore have fallen off rapidly from 1968 to nothing by 1984 due to the increasing off-take by the ferrochrome smelters. Presently almost all chromite production is smelted and exported in the form of ferro-chrome. In 1987 ferro-chrome exports were 242 kt worth 250 MZD, second to gold, 10.5% of total exports. Employment in chromite mining in 1988 was just under 6,000, about 10% of total employment in mining. Output per worker has fallen from 138 tonnes in 1975 to 98 tonnes in 1988.

Union Carbide Corporation's wholly-owned subsidiary, Union Carbide Zimbabwe (Pvt) Limited has a chromite mining and smelting subsidiary, Zimbabwe Mining and Smelting Company (Zimasco), which operates four mines (Shurugwe, Valley, Lalapanzi and Mutorashanga) and a smelter in Kwekwe. Chromite production rates are about 300 kt/an for Shurugwe, 70 kt/an for Valley, 35 kt/an for Lalapanzi and 20 kt/an for Mutorashanga and 70 kt/an from tributors including cooperatives, giving an annual production rate for the group of approximately 500 ktonnes. Reserves are estimated to be good for 20 years at present production for all mines except for Valley where only two more years of production are assured.

Shurugwi and Valley are on podiform deposits while Lalapanzi and Mutorashanga are on the Great Dyke stratiform deposits, but the overall ore mix from the group is such that agglomeration of the ore is not necessary for smelting, but due to increasing ore from friable stratiform deposits, both agglomeration and direct injection are being investigated.

The Zimasco smelter produces 175 kt/an of high carbon (6 to 8% C) ferrochrome from five 18 MW furnaces and one 12 MW furnace. The -1mm ferrochrome fines are remelted in a small 3 MW double crucible induction furnace. Roughly 100 tonnes/an. is sold to local foundries. Due to high ferrochrome prices in 1988 and 1989, the company made a healthy profit, but with the current fall in prices 1990 is likely to be a difficult year financially.

Anglo American Corporation of South Africa has a local chromite mining and smelting subsidiary, Zimbabwe Alloys Limited which has four mines (Great Dyke, Caesar, Netherburn and Inyala), a quartz quarry (Broadside) and a refinery which was commissioned in 1953 and is situated in Gweru. The mines fall under its wholly-owned subsidiary, Zimbabwe Alloys Mines Limited. Ore is also purchased from

cooperatives, tributors and contractors. All of the mines, except Inyala, exploit the thin seams of the stratiform deposits of the Great Dyke where mining is expensive and the friable chromite ore produced needs to be agglomerated before smelting, adding significantly to costs. The richer podiform deposits are cheaper to mine and the lumpy ore produced can be smelted directly.

Ore production for the group for the year ended 31 March 1990 was 79.9 ktonnes of chromite and 89.2 ktonnes of quartz; in addition, 35 kt were purchased from cooperatives and 44 kt from other sources, giving a total of 152.9 kt of ore supplied to the refinery. The refinery produced 35.9 ktonnes of low carbon ferrochrome, 49.3 ktonnes of ferrosilicon chrome, some of which is used to produce low carbon ferrochrome, 6.3 ktonnes of high carbon ferromanganese, 2.3 ktonnes of ferrosilicon 75 and 1.1 kt of charge chrome and 44 tonnes of low carbon silicomanganese.

The ferrosilicon and ferromanganese are sold to the local steelmaker, Zisco, and the ferrochrome and ferrosilicon chrome are exported. The production of calcium carbide is an experimental project for the future supply of the domestic market for acetylene and, possibly, PVC's, and a new furnace is being commissioned for this. In 1988 a new plant was commissioned to produce ultra low carbon and nitrogen ferrochrome for export to specialty consumers.

16.10 ZIMALLOYS, FINANCIAL PROFILE.

(year end 31/03)	1983	1984	1985	1986	1987	1988	1989
Capital Employed	80.0	87.4	95.6	95.8	96.4	127.5	150.2
Assets	51.5	50.2	68.2	69.7	74.0	96.3	101.0
Debt	23.6	31.1	15.3	11.4	8.2	8.5	17.2
Turnover	46.0	76.0	78.4	78.4	107.0	138.6	169.3
Operating Profit	-.6	-1.7	19.2	16.3	17.7	25.2	53.3
Tax	0	.0	0	4.7	3.7	1.3	18.0
Final Profit	-6.7	-7.7	11.8	6.6	7.1	16.7	30.0
Dividend	0	0	4	3	3	6.3	14.9
Debt/Capital	29%	36%	16%	12%	9%	7%	11%
Op.Profit/Sales	-1%	-2%	24%	21%	17%	18%	31%
F.Profit/Capital	-8%	-9%	12%	7%	7%	13%	20%

Source: Zimbabwe Alloys Annual Reports, 1983-1989

Due to depressed world prices in the first half of the decade, Zimalloys increased its debt to capital ratio to 36% and made a loss of 7.7 MZD for the year ended 31 March 1984, but with the improvement in the world stainless steel industry, by 1989 the debt ratio had fallen to 11% and a final profit of 30 MZD was declared. The average return on capital for the period 1983 to 1989 was however only 6%. Employment at the refinery in 1989 was 1,110 and 1,360 on the mines, making a total for the group of 2,470.

Union Carbide, jointly with Zimalloys and the Ministry of Mines, has a project underway to test the feasibility of using an Eikhoff roadheader for the development of chromite mines on the Great Dyke and trials are being carried out at Mutorashanga.

All ferrochrome marketing is done through the MMCZ mainly to North America, Japan and the EEC. About half is exported through South African ports and half through the Mozambican port of Maputo, via South Africa.

Zimbabwe has the world's largest reserves of high-chromium ores estimated at between 580 Mtonnes and three billion tonnes, the large majority of which are the stratiform ores of the Great Dyke. The latter

figure represents 84% of world high-chromium reserves. Reserves of high-iron ores are 56 Mtonnes or 5% of world reserves²⁰. South Africa has over 90% of world reserves of this grade. Due to technical advances the Zimbabwean high-chromium ores have lost their premium on the world market, but ferrochromium alloys made from it are still favoured by steelmakers.

This large resource could conceivably be an alternative to South African supplies in the event of sanctions or counter sanctions being imposed against or by South Africa, the world's largest producer. In this regard Mozambique's large hydroelectric potential at Cabora Bassa has been considered as a source of cheap electricity for the expansion of ferrochrome production. However, the likelihood of sanctions being imposed has decreased recently.

Although Zimbabwe produces all the constituents of stainless steel (ferrochrome, nickel and steel) there are no firm plans for the creation of a plant for its production. Small amounts of stainless, however, are produced on a "once-off" basis by the small foundries for stainless castings (such as geological hammers) and Zimalloys has an embryonic plan for the production of high grade stainless precision castings. The establishment of a stainless steel facility would also be important for supplying a tool making industry with its principal raw materials²¹.

Iron and Steel

Iron ore production peaked in 1976 at 1.35 Mtonnes, then fell to 0.84 Mtonnes in 1982 (-38%), before recovering to 1.14 Mtonnes in 1989 when the value of production was 2.6% of total mining output. Exports of iron ore ceased in 1968 and since then all ore has gone to Zisco.

The Zimbabwe Iron and Steel Company Ltd. (Zisco) is almost completely state owned and started operations in 1948 at Redcliff near Kwekwe in the centre of the country. All iron ore production is from its two mines (Buchwa and Ripple Creek) and is destined for its iron and steel works. Overall grade is 61.6% Fe and 0.2% Mn. However, current reserves at Buchwa are low and a major investment is being made in a sintering plant to handle the friable Ripple Creek ore which will become the principal future feed. Reserves of limonite ore at Ripple Creek were greater than 41 Mt in 1980, grading 51.4% Fe and 2.1% Mn.

16.11 ZISCO: FINANCIAL PROFILE

	1982	1983	1984	1985	1986	1987	1988	1989
Capital Empl.	125.4	109.4	115.5	120.4	145.3	146.7	167.8	305.0
Assets	136.4	127.6	119.2	114.6	137.9	132.1	118.1	216.6
Debt	97.1	141.1	220.5	117.4	101.5	120.8	219.5	410.1
Turnover	93.0	106.1	112.9	167.0	237	176.8	178.8	235.5
Profit	-44.3	-62.7	-73.4	-43	-11.7	-83.8	-76.8	-53.3
Tax	.0	.0	.0	.0	.0	.0	.0	.0
Accumulated Loss	na	na	na	255.9	267.6	351.4	428.2	481.5
Debt/Capital	77%	129%	191%	98%	70%	82%	131%	134%
Acc.Loss/Capital	-	-	-	213%	184%	240%	255%	158%

Note: 1985 data is averaged as 1986 is for 18 months from 1/85 to 6/86 Source: Registrar of Companies, Harare.

Roughly 80% of iron and steel production is exported. In 1987 exports were: 283 ktonnes of ingots and billets, 86 ktonnes of bar, rods and sections, and 7 ktonnes of wire, with a total value 93 MZD. Zisco has a maximum capacity of one million Mtonnes and is at present operating at about half of this due to

depressed export markets. In 1989 Zisco had a turnover of 235 MZD on which it made a loss of 53 MZD, had an accumulated loss of 482 MZD and had a large debt of 217 MZD, necessitating an annual government subsidy. A major expansion and modernisation project is underway which includes the purchase of a new rolling mill for steel sheet from Sweden and a conversion to continuous casting of all sections. This is expected to bring the company back into profitability by 1995.

Zisco is the only integrated steelworks in the region and much of its exports are to regional customers, but the lack of a common currency and adequate lines of credit are a major limitation to the company effectively penetrating this market. A PTA/SADCC study in 1986, recommended that Zisco become the core plant supplying raw steel in a regional network of smaller (arc) smelters²². The advent of a democratic South Africa would pose a major threat to the viability of Zisco as the lower cost South African producers would most probably take its regional export markets.

Tin

Tin production of 848 tonnes in 1989 was 1.3% of total mineral production by value. Production peaked in 1984 at 1024 tonnes but output was reduced following the collapse of the international tin price in 1985. Employment in tin mining was 2% of total mining in 1988.

Kamativi Tin Mines Limited (KTM) in the west of the country is responsible for almost all of the tin production. Small operations started on the pegmatite in 1936. In 1952 Billiton (Dutch) started the present mining operation. In 1970 the state Industrial Development Corporation (IDC) took a majority share and in 1974 Billiton sold out completely leaving only one private holding in the company, that of the Oakes Trust with 5%. In 1986 the IDC holding was transferred to ZMDC.

In 1988 KTM made an operating loss of 7 MZD on sales of 15 MZD and a final loss of 1.2 MZD after receiving a government grant. With current tin prices the operation only manages to continue on the basis of an annual government subsidy. Exports of high grade tin (99.93% "Jupiter" grade Sn) from the mine are worth about 10 MZD annually. The mine also produces small amounts of tantalite and can potentially produce spodumene (Li) and beryllium.

The ore is processed, smelted and refined at the mine. Solder and white metal are also produced for the local market. A small amount of tin is also sold to local industries for tin plating, solder and white metal for alloys. The smelter also treats concentrates from other workings (about 3t/month). The mine has 20 million tonnes of reserves at present prices grading on average 0.18% Sn, equivalent to about 30 years at present production rates.

The tin is marketed internationally by the state's Minerals Marketing Corporation of Zimbabwe (MMCZ) and is mainly sold to West Germany. It is railed to South Africa and shipped from Durban and Port Elizabeth to Europe.

Apatite and Pyrites

In 1989 134 kt of phosphate rock (apatite) were produced by Dorowa Mining (Pvt) Ltd. in the Nyazura district, for their mother company, Zimbabwe Phosphates Ltd. (Zimphos), for fertilizer production. Zimphos produces single and triple phosphate (100% of local demand) after treating the ore with sulphuric acid.

Zimphos is a wholly-owned subsidiary of Chemplex Corporation which is in turn owned by AECI of South Africa, an AAC company, but the foreign (AECI) holding is expected to be bought out by the state Industrial Development Corporation (IDC), Norskhydro of Norway and Norad (Norwegian aid agency). The new company will be called the National Fertilizer Company and its explosives division will

be sold to a group made up of the IDC, Nitro Nobel of Sweden and Swedefund and will supply about 50% of the Zimbabwean explosives market.

Zimphos has two sulphuric acid plants, one using iron pyrite and the other using imported sulphur. In the phosphoric acid plant, apatite (phosphate rock), reacts with sulphuric acid to give phosphoric acid and by-product gypsum. Single superphosphate is produced by reacting sulphuric acid with phosphate rock and triple superphosphate by reacting phosphate rock with phosphoric acid. In addition Zimphos produces aluminium sulphate by reacting bauxite (from Mozambique) with sulphuric acid.

Iron pyrite is mined at the Iron Duke mine near Mazowe owned by Anglo American Corporation. Output in 1989 was 47.6 kt worth 2 MZD and is all destined for the Zimphos sulphuric acid plant in Msasa.

Platinum Group Metals

Platinum Group Metal (PGM) concentrates are produced from the residue of nickel-copper refining. In 1989 25 kg of platinum and 46 kg of palladium were produced from this source but Zimbabwe has significant reserves of the PGM's in the Great Dyke estimated at 1.68 Gtonnes grading 5.54 g/ton PGM's (86%) and Au (14%) with 0.2% Ni and 0.15% Cu. RTZim ran a pilot plant on one of these deposits for several years at Zinca in the early eighties but decided not to open a mine at that time.

With the higher nickel prices in the late eighties RTZim, AACZim and Plateau Mining plc (Robertson Research) of the UK joined up on an exploration exercise to reassess both the RTZim and the AAC properties on the Hartley Complex of the Great Dyke. Plateau Mining will spend 5 MUSD on further drilling and a complete feasibility study, which will earn them 24% in the joint venture. A local company, Mhondoro Mining, has been formed to carry out the exploration. The joint venture envisages a 2.2 Mt/annum project producing a nickel-copper-PGM concentrate, containing about 2.7 tonnes of platinum, 2.5 tonnes of palladium and 4.3 kt of nickel, which will be smelted at either Bindura (AAC) or Eiffel Flats (RTZim).

Union Carbide also has PGM claims on the Wedza Complex (Mimosa) which they are reassessing for a possible platinum-nickel operation. Delta Gold of Australia has completed a detailed feasibility study of a PGM prospect on the north of the Hartley Complex for a two million tonne per year operation at an estimated cost of 420 MZD which will produce about 3 tonnes of platinum, 2.4 tonnes of palladium and 2.2 kt of nickel. Financing from a variety of sources is being sought and a final decision to go ahead with the project will be made in 1990. In addition, Cluff Minerals (UK) is exploring the PGM horizon of the Musengezi Complex on the "horseshoe" at the northern end of the Dyke.

Other Minerals

The total value of the other minerals in 1989 was 64.7 MZD or 5.4% of total mineral production. In 1989 the most important by value were: limestone (14 MZD), phosphates (12.2 MZD), silver (8.2 MZD), graphite (7.2 MZD), lithium minerals (4.3 MZD), tantalite concentrates (3.2 MZD), cobalt (2.7 MZD) and rough emeralds (2.5 MZD).

The most important of these in terms of world output, is lithium (petalite concentrate) which was approximately 7.6% of world production in 1988. All lithium minerals are produced by Bikita Minerals (Pvt) Ltd., a subsidiary of RTZ plc of the UK (50.5%), from one of the richest lithium pegmatites in the world (1.4% Li) at Bikita in the southeast of the country. Reserves in 1980 were 113.5 ktonnes of contained lithium.

Almost all limestone quarrying is for cement production at Cleveland (about 500 kt/an) and Sternblick (about 400 kt/an), and for steel production at Zisco (about 430 kt/an). Small amounts are also quarried for lime production (Early Worm Mine) and for agriculture (Springbok). Total output in 1989 was 1.37 Mt worth 14 MZD. There are also numerous other known deposits with large reserves, but none with the specific characteristics necessary for the Zimalloys ferrochrome plant which has to import about 50 kt/an of low sulphur and phosphorus lumpy lime from South Africa. Several deposits in the SADCC region have been considered in this regard, but thus far none have been found to be suitable.

Virtually all silver production, of 22 tonnes (8.2 MZD) in 1989, is a byproduct of other mining, mainly from copper and gold production. Antimony is also produced as a byproduct of gold production (Indarama) and by some small mines such as Belingwe Star. In 1989 210 tonnes worth 0.5 MZD were produced for export.

Most of the country's graphite production of 16.9 kt (7.2 MZD) in 1989, is from Zimbabwe Germany Graphite Mines Ltd.'s Lynx mine in Hurungwe District, jointly owned by ZMDC (50%) and Grafitwerk Kropfmuhl AG (50%) of West Germany. In 1988 output was 2% of the world total.

Tantalum concentrate production comes from small-scale pegmatite workings, but mainly as a byproduct of tin mining (Kamativi). Production in 1989 was 31.5 tonnes worth 3.2 MZD. Small quantities of tungsten concentrates are also produced from pegmatites such as R.H.A. mine and Richardson Kop.

Bauxite production used to come from the Alumina mine belonging to E.C. Meikle Ltd., on the eastern border, but since 1987 all production has come from the other side of the border in Mozambique. In 1989 only nine tonnes of corundum were produced, but in the mid-sixties Zimbabwe was the world's largest producers.

Magnesite production of 33.4 kt (1.4 MZD) in 1989 is mainly destined for export to South Africa, except for a small amount which is used by Sable Chemicals for the production of fertilizer. It is mined by Kadoma Magnesite at the Barton Farm Magnesite Mine. Several other deposits are also known (Mat Mine, Calac Deposit and Bukwa Magnesite). The possibility of producing magnesite refractory bricks is being investigated by the ZMDC and has been taken up by the SADCC Mining Sector for consideration as a regional project.

Gem stones come from numerous small workings and include aquamarine, beryl, citrine, amethyst, garnet, iolite, tourmaline, chalcedony and emeralds. The only large scale production is the Rio Tinto emerald mine, Sandawana. In 1989 6.5 kcarats of cut emeralds worth 1.6 MZD and 343 tonnes of rough emeralds worth 2.5 ZD were produced.

Kyanite production stood at 1.9 kt in 1989 from ZMDC's Ky mine in the north-east. It is consumed locally by the ferrochrome smelters as a flux and is used for the manufacture of fire assay crucibles. Talc is produced from several operations but most production comes from Manzonzo and Simon mine at the rate 1.5 kt/an for the filler and cosmetics industries.

Clay production was 105 kt in 1989 and was almost all from the Bemas and Corbut pit (for cement) and the Gwaai River Clay deposit (for ceramics). Over nineteen thousand tonnes of fireclay were produced in 1989 from the clay horizons in the lower Karoo coal measures at Wankie for the manufacture of refractory bricks by Clay Products Ltd. in Bulawayo, mainly for the steel industry. Production of kaolin in 1989 was only 17 tonnes, mainly from the Athi pit for the ceramics industry.

Mica production started in 1919, peaked in the early fifties and was virtually dead by 1960. In 1989 1.5 kt of block mica were produced, mainly by Turning Point Mine owned by Mitmar (Pvt) Ltd. Most of the feldspar production is as a byproduct of lithium production at Bikita. It is also produced by the Mistress Mine near Harare. In 1989 2.7 kt were produced, mainly for the glass and ceramics industries. Vermiculite is produced for export from the James mine at the rate of about 1.5 kt/an.

Although the total value of industrial mineral production is low in comparison to the major export minerals, they are in some ways more vital to an integrated resource-based industrial development than the export minerals which are vertically integrated into the industrialised economies.

Infrastructure

Zimbabwe most probably has the best physical infrastructure in the whole of Black Africa. It has an excellent paved and unpaved road network covering most of the country and all of the main mining areas. The railway network is well developed and most major mines are linked by rail, but over the last few years the National Railways of Zimbabwe (NRZ) has displayed an increasing inability to handle all of the rail traffic effectively, particularly the domestic distribution of coal. Government has however recently recognised the acute managerial problems at the NRZ and remedial action is being taken.

Before 1976 most mineral exports were via the Mozambican ports of Beira and Maputo, particularly the latter, but in March 1976 the Mozambican government closed these two routes in compliance with the then UN sanctions against the rebel settler regime and all mineral trade was routed through South African ports. After independence in 1980 minerals once again started flowing through the Mozambican routes but by 1984 these were once again effectively closed due to sabotage by the South African sponsored MNR bandits.

The potential instability of the southern routes has motivated Zimbabwe to attempt to make the Mozambican routes functional. The first step in this regard was the sending of troops to help guard the Mutare-Beira corridor and the second, the rehabilitation of the railway line jointly with the Mozambican Railways. Unfortunately the port of Beira's ability to handle bulk mineral cargo is limited, both in terms of the port's handling facilities and the limited tonnage of ships that can enter the port (25 kt), which is being increased by a SADCC dredging project. Maputo is more suited for mineral exports and in 1989 Zimbabwean troops were sent to guard this route as well. Some Zimbabwean minerals are exported from Maputo, but routed via South Africa.

The Zimbabwe Electricity Supply Authority (ZESA) maintains an electricity grid over most of the country including all of the major mines. Electricity costs have increased considerably to pay for the one billion US dollar Hwange power project, but are still among the lowest in the world. Over the last few years supply disruptions have become more common due to a fire at the Kafue power station in Zambia in 1989 and due to problems at the Hwange power station, but ZESA has attempted to minimise disruptions to the productive sectors such as mining.

Negotiations are well advanced with HEP (Portuguese Hydroelectric Company), who run the Cahora Bassa power station in Mozambique, for the supply of electricity to Zimbabwe. If all goes well Cahora Bassa will be linked to the Zimbabwean grid at Bindura by 1994. Under the original contract 80% of the south bank power was destined for South Africa, but they have a surplus predicted until 2003 and are therefore willing to let Zimbabwe be supplied. After 2003, it is expected that the Cahora Bassa north bank station will be functional to supply Zimbabwe.

Zimbabwe has an excellent financial sector boasting several commercial banks, merchant banks, a discount house, and a thriving stock exchange. Telecommunications with the region have improved considerably with the SADCC microwave projects, and links with the rest of the world are through the new Japanese constructed satellite station in Mazowe.

The Chamber of Mines of Zimbabwe is supported by both the small and the large mining houses and represents the industry in negotiations with government.

Unlike other countries in the SADCC region, Zimbabwe has a surprisingly developed mining inputs manufacturing sector making a wide range of mining consumables. An important proportion must however still be imported, particularly heavy equipment (capital goods).

Discussion

By far the major problem for the mining industry has been and is the constantly falling real value of their products, except for precious metals/minerals, even with the increases registered in 1987 and 1988. The strong US dollar and the steady devaluation of the ZD (70% against the USD since 1980) has however meant that in Zimbabwe dollar terms the profitability of the mining companies has generally been maintained.

The next pressing problem is the acute foreign currency shortage to import essential mining consumables and equipment. In 1989 32 MZD were allocated to non-exporting mines and about 70 MZD to exporting mines which together were only 9% of the value of mineral production for that year (1195 MZD). In 1987 foreign currency allocations to the mining industry (36 MZD) amounted to only 3.4% of the value of mineral exports (1032 MZD). In US dollar terms allocations have however increased from about 15 MUSD in 1984 to about 50 MUSD in 1989.

Another crucial problem facing the mining sector has been the increase in energy costs in Zimbabwe caused by the one billion dollar Hwange thermal power project. Electricity charges increased three-fold from 1980 to 1985, but since then there have only been marginal increases for the mining industry, which consumed 35% of total power supply by ZESA in 1988/9, if the ferrochrome producers are included (18%).

As a land-locked country Zimbabwe has logistic problems in getting its mineral products to the nearest ports. These problems have been compounded by the security situation in Mozambique. Before the independence of Mozambique two-thirds of Zimbabwe's exports left via Maputo and Beira. Both of these routes are now hazardous, forcing some exports to leave via more distant South African ports, at that country's discretion. Although the port of Beira is operational, it is not suitable for bulk minerals which will go via Maputo once the Limpopo corridor is operational.

The replacement of skilled personnel is now cited by most medium to large mining companies as their most serious problem after foreign exchange shortages. There has been a steady flow of experienced staff out of the country since independence who have been difficult to replace. This problem appears to be partly overcome on most mines and plants by new graduates and in-service training, but some companies are faced with the situation where they do not have the experienced staff to train new recruits. Over the last twenty years the mines have moved away from migrant labour and currently have a permanent workforce, but this has not led to a significantly greater degree of mechanisation, due to forex restrictions on imported machinery.

An important feature of mining in Zimbabwe is that although the mining industry's dependence on expatriate technicians and managers is superficially low, professional and managerial staff generally come from the "settler" section of the population who are steadily leaving the country. Only a handful of indigenous mining professionals were trained before independence. This dependence on a small, culturally distinct, section of the population clearly poses certain limitations of the new government's policy options.

Only a small fraction of the total value of mineral production is consumed by local industries. By far the majority is exported to the industrialised countries to be transformed into finished products, some of which will ultimately be reimported by Zimbabwe. Primary commodities, mineral and agricultural, typically constitute about 90% of total exports.

There are several projects for the further transformation of minerals in the country that have been under consideration for some time such as the manufacture of refractory bricks, the spinning of asbestos fibre, the manufacture of stainless steel from local chromium, nickel and steel and a coal-based chemical industry. But, as long as downstream transformation is only for import substitution for the local market, the primary commodities sector (mining and agriculture) will continue to be the foreign exchange generator for the rest of the economy and the manufacturing sector will continue as a net foreign exchange consumer.

The real (terms of trade) prices of Zimbabwe's primary commodities are constantly falling, even during periods of recovery in the advanced capitalist countries, forcing Zimbabwe to attempt to increase volumes to maintain essential foreign currency flows for the importation of relatively more expensive manufactures and other commodities necessary for the rest of the economy to keep functioning. Falling real prices of raw materials exports put pressure on local inputs costs to maintain profitability, especially labour costs. Low wages in the primary commodities sector in turn limit the growth of the manufacturing sector due to the restricted market for its goods.

Attempts to maintain the price of primary commodities by devaluing the local currency are only a part and short-term panacea as the increased sales revenue will eventually be offset by the higher cost of imports to the economy as a whole with resulting imported inflation.

Strategies for integrated economic development therefore need to increase exports of manufactures, decrease dependence on primary commodity exports and decrease dependence on imported capital goods by developing a local capital goods manufacturing capability. Given the limited possibilities of Zimbabwe penetrating the world market for manufactures, economic integration (or collective self-reliance) in the region is the only viable method of breaking away from the present vertical integration with developed world.

A regional strategy is not only necessary in terms of an increased market for manufactures, but also in terms of utilising the larger resource base (human and material) for the development of primary industries, particularly capital goods. The SADCC region produces, or has resources of, virtually all the raw materials essential for integrated industrialisation.

Regional cooperation in metals refining has already taken place in the case of copper-nickel matte from Botswana and copper concentrates from Mozambique are being refined in Zimbabwe, but there is a large potential for similar schemes in the region. For instance, Zambia could possibly refine Zimbabwe's copper slimes and cobalt hydroxide and Zimbabwe could refine the region's gold bullion production.

But by far the most important regional cooperation by Zimbabwe with another SADCC state has been the securing of the rail and road corridors through Mozambique to the ports of Beira and Maputo and to Malawi. An essential prerequisite for the maintenance of mineral production is the provision of an operational transport system for exports.

In conclusion, Zimbabwe has a diverse and well-developed minerals sector which plays an important part in its economy both as a foreign exchange earner and as the provider of raw materials to the manufacturing and metallurgical sectors. The mining industry is also an important employer and provides a market for the local manufacturers of mining machinery and consumables. The mining sector is supported by an exceptional physical and financial infrastructure. In addition, there is a well-established manufacturing sector which is able to provide a substantial proportion of mining inputs. Due to low mineral prices, a lack of new investment and regional instability, the mining industry has not expanded since 1980. But with the current improvement in mineral prices, the stabilisation of the region and the new investment code, the Zimbabwean mining industry is poised to expand appreciably in the next decade.

Footnotes to Chapter 16

- 1 Summers 1969 2 Oliver 1972, p48. 3 Tabex 1987.
 4 Arrighi 1973, p336. 5 Arrighi 1973
 6 World Bank 1989. It should be noted however that the smelting and refining of certain ores such as chromite (ferrochrome) and iron (steel) is classed as manufacturing while for copper, nickel and tin it comes under mining. This has the effect of inflating the size of the manufacturing sector.
 7 World Bank 1989. 8 NOTE: This section draws substantially on Jourdan 1986.
 9 Much of the chromite and copper refining capacity was installed during this period.
 10 The bulk of the AAC investment came from Zambia in the forties and fifties.
 11 Herbst 1987. 12 Herbst 1987.
 13 Personal communication with a Minerals Marketing Consultant.
 14 Chamber of Mines 1973, page 113. 15 Eurequip 1987.
 16 Eurequip 1987. 17 Summers, 1969, p218
 18 Huffman 1974, p241. 19 Morrison 1985. 20 Slater 1980. 21 Ndlela 1983, page 17.
 22 UNIDO 1986
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Chapter 17: Regional Strategies for the Mining Sector

Introduction

The country chapters have already dealt extensively with a wide variety of specific areas where a regional approach would be beneficial and the chapter on the SADCC Mining Sector Coordinating Unit mentioned the numerous studies on various aspects of the regional minerals industry that have been undertaken since 1985, almost exclusively by outside (European) companies. This section will bring together the possible regional approaches and the Mining Unit projects under broad areas of regional strategies to provide the basic possibilities, or potential, for a coherent regional planning strategy for the minerals sector. A discussion of possible mechanisms for the realisation of the various strategies will follow. However, it would be useful to provide at the outset a framework that outlines the general advantages of a regional approach:

- 1) The most important of these, for all of the areas cited below, is the advantage of the larger market that might allow a facility based on the regional market to be feasible but which would otherwise not be economic in any one country. This is particularly important for mining inputs manufacture (machinery) and downstream mineral transformation into finished products.
- 2) The second is the larger mineral resource base provided by the collection of regional resources. The regional mineral resource base includes virtually every mineral necessary for an integrated industrialisation strategy, many of which are already exploited, but for export onto the international market or only on a small scale for any one domestic market. There are almost no minerals currently mined specifically for the regional market.
- 3) The third is the larger human resource base. Although there is a critical shortage of mining managerial and professional staff in all of the member states, causing them to resort to the import of expatriates, in any one mineral field there are usually at least one or two experts to be found in the region. Related to this is the larger range and variety minerals research and development facilities within the region compared to any one country. In the regional context it could also ^{be} feasible to create training facilities for more specialised areas of geology and mining, that would not make sense in any one country due to the low demand.
- 4) Mining and mineral processing projects often require the mobilisation of huge amounts ^{of} finance, particularly for infrastructure, in both local and foreign currency, which would be more easily located in the larger financial base of the region.
- 5) The larger size of the regional economy could allow for the development of large local mining companies with the capacity of taking on major mineral development projects that would otherwise be the preserve of the mining TNCs. It would also allow for the operation of several large mining companies as opposed to the current domination of mining by one or two companies in each country.

These potential advantages form the basis for the planning of a series of regional strategies for the mining sector. It should be emphasised that these are potential areas given the regional context. A discussion of the possible mechanisms for the realisation of strategies within this context will follow the elaboration of the strategies.

- 1) The most obvious of area where the regional context could be beneficial is complementarity in mineral production by one state and imports by another state. Several states currently import from outside the region minerals that are already produced in the region. Imports are also made from outside the region of minerals which exist in the region but are not as yet exploited. This has been the justification for many of the SADCC national projects to develop a specific mineral in any one country, on the grounds that there will be the potential for the region to take some of the product once it is produced. Other minerals are produced but not beneficiated into the form necessary for the consuming industry. In addition, the mining industry itself is a consumer of a wide variety of minerals such as coal, coke, limestone, lime, iron and steel, manganese, quartz and pyrites: almost all of these could be secured from within the region, but many are currently imported from outside the region, particularly South Africa. The regional complementarity is even greater when one considers intermediate mineral-based products rather than minerals, like chromium salts for tanning and titanium oxide for paints. The region currently imports a wide range of intermediate products, particularly chemicals, that are that are only slightly processed forms of minerals available in the region.
- 2) The large majority of people in the SADCC depend on agriculture for a living, but in general yields are low. However, the region has numerous deposits of fertiliser minerals, mostly unexploited, that could be a key factor in the development of regional agriculture, if made available cheaply and in local currencies.
- 3) The SADCC region possesses numerous deposits of iron ore and has all the other minerals necessary for iron and steel making. A regional strategy for the development of this vital sector is essential for industrialisation. Many iron and steel transforming industries across the region are operating below capacity due to a shortage of raw material. Iron and steel have linkages to almost all other sectors of the economy including the mining industry itself, for the manufacture of mining equipment, rails, grinding media, etc...
- 4) The mining industry of the region has a primary function of forex generation, yet it is itself a major forex consumer due to the relatively high capital intensity of mining. Between 20% and 40%, depending on the country, of the forex generated every year by mining is used for the import of mining machinery, plant, equipment and a range of consumables, many of which are already produced in the region and if they are not, for many items the larger regional market could justify a production facility. In addition, many of the items imported are themselves mineral-based.
- 5) The regional rationalisation of mineral beneficiation plants could keep more value added in the region and the scope for further mineral transformation is enormous, particularly if the larger, regional, market was available. Most minerals are currently exported in a pure but untransformed form such as ingots, bars, cathodes and billets.
- 6) Another area where the regional context would be advantageous is that of human resources including the facilities for the development of human resources. The regional collection of competent and experienced mining and mineral processing professionals, albeit small, is evidently larger and more varied than any one country. Educational facilities created for the region would be able to cover a much wider range of disciplines and specialities than would be feasible for any one country and could, potentially, avoid the current costly duplication of mining related educational facilities.
- 7) The area of research and development is another where the regional context might justify a research facility that would not be justified in any individual country. Furthermore, the existing facilities could

often be better used by the whole of the region instead of serving just one country. For a mineral produced in several countries, it could be worthwhile to create research and development facilities that could not be justified by the production of that mineral in any one country. Regional cooperation in mineral exploration could be beneficial, particularly in border areas where two or three states share the same geological phenomena.

8) The regional context would theoretically allow for a greater mobilisation of regional capital for investment in mineral and mineral related projects than is possible for any individual member. The initial capital costs for most new mining projects usually exceeds what can be raised on the domestic financial markets, meaning that outside investment is generally necessary, but the regional financial resources may well be sufficient for the funding of strategic projects without recourse to foreign investment, particularly for strategic investments that foreign investors would not be interested in. Mechanisms for tapping this resource could be the creation of mineral development funds, a regional stock market and regional banking. Regional planning and rationalisation could also be beneficial in the area of minerals marketing and in the purchase of inputs to the mining industry, not available within the region, by taking advantage of the larger market. The share of the world market of the SADCC region for many minerals is evidently greater than that of any individual country and, in some cases, raises the possibility of influencing world market prices.

9) A vital area for regional strategies and collaboration would be that of mineral legislation and a common strategy towards the mining TNCs. Each individual state is weak in comparison to the large TNCs but the regional context could provide a stronger base for negotiations with the TNCs. The regional context might also allow for the creation of large regional mining companies with skills and capital to match the foreign companies making them less necessary for any specific minerals development project.

Finally, as mentioned in the beginning of this study, an important reason for the SADCC coming into existence in the first place was that it was thought that aid funds from the developed world could be better mobilised with a regional approach and it is generally accepted that funding has exceeded what might have been attracted by the individual members on a bilateral basis.

Mineral and Mineral-based Imports

Not only does the SADCC region currently import numerous minerals and mineral-based products for which there are unexploited deposits in the region, but even when the mineral is being exploited in one member country it is often not purchased by other member countries who continue to source the mineral from without the region for a variety of reasons. Also, there are instances where a non-mineral-based import into the region can be replaced by a commodity based on a local mineral resource.

In line with the founding objectives of the SADCC, the first imported minerals for which regionally sourced substitutes were considered were those coming from the Republic of South Africa¹. The possibility of sanctions being imposed by or against South Africa gave added impetus to the search for alternative sources of these imports in the region. However, recent developments (1990) in South Africa might make this strategy somewhat redundant, nevertheless some of the projects, once operational, would still be viable in competition with South African sources and any future regional system including South Africa would have to relocate some facilities in the rest of the region.

The South African imports include special low sulphur and low phosphorus grades of coal and coke which are used as a reductant in Zimbabwe in the smelting of chromite ores by Zimasco (Union Carbide) at the rate of about 50 kt/annum each. An alternative source for the coal has been found in Zimbabwe in the Sengwa coal field and Rio Tinto Zimbabwe and will start production in 1990, as soon as the road connecting the field to the district capital of Gokwe is completed. This project will not only save forex for Zimbabwe but will open up the hitherto isolated areas of Sengwa and Siabuwa and make the central part of Lake Kariba more accessible. The project is financed by Rio Tinto Zimbabwe from their own sources, with a minimum of forex, and the access road is being constructed by the Zimbabwean government. Unfortunately, although the Sengwa coal has exceptionally low phosphorus and sulphur content, it has no coking (swelling) properties and therefore cannot be used to replace the imported South African coke. However, the coking coal produced by Moatize Colliery in the Tete Province of Mozambique is of suitable quality and a SADCC mining project on the feasibility of constructing coking ovens at Moatize will be undertaken in 1990². The coke would be transported by road (truck) to Zimasco in Kwekwe as the rail connection from Moatize to the Beira line is out of action due to MNR (Renamo) sabotage.

Swaziland has a seemingly strange situation whereby it imports about 160 kt/an of coal from South Africa and it exports a similar amount of coal to Kenya and South Korea. This is because the boilers that consume South African coal were designed in that country for its coal. In 1988 the SADCC Mining Ministers Meeting approved a project to study possible adaptations to Swazi coal burning equipment to allow local coal to be used. Swaziland is also the only source of semi-anthracitic coal in the region which could provide the raw material for the manufacture of Soderberg electrode paste (for smelting furnaces in Zambia and Zimbabwe) which is currently imported from South Africa at the rate of about 12 kt/an. A Zimbabwean subsidiary of a British company, Fosco, has attempted to manufacture paste using local graphite instead of anthracite, but the trials carried out at Zimalloys were unsuccessful. However, it is hoped that the planned establishment of a plant for the distillation of coal tar at Kwekwe, by the Industrial Development Corporation, will provide the materials necessary for the local manufacture of electrode paste. A project to study the feasibility of producing electrode paste in the region was approved by the SADCC Mining Ministers in 1987 but still awaits funding.

The Maputo power station in Mozambique currently imports all its coal from South Africa at the rate of about 80 kt/an as it is cheaper than bringing it from Moatize, but the possibility of using Swaziland coal, which is closer than South African, has apparently not been investigated. However, as with Swaziland's boilers, it is possible that the Maputo power station was designed for the use of South African coal.

The other chromite smelter in Zimbabwe, Zimalloys, imports about 50 kt/annum of burnt lime from South Africa for low carbon ferrochrome production. The company has assessed numerous deposits in Zimbabwe and in the region but none has had the suitable properties of low sulphur and phosphorus and strength. The high grade limestone deposit at Mwanza in Mozambique that used to be quarried for cement production at Dondo, is considered to be the most likely source but it has been impossible to obtain samples of the rock due to MNR activity in the area, though a fresh attempt will be made in 1990. If the deposit proves to be suitable it will also be tested for suitability for the proposed acetylene/polymer plant in Gweru based on high grade limestone. Initial experimentation for this project at the Zimalloys smelter in Gweru was done on the burnt lime imported from South Africa as local metamorphic (reheated) limestones tend to disintegrate on firing. In the event that the Mwanza deposit could be used for both it would then probably be worthwhile extending the current area of Zimbabwean military presence from the Beira Corridor seventy kilometres up the line to the quarry. A study carried

out by Austroplan of Vienna in 1989 on lime in the SADCC region³ strongly recommended the investigation of the Mwanza deposit for this purpose as soon as possible.

About 2.5 kt/an of ferrosilicon used to be imported from South Africa for steel making at Zisco in Zimbabwe, but from 1988 Zimalloys has managed to produce a small amount to substitute for this import. Zimalloys are also considering the production of a low aluminium ferrosilicon for export onto the world market. This substitution for a South African sourced mineral import came about without any initiative from the SADCC Mining Unit. When asked why a South African owned company was willing to aid in the substitution of South African imports, an executive of the company replied that they saw no contradiction and so long as the project was profitable and the product was not produced in South Africa by their company they would be willing to consider it⁴.

Manganese ore is currently imported from South Africa by Zimalloys for the production of ferromanganese (about 5 kt/an) for Ziscosteel⁵ in Kwekwe and some small foundries. Ore from a Zambian deposit near Kabwe has been imported successfully but it has been difficult to find an operator capable of regular low-priced supply⁶. Zambia currently mines, on a small scale, a deposit near Mansa for battery production, but it would be costly to get this ore to the nearest railhead (Tazara). This is another regional initiative that has had no input from the SADCC Mining Unit, even though it is based in Lusaka.

Bentonite clay for foundry moulds and animal feeds is currently imported from South Africa but a deposit exists in the region near Maputo in Mozambique. This deposit (Luzinada) has been the subject of a SADCC mining sector study⁷ to develop it for the regional market, possibly as a joint venture with G & W Industrial Minerals, a Zimbabwean state owned company (IDC). The assessment concluded that the plant could produce 6 kt/annum for the local, regional and export markets, but that further work was required to accurately delineate the reserves. Since 1988 G & W have been importing the Luzinada product under the joint Zimbabwe - Mozambique trade protocol whereby each country can import products that are on two approved lists, up to a predetermined ceiling, every year. The Institute of Mining Research in Zimbabwe has carried out a series of tests on the Luzinada bentonite to determine its characteristics which have been found to be suitable for a range of local uses⁸.

The region currently imports all of its calcium carbide (for acetylene for oxy-acetylene welding), cyanide (for gold extraction), caustic soda (for paper and textile industries), hydrochloric acid, sodium hypochlorite, liquid chlorine and PVC (plastics) needs, mostly from South Africa, which will, in part, in the future be met by the proposed Zimalloys, IDC, Tregers and Prodorite⁹ project based on limestone in Gweru. The first phase of this project will require a new furnace for the manufacture of calcium carbide from calcined lime and Wankie coke which will be further processed to produce calcium cyanide, acetylene and calcium hydroxide. The second phase of the project (polymers) will be based on imported salt (NaCl) from the Sua Pan project in Botswana from which caustic soda (NaOH), hydrochloric acid (HCl), sodium hypochlorite and chlorine will be produced and PVC's will be manufactured from the acetylene, from the first phase, and the hydrochloric acid. This would be an essentially Zimbabwean venture but there is an excess capacity (the minimum economies of scale were larger than current Zimbabwean consumption) which could be taken up by the region or the projected increase in Zimbabwean plastics demand once PVC is freely available. It is envisaged that the whole project will cost about 400 MZWD, two-thirds in foreign currency, and it has been put out to tender to two groups of companies, one Japanese and one European. However, this project does not go very far in reducing dependence on South Africa as the burnt lime that it is based on is imported from South Africa as there are no suitable local deposits (see above, lime).

It is interesting to note however that this mineral-resource-based industrial project, which involves the resources of two or possibly three SADCC states (Zimbabwe for power and coke, Botswana for salt and possibly Mozambique for limestone) and whose products could be used by all the SADCC states, came about with absolutely no input from either the SADCC Mining Sector Coordinating Unit in Lusaka or the SADCC Industry Sector Coordinating Unit in Dar es Salaam.

The large Sua Pan project has already been mentioned in the Botswana chapter and will make the region theoretically self-sufficient in soda ash, salt and possibly caustic soda. Although this project will increase the range of minerals and mineral products available for regional industrialisation, it is not as straight forward as it seems and warrants some attention as it brings out some of the problems of the South African dimension of "collective self reliance". Initially, in the sixties and seventies, the project was considered with the South African market in mind as they import all of their soda ash needs. In the early eighties a synthetic soda ash plant was being considered in South Africa and in 1984 a Botswanan delegation went to South Africa to try and attract interest in the Sua Pan project as a viable alternative to the proposed synthetic plant, but the Botha government of the time informed them that they were not interested unless Botswana agreed to sign a "Nkomati" type non-aggression pact first. Botswana did not feel that any such agreement was necessary as their policy already did not permit any of the liberation movement's combatants to operate from their country. They then looked to the SADCC as a possible market for the project and in 1987 a SADCC mining sector project to look at the regional market for Sua Pan and Lake Natron (see Tanzania chapter) products was approved and subsequently carried out by MDPA-Ingénierie of France with funding from UNDP¹⁰. But before the study was completed the South African government withdrew their non-aggression pact pre-requisite and the project was taken over by AECI¹¹ (an AAC subsidiary) for production for the South African market. Hence the SADCC mining sector ended up financing a market study of the region for a South African company for a project that flies in the face of the basis of the SADCC, as it will ultimately increase regional dependence on the Republic, both as the resource operator and as the principal market.

All of the region's alumina and aluminium requirements are currently imported, except that Zimphos¹² in Harare treats bauxite from Mozambique for the manufacture of aluminium sulphate for water treatment. In 1989 Austroplan carried out a regional study for the SADCC Mining Sector funded by UNDTCD¹³ on the potential for the establishment of an alumina and aluminium industry in the region¹⁴ which concluded that the regional market for aluminium, if freely available, would be about 15 thousand tonnes per annum and that the potential demand for bauxite for the production of aluminium sulphate could be about 60 kt/an, based on Zimbabwean per capita consumption. The study recommended that a detailed feasibility study be carried on the establishment of either a 15 kt/an Al capacity plant (about 165 MUSD) for the regional market or a 125 kt/an Al capacity plant (about 840 MUSD) for the regional and export markets, based on the Mulanje bauxite deposit in Malawi, Mozambican hydropower (Cahora Bassa) and Malawian coal and lime. The caustic soda for bauxite calcination could come from the Sua Pan project and the coke from Moatize (Mozambique) but the cryolite would have to be imported. Given the fluid situation in South Africa this project could also consider the possible future (post-apartheid) export of alumina to the Alcan (Al) plant in South Africa at Richards Bay, as South Africa has extremely limited bauxite resources. This would entail a mix of the two options namely the large scale plant for alumina and the small scale (15 kt/an) plant for aluminium. The study also recommended that the Manica bauxite deposit in Mozambique continue to be exploited for the production of aluminium sulphate in Zimbabwe, expanding if necessary for the regional market; however, a study by a Zimbabwean consultant¹⁵, contracted by Mozambique, considers that it would be better to make alumina trihydrate ($\text{Al}(\text{OH})_3$) using local lime and Botswana soda ash for export to other SADCC countries to make aluminium sulphate and other alumina derivatives.

In 1989 a study of the possible regional utilisation of coal was carried out by the Commonwealth Secretariat's Industrial Development Unit (IDU) with a private consultancy company, Monenco¹⁶, which concluded that no new development of coal mines was necessary as most mines were operating below capacity but recommended rather that the existing power stations be rehabilitated to increase their capacity. The report however notes that the, currently shelved, Mozambican plan for the development of the Moatize coal field to produce metallurgical grade coal would also produce 10 to 15 million tonnes of reject coal annually¹⁷ which could provide the basis for a local power station to supply the region, but as the nearby Cabora Bassa hydroelectric power station already has the potential to immediately produce 2000 MW and in future a further 1600 MW, this would be a long term regional project. However, the Zimbabwe Electricity Supply Authority plans to purchase Cabora Bassa electricity from 1994, which would allow for an expansion in ferrochrome smelting and exports.

Unfortunately the IDU report does not consider uses of coal other than energy and metallurgy, such as gas (fertilizer), chemicals and fuels. The IDC in Zimbabwe, together with private interests, is planning to establish a coal tar distillation plant to produce a wide variety of chemicals, in Kwekwe, based on tar from the new Zisco and Wankie coke works, but the project has no overt regional dimension¹⁸ other than that products surplus to Zimbabwean demand will be available for export to other countries in the region. Another initiative in Zimbabwe¹⁹ is considering the exploitation of methane for ammonia production (for fertilizer) via coalbed extraction from deep-seated, heat altered and preferably underwater coal seams, that would never be economic to mine, which could well be viable in other SADCC countries with deep uneconomic coal resources such as Botswana, Zambia and Mozambique.

The Commonwealth Secretariat study also recommends several regional projects on the use of coal or coal briquettes to replace firewood consumption. Deforestation in the SADCC region is a problem requiring urgent attention and there have been several studies on the use of coal as an alternative fuel in both Zimbabwe²⁰ and Zambia²¹ which have tentatively concluded that they could be a viable alternative if priced competitively. The Zimbabwean briquettes, developed by the Institute of Mining Research, based on waste coal and coke fines, did not require carbonisation or binders, making their unit cost lower than the Zambian prototype²². A regional briquetting plant based at Wankie Colliery on the line of rail could possibly supply south-western Zimbabwe (Matabeleland), southern Zambia and eastern Botswana, but a project of this nature would fall under the SADCC Energy Sector for coordination.

In addition to the above projects where the regional offtake of the mineral or mineral-based product would be high or where production reduces dependence on South Africa, there are numerous development prospects for minerals currently not produced in the region but where the regional consumption is low or where the only regional producer is in difficulties. These prospects would therefore primarily be developed for the export and/or domestic markets and thus only have a marginal regional impact, but many have nevertheless found their way onto the SADCC Mining Sector programme. These include support for coal mining in Mozambique and Malawi, exploration for further reserves for the Kabwe (Zambia) lead/zinc deposit, development of vermiculite mining in Zimbabwe and Malawi, assessment of heavy mineral sand deposits in Mozambique, Malawi and Tanzania, tin mining in Zimbabwe, phosphate production in Angola and fluorspar mining in Zambia. In many cases, where several countries have been interested in developing the same mineral, a joint project has been devised to study the potential for its development in the region, thereby giving the project a "regional" dimension so that it qualifies to be put on the SADCC shopping list for funding, even though the individual country components have no regional aspect. Examples are a study of gypsum production in the region and the reassessment of the iron ore deposits in Swaziland and Angola.

However, it should be borne in mind that even if one member state produces enough of a certain mineral to satisfy the region's needs, it still does not follow that all the other member states will automatically import it from this producer for a variety of reasons including the soft currencies of most SADCC states, the direct price (it might be cheaper for a coastal country to ship the mineral in from a non-SADCC producer rather than rail it from a SADCC member) and indirect price: due to export credits and commodity aid programmes the final price of a non-regional source is sometimes lower than the regional source even though the list price may be higher. For the SADCC mineral sector to take advantage of the larger regional market, the SADCC would have to move towards some form of trade integration.

Several national mines are receiving SADCC support because they are considered strategic to the region in that there are no other local sources of the mineral/s such as lead/zinc (Kabwe) and tin (Kamativi). However, the conservation of these resources for current and future regional consumption has not been considered and the bulk of the output of these minerals continues to be exported outside the region, even though in the original 1981 document proposing mining as a sector for regional cooperation²³, the issue of conserving certain strategic mineral resources was raised:

“Depletion rates must be examined to ensure that when regional economic growth begins to accelerate essential minerals and metals will still be available in Southern Africa”²⁴.

In conclusion, there are evidently numerous minerals that could be developed for the regional market or where current production could be expanded for regional demand. Several studies have cited the lack of complementarity in SADCC exports as being a factor inhibiting intra-regional trade and integration²⁵, but this is only true for the major export minerals (copper, diamonds, ferrochrome, etc...) and not for numerous mines producing industrial and smaller scale minerals. Also, the complementarity in mineral resources is much higher than minerals produced (for export to the developed countries). Because some minerals with a high local demand (such as lead and zinc) are being mined out, regional planning should take on the problem of strategic mineral depletion rates as a matter of urgency.

Fertiliser Minerals

The large majority of SADCC citizens are peasant farmers whose life depends on agriculture. The regional agricultural sector is by far the largest in terms of contribution to GDP and employment, and is the second largest source of export receipts, after minerals. Unlike mining, the regional agricultural sector has numerous linkages with other industries such as food processing and textiles, on the downstream side, and fertilizers, pesticides and agricultural machinery, on the upstream side.

“Throughout the SADCC region there is a predominance of highly leached, acidic soils with relatively little organic matter, low nutrient content and retention capability. The need for regular applications of fertilizers to improve crop yields on major land areas and to maintain output levels in the more intensive farming regions, is apparent. Considerable areas of cropped land are not receiving fertilizer applications at all and, in general, where fertilizers are applied, rates of usage are well below recommended levels”²⁶.

The regional market for fertilizers is substantial and the potential market is huge. It has been estimated that 65 to 70% of fertilizers consumed in the region are imported²⁷ even though the region has several sources for all of the main fertiliser materials. These have been described in the country chapters and

are natural gas for the manufacture of nitrogen fertilizers (Angola, Mozambique and Tanzania), coal for the manufacture of nitrogen fertilizers in Botswana, Mozambique, Zimbabwe, Malawi and Tanzania, hydro-power for the manufacture of nitrogen fertilizers in Zimbabwe (operational), Zambia, Mozambique, Angola (potential) and Malawi (potential), pyrites for sulphur in Zimbabwe (operational), Zambia (operational), Tanzania, Angola and Mozambique, phosphate rock for phosphatic fertilizers in Zimbabwe (operational), Angola (pilot plant), Tanzania (semi-operational), Mozambique, Malawi and Zambia, brines for potassic fertilizers in Botswana (under development) and Tanzania, and lime/limestone for soil conditioning in all SADCC states²⁸. In addition, fertilizer and construction minerals are currently the most integrated into the regional economy (phosphate in Zimbabwe and Tanzania, pyrites in Zambia and Zimbabwe, coal (nitrogen) in Zambia and lime/limestone in all countries) of all minerals with evidently strong linkages to the agricultural sector and cross linkages within the mining sector (such as pyrites mining for sulphuric acid manufacture for the treatment of phosphate rock concentrate).

Nitrogen constitutes 56% of regional current fertilizer nutrient demand and is produced in Zimbabwe using Kariba hydropower and in Zambia from coal gasification, but both plants are expensive and fail to satisfy the domestic markets let alone the regional market. Two studies on the SADCC fertilizer situation²⁹ have recommended that a regional facility should be based on the most economical process which is the natural gas route. Three countries have suitable natural gas reserves, Angola (Soyo), Mozambique (Pande) and Tanzania (Songo Songo) but the 1984 regional fertilizer study³⁰ suggests that the Tanzanian Kilamco facility should be the regional facility as it already has proven reserves and has been shown to be feasible for the export market³¹. In addition it is better situated for regional supply than Soyo and does not have a security problem like Pande has.

Zimbabwean phosphate production is based on a low grade carbonatite apatite deposit. This is a hard ore which requires extensive grinding before being treated with expensive sulphuric acid made from pyrites. This results in phosphate fertilizers in Zimbabwe priced well above that of the world market³², but available in local currency. However, the SADCC region has several phosphate rock deposits that are of a much higher grade and more amenable to processing such as Minjinji in Tanzania, which is already exploited for the Tanga Fertilizer Plant but is some distance from the closest railhead, Evate in Mozambique, which is close to the Nacala railway, and in Angola at Kindonacaxa, on the coast, and Mongo Tando in Cabinda, all of which could be developed for the regional market, but, in terms of access to the regional transport system the Minjinji or Evate deposits are better placed.

The two main regional resources of soda ash are the brines of Sua Pan in Botswana and Lake Natron in Tanzania. The former is the basis of a large 300 MUSD development project by AECI³³ to supply the South African market and has been discussed above. A regional SADCC fertilizer study recommended that the extraction of potassium chloride for potassic fertilizers be undertaken at Sua Pan³⁴ for the SADCC market and that the Lake Natron trona continues to be exploited for the immediate local market only, as Kenya is already a major producer of soda ash and exporter to the East African region³⁵.

Pyrites is used both for the manufacture of sulphuric acid for the production of phosphate fertilizers and as a conditioner for sulphur deficient soils. Regional sulphur production is mainly in Zambia, where it is recovered during the smelting of copper sulphide minerals and from iron pyrites, but most goes into hydrometallurgical uses (copper leaching). In Zimbabwe sulphuric acid is manufactured from iron pyrites (Iron Duke), but large quantities are lost into the atmosphere, as pollution, from the nickel and copper smelters at Alasko, Bindura and Eiffel Flats and from the gold roasting plant in Kwekwe. All of these operations claim that the sulphur volumes are not high enough to justify the installation of

recovery equipment. Further sources of sulphuric acid will be required in the region for the treatment of phosphate rock deposits and these would be best obtained, in the first instance, from the scrubbing of sulphur emissions from the region's sulphide mineral smelters and thereafter from the numerous deposits of pyrites.

Lime and limestone are used throughout the region as conditioners for acidic soils and, due to the existence of numerous deposits, quarries can be opened near demand rather than the creation of large regional facilities. In this regard a study on the development of lime production in the region³⁶ recommended that a series of small lime plants should be constructed to satisfy demand in each member state, except for Lesotho and Swaziland which have no deposits of economic size. Regional strategies in this regard would be more in the area of sharing appropriate production technology experiences rather than regional supply facilities.

Given the number and variety of fertilizer minerals in the region and the great importance of fertilizers to the regional agricultural sector and the majority of the population, the peasantry, regional strategies in this regard would appear to be appropriate for the exchange of data on small scale production and the establishment of large scale facilities for the regional market, but this would require a commitment to purchase unless the facility was based primarily on exports outside the region, such as the Kilamco project in Tanzania. The SADCC Mining Sector is currently considering the establishment of a centre for agro-minerals research together with the Agriculture Sector and the Industry and Trade Sector³⁷.

A UNIDO sponsored study of the SADCC mining and mineral resource-based industries concluded that, given the crucial importance of fertilisers to regional agriculture and food security,

“SADCC is recommended to set up a Fertiliser Board whose brief would include: i) an assessment of the subregion's fertiliser potential and requirements, ii) the preparation of a blueprint for collective self-reliance in phosphate and nitrogen fertiliser, iii) (make) recommendations concerning the coordination of fertiliser facilities, existing and projected, iv) information dissemination, training, etc...”³⁸.

This proposal should be taken up because, although the SADCC structure has no trade mechanisms making the establishment of regional facilities difficult, the fertiliser sector is of such importance to the region that it is one of the few areas where regional facilities based on a commitment to purchase might gain the support of all member countries. The supply of cheap and abundant fertiliser would benefit almost all classes in the SADCC. Firstly the farmers and peasants who would increase their output and returns, secondly the working class as more efficient agriculture should lead to cheaper basic foodstuffs, thirdly the bourgeoisie as, if the workers have cheaper food, they could possibly pay lower salaries and finally the government as they would collect more revenues and import less foodstuffs.

Iron and Steel

The development of an iron and steel industry is generally held to be vital for any type of industrialisation and the SADCC states have both individually and collectively looked at the establishment of facilities to serve their nations and the region. A survey of the iron and steel sector in the PTA and SADCC countries in 1986³⁹ noted that although the region had an abundance of basic steelmaking materials (iron ore, coal, coke, limestone, quartzite and alloying materials such as chromium, nickel, manganese and cobalt) it still imported about 600 kt/an of semi-finished steel products, mainly plate products, and 500 kt/an of finished engineering products, mainly transport equipment (vehicles), and had one of the lowest per capita consumptions of steel in the world (10% of Latin America and 20% of Asia).

In the early eighties steel consumption in the SADCC was about 720 kt/an and in the PTA plus SADCC about 1.2 Mt/an, which was projected to grow to over one million tonnes per year by 1990 in the SADCC alone. Over three-quarters of the regional steel making capacity is in Zimbabwe which has the only integrated steelworks (Ziscosteel), with the rest being mini-mills operating on a mix of billets/ingots and scrap, but overall capacity utilisation was only 73% for the 1981-1983 period⁴⁰. The aggregate rolling capacity for the region is about 1.6 Mt/an exceeding the steelmaking capacity by 57%, but utilisation is estimated to only be one quarter of capacity, partly due to severe ill-match between production capacity and consumption patterns, which leads to a high level of imports, particularly for plate products as there is currently no sheet rolling mill in the region, though Zisco plans to install a flats mill by 1993.

Other than plate products, the region has excess rolling capacity for most shaped products but imports are also made for these as a result of the low capacity utilisation in turn due to the old, sometimes obsolescent, machinery, poor maintenance, lack of spare parts, lack of raw materials and the acute shortage of skilled manpower. Another reason for the high level of imports is that, and for the same reasons, local production prices are often higher than those for the industrialised countries, meaning that some countries will rather import from the West than from their neighbours. This tendency is aggravated by the industrialised countries subsidy of their steelworks' exports to the region through export credits and import commodity programmes.

The iron and steel sector would therefore be a prime candidate for regionally coordinated strategies for rationalisation, not only because almost all the production and rolling facilities to satisfy regional demand are to be found in the region, but also because this is probably the most vital sector for industrialisation. Yet, notwithstanding this, several SADCC countries are seriously considering establishing their own integrated steel plants, particularly Zambia and Tanzania, at great cost, which will lead to an even greater regional overcapacity. Although this makes absolutely no sense in terms of regional integration, it makes sense in the individual national economies where industries based on steel products are running well below capacity, with severe effect on their customers (such as agriculture and mining), due to a shortage of forex to buy basic ferrous raw materials. If they were to develop their own steel industry they would be able to supply their manufacturing industry with iron and steel without the need for forex, though the initial plant and equipment would have to be paid for in forex, resulting in a forex component of up to 50%⁴¹ for the duration of the forex loan.

The regional study, referred to above, concluded that regional iron and steel production and rolling capacity was more than sufficient, except for plate and sheet and therefore the main task to attain self-sufficiency was to increase capacity utilisation and not to establish new capacity⁴². The report recommended that the production of the few new product lines necessary (special steels, high alloy steels and plate/sheet) should be at Zisco due to the high technological level of operation necessary. It would therefore seem feasible for the region to have one central integrated iron and steelworks located at Zisco in Zimbabwe which supplied the numerous mini-mills (arc furnaces) with billets, both of which could then supply the regional rolling mills with suitable feed. New capacity would only be needed if there was greater than 70% capacity utilisation in the region's rolling mills and if the necessary capacity for sheet rolling was installed⁴³. This new capacity could come from a combination of expanding Zisco's capacity to its full rating (about 1 Mt/an), increasing the regional scrap collection efficiency to increase output from the mini-mills (arc furnaces) or a new direct reduction plant (DRI) in Tanzania (Liganga, SL/RN), based on coal (Ruhuhu), or Mozambique (Honde), based on natural gas (Pande). The UNIDO report suggests that the Angolan natural gas could best be used for the planned Soyo fertilizer production project rather than a DRI plant, but given adequate gas reserves a DRI plant based on local

iron ore (Kassinga or Kassala-Kitungu) could be feasible, which is considered in another regional report done for a different branch of UNIDO in 1985⁴⁴.

In 1989 Ziscosteel announced a major investment plan of 1.2 GZWD⁴⁵ comprising three projects, each about 400 MZWD. These are the Flat Products Project for which a slab caster, a hot rolling mill, cold rolling mill⁴⁶ and a galvanising facility will be purchased, the Ripple Creek iron ore mine expansion project⁴⁷, and the general rehabilitation and modernisation project which will result in a change to continuous casting in all divisions by 1995. The flats facility will have a capacity of 400 kt/an (of which 200 kt/an will be used, mainly for the local market) which should be operational by 1993 and will make the region self sufficient in flat products. However, the UNIDO study notes that:

“Whereas Zimbabwe’s decisions in substantial part must be based on its self-interest, it is of paramount importance that the country plans sectoral investment and production in conjunction with other countries in the sub-region.”⁴⁸

The Ziscosteel investment plan takes the domestic market as its baseline in terms of the feasibility of the expansion, but includes the potential regional market in terms of capacity. An example of this would be the new rolling mill which has the capacity to supply the whole PTA and SADCC region, but will commence at half capacity for the guaranteed home market.

Dan Ndlela in his survey of the regional iron and steel industry emphasizes the important linkages between the iron and steel sector and the capital goods sector which are vital for integrated industrialisation. The capital goods sector itself provides many of the necessary inputs to the iron and steel sector in terms of mining machinery and spares, minerals processing equipment and consumables, iron smelting plant and equipment and equipment to provide the necessary inputs such as limestone, coke, quartz, ferroalloys, refractories, etc...

“On a regional perspective planning and coordination of iron and steel production is a crucial variable not only for achieving self-reliance but even more importantly if these countries are to avoid over production and subsequent underutilized capacities...”⁴⁹

But this obvious form of integration has not come about in the decade since the formation of the SADCC due mainly to the fact that SADCC has made no progress in creating mechanisms for the realisation of the regional market which is essential for the planning of a regional iron and steel strategy, other than the, by no means unimportant, rehabilitation of the regional infrastructure. This has meant that four other SADCC countries have plans for their own primary iron and steel production (Angola, Mozambique, Tanzania and Zambia⁵⁰), two of which are in an advanced stage of planning (Tanzania and Zambia) and one of which, Zambia, is likely to go ahead, even though this is most probably the least feasible of the four. But it makes the most sense in Zambian terms as it is the region’s largest net importer of iron and steel.

To ensure greater regional capacity utilisation the steel plants need a reliable supply of currently imported raw intermediate products such as ferroalloys, graphite electrodes, refractories and chemicals, the raw materials for many of which are available in the region. A regional strategy would also therefore include an assessment of the feasibility of establishing industries based on local minerals to produce the necessary intermediate products. Most of these are under assessment or are planned, such as the production of ferroalloys (ferrochrome, ferromanganese and ferrosilicon), refractories and electrodes (see section on “Mining Inputs Manufacture”).

Both studies⁵¹ point out that growth in the engineering sector is essential for promoting steel demand and that the “pull” effect of demand has been shown to be more important than the “push” effect of local steel production. Hence...

“...the development of engineering should be seen as a precedent for the development of an iron and steel industry rooted in sub-regional demand.”⁵²

In the early stages of development most of the demand for steel comes from the construction sector which uses mainly only slightly transformed products (bending and joining), but with further industrialisation the vital engineering sector becomes the main customer. It transforms iron and steel into both capital goods (plant and machinery) and consumer durables (white goods, transport equipment). The only basic engineering sub-sectors for which iron and steel (and alloys) are not the most important raw material are the electrical equipment (including electronics) and scientific equipment. In terms of iron and steel based imports into the region, the most important sub-sectors of the engineering sector are road vehicles (over half) and metallic structures (one fifth). The share of the engineering sector in manufacturing value-added is typically 40 to 50% in industrialised countries and around one-third in newly industrialising countries, but is less than 10% in the SADCC⁵³.

A study on the regional tractor industry estimated that the region spends about 45 MUSD on tractor and tractor components imports in the mid-eighties⁵⁴ and projected regional demand by the 1990's is estimated at about 13,700 tractors worth about 140 MUSD in forex. Currently the region imports a wide variety of different tractor makes from numerous countries depending generally on the bilateral aid and barter⁵⁵ arrangements of each country. However, if the regional tractor supply was standardised to one or two less than 45 HP⁵⁶ and one 45 to 100 HP⁵⁷, a company in Zimbabwe, which currently produces a 24 HP and a 45 HP tractor with 40% local content⁵⁸, predicts that, with the regional market, it would then be viable to cast the engine blocks and make the gear boxes locally, thereby reducing the forex component to almost zero. In addition both the study and the above company emphasize that the demand for a tractor available in local currency would be well above the figures cited. Similar economies of scale would apply for other engineering goods such as motor vehicles, particularly trucks, for which the region spends hundreds of millions of USD annually in forex.

Current and planned capacity in the regional iron and steel industry appear to be adequate and future expansion will have to be led by an expansion in demand particularly through the development of the engineering sector. But this development will to a large part be dependent on the size of the local market for engineering products (such as road vehicles and accessories) and capital goods which will in turn be dependent on the level of integration of the small domestic markets. Therefore, due to the complex linkages between the mining sector and the industrial sector in the development of a regional iron and steel industry, including the mineral-based intermediate products necessary for iron and steel production, and considering the crucial importance of this sub-sector, it would appear to be advisable to establish a specialised SADCC unit for the rationalisation and development of the regional iron and steel industry, comprising representation from both the industry and mining sectors. This sector is by far the most important in terms of a mineral-based regional industrialisation strategy, and would arguably benefit the most from the economies of scale possible through regional economic integration. The 1984 UNIDO study also recommended the establishment of an Iron and Steel Board to coordinate the development of this vital sector⁵⁹.

Mining Inputs Manufacture

The regional mining industry is not only the principal forex generator but it is also most probably the largest consumer due to the generally capital intensive nature of mining. In Zambia the mining industry estimates that it needs to directly retain about 40% of its earnings⁶⁰ for essential imports to keep operational. The industry also consumes forex indirectly through the local purchase of goods with a forex component and the use of the national infrastructure which has a forex component. In Tanzania mining companies are allowed to retain 70% of forex earnings to import not only essential mining inputs but also consumer goods to motivate the workforce, and a similar system exists in Mozambique. In Zimbabwe the industry is directly allocated only about 15% of its earnings but due to the relatively advanced mining machinery and consumables industry in that country, which imports a variety of raw and intermediate goods, the true figure is about 25%⁶¹. Overall, a rough estimate for the regional forex consumption of mining, excluding oil, would be around 50% of forex generated. This means that approximately only half the forex generated by mining is available to import goods essential for the development of the rest of the economy.

A study done in 1985 on mining equipment, manufacturing, repairing and reconditioning facilities in the region⁶² looked at the regional consumption by the mining industry of 37 categories of equipment including rubber products, metallic products, electrical components and assembled components⁶³ and found that of the 300 MUSD/an spent at that time on these items 63% was imported and of the 37 categories 24 were already manufactured in the region, mainly in Zimbabwe and Zambia who together accounted for 83% of the total value of annual purchases. It was noted that the current import figures err heavily on the low side as they represent what the industry was allocated rather than what it needed. The study discovered a surprising range of facilities capable of mining machinery and spares manufacture, but most of these were grossly under utilised mainly due to a shortage of forex both to maintain capital equipment and to purchase imported raw materials and intermediate products. Most of the plant and machinery of these facilities was old and outdated and in dire need of replacement, which resulted in inefficient production. In addition there is a high degree of supply and demand complementarity meaning that most of the currently imported items could be catered for by increasing the output and range of facilities already in place in one or more countries. It was also noted that most of the items currently not manufactured in the region, could be catered for using existing methods and would require the acquisition of no new technology and, furthermore, the region had all the necessary raw materials. The study recommended that a central regional office be created to...

“...help coordinate existing manufacturing facilities in the region (and) to establish a detailed data base of the facilities available within the region (to) assist local mining companies to purchase locally manufactured goods... This office would also highlight and analyse the effects of present intra-SADCC trade barriers to encourage their reduction.”⁶⁴

In this regard the Nordic countries have funded an expatriate mining engineer⁶⁵ who, with a Zambian mining engineer, will constitute this “office” and set up the databank from 1990. The 1985 study also isolated several specific areas that later were accepted as SADCC projects: these are the regional rationalisation of rock drills⁶⁶ and drill steel manufacture, wear resistant liner manufacture and the range of rail track and fittings manufacture. The expatriate mining engineer and his counterpart are also expected to execute these projects over the next few years. Zimbabwe already runs a database on all forex allocations directly to the mining industry⁶⁷ since 1986⁶⁸ which contains data on the type of equipment, the value, the supplier and the customer (mine). By 1990 it had over thirty thousand records and is maintained by a full-time operator. The database is aimed at local manufacturers who are interested in

assessing the market for imported equipment and spares. A database that covers all SADCC countries and that also includes all the regional manufacturers can be expected to have in the order of 10,000 records per year and would need at least three full-time people to maintain it.

Heavy mining equipment such as dozers, off-road loaders and trucks, scrapers, LHDs⁶⁹, drilling rigs, drifters, etc... are all imported and the above study did not consider their manufacture to be feasible due to the small numbers imported and their diversity, except in terms of spares, but there have been some one-off cases where drilling rigs have been manufactured in the region with certain imported parts and small dump trucks are manufactured in Zimbabwe with imported engines. The regional market may well be large enough to support the manufacture of one or two standard sized underground drifters, possibly utilising the rock drills already manufactured in Zambia, and an expansion of dump truck manufacture/assembly may be viable. This would appear to warrant further investigation.

Other areas isolated by the 1985 study⁷⁰ that required the investigation of regional rationalisation of manufacturing facilities were for pumps and spares⁷¹, all types of cable, protective clothing, electric motors, and nuts, bolts and washers. The report also recommended the investigation of the feasibility of manufacturing spares for off-highway trucks and loaders, for reconditioning special size tyres and for rehabilitating existing unused or under-utilised manufacturing facilities. The SADCC Unit has not produced projects to cover these areas, possibly due to the fact that they are not exclusive to the mining industry but are items also used by other sectors of the economy. However, they do not appear on the SADCC Industry Sector's shopping list of projects either and would therefore warrant further action.

Surprisingly, the study did not consider the proposed "Parts Manufacturing Facility⁷²" in Zambia which, in 1984, was based on a survey of parts consumption by all of ZCCM's divisions and will manufacture about 800 parts that have a high turnover and are relatively high forex consumers. The 1984 forex cost of the facility was 17 MUKP and it was estimated that it would save Zambia 28 MUKP per annum in forex⁷³. The buildings for the facility are complete and foreign concessionary finance is being sought for the machinery. The project might be combined with a similar initiative for the Indeco group of companies⁷⁴. Given the regional dimension, particularly Zimbabwe's spares consumption, this project could warrant reassessment as a regional facility. A major problem faced by any initiative to set up a regional parts manufacturing facility is the wide range of manufacturers of the same equipment currently imported by different countries.

"It would be imperative that standardisation of components take place and even so, there are likely to be exceptions which would still require the importation of certain items.... There must, however, be a willingness on the part of the user to make modifications and changes to his equipment to accommodate the standard sizes."⁷⁵

If standard machinery was used throughout the region, such as a standard range of electric motors, then the market for spares for the machinery and for the machinery itself would be several times greater than that at present and could well support regional manufacturing facilities. Because of this, the issue of standardisation has been taken up by the SADCC Industry and Trade Sector who have secured funding for a regional project on "Standardisation and Quality Control"⁷⁶ which includes sub-projects on the establishment of national standards bodies, the strengthening of existing standards institutions, standardisation and quality control training programmes and the harmonisation of regional standards and certification schemes.

One of the recommendations of the mining machinery study was for assessment of the regional explosives industries which was later carried out by the Commonwealth Secretariat in 1987, including

an assessment of mining chemicals, in a study entitled "Assessment of the Manufacture of Mining Chemicals and Explosives in the SADCC Region"⁷⁷. In terms of explosives the survey identified regional imports of about 23 MUSD (in 1987) which, as with mining machinery, could almost entirely be catered for by existing facilities, principally in Zambia and Zimbabwe. For NG⁷⁸-based explosives, current imports could be catered for by an expansion of output at Kafironda Explosives in Zambia by 2 kt/an to supply the Zimbabwean shortfall after the new production from the IDC/Nitro Nobel factory in Zimbabwe comes on stream (in 1991), while the long term deficit could be covered by increasing the capacity at either plant by 3 kt/an⁷⁹. The regional deficit of 2 kt/an for slurry-based explosives could be catered for by an expansion of the Samwari⁸⁰ plant in Zimbabwe, but as the shortfall was in the three SACU⁸¹ countries, it would be unlikely that they would switch from their current South African, tariff protected, suppliers. The report anticipated regional imports of 16 kt/an of ANFO⁸² explosives by 1992 and recommended that the feasibility of expanding the capacity of Nitrogen Chemicals of Zambia (NCZ) or the creation of a new line of production (porous prilled ammonium nitrate) at Sable Chemicals in Zimbabwe be assessed. With regard to imports of explosives accessories, the report noted that these could only be substituted for by the creation of new facilities and recommended that the thirty thousand metres of detonator cord and 28 thousand detonators consumed annually be manufactured at Kafironda in Zambia as that country was by far the largest regional consumer (about 50% in 1987). These strategies would make the region virtually self-sufficient in explosives and accessories. The IDC/Nitro Nobel explosives project in Zimbabwe will create a facility to produce a substitute (emulite) for a product already produced in a neighbouring country (Kafironda) with excess capacity.

The 1987 IDU⁸³ report estimated that the region imported about 21 MUSD of mining chemicals in 1987, the bulk being for Zambia. The small shortfall for zinc dust and shavings for gold recovery in Zimbabwe and Tanzania could be catered for by creating extra capacity in Zambia, the only zinc producer in 1987⁸⁴, or Zimbabwe where it is already produced. Calcium cyanide, also for gold recovery, will be produced in Zimbabwe if the carbide project goes ahead⁸⁵, as will caustic soda. However, given the large markets for caustic soda outside the mining industry, attention should be given to the IDU suggestion that redundant electrolytic refining facilities at Kabwe and Ndola (both in Zambia) be considered for conversion to caustic soda and chlorine production (for hypochlorous acid, HClO), over and above the small output related to the Zimbabwean project.

The third major method of gold recovery is the use of activated carbon (CIP, CIL, CIC⁸⁶) currently imported from South Africa. This could be manufactured in either Tanzania or Mozambique where the raw material, coconut shells, is available and a SADCC project to consider the feasibility of this will be funded by the Commonwealth Secretariat in 1990⁸⁷.

A special type of low silicon ferrosilicon is imported into the region (about 4.5 kt/an) principally for diamond recovery (HMS⁸⁸) in Botswana, Angola and Tanzania⁸⁹, but also for high carbon ferrochrome production (Zimasco), which could be produced as a byproduct of the proposed carbide project at Zimalloys. Zambia is currently importing aluminium sulphate which could be sourced from Zimbabwe where production is based on Mozambican bauxite. Other chemicals used by the mining industry such as sulphuric acid, electrode paste and lime have been dealt with under the section on mineral-based imports, above.

A major area of chemical imports to the mining sector is that of solvent extraction reagents, flocculants and flotation reagents (xanthates, frothers and sodium hydrosulphide) comprising the bulk (60% in 1987) of forex expenditure. Most are imported from South Africa and the feasibility of setting up a

manufacturing facility for these, some of which are already being manufactured⁹⁰, is to be followed up by the IDU with regional manufacturers.

South Africa is a major source of the SADCC's imports of refractories for mineral smelting and refining, mainly in the form of furnace bricks, yet although the SADCC possesses deposits of almost all the minerals used in the manufacture of refractories (alumina-silicates, magnesite, dolomite, chromite, graphite, olivine, quartzite, vermiculite, diatomite, perlite, etc...), there is only one producer and only of one type, fireclay refractories⁹¹. In 1989 a regional study on the feasibility of establishing a refractories industry in the region was carried out by Techro Mining of the UK funded by UNDTTC⁹² which concluded that, due to the small regional demand and the serious difficulty in penetrating the export market, a local plant to substitute for all refractories imports (70% Zimbabwe, mainly Ziscosteel) would be too small to be viable⁹³. In addition, due to the low quality of certain local raw materials deposits, the magnesia, co-chrome, calcined bauxite (alumina) and high alumina cements would have to be imported, though bauxite, graphite, chromite and kyanite could be sourced locally. Instead, the study suggests that the already existing producer, Clay Products in Bulawayo, be upgraded to produce the forecast increased demand for high-alumina products⁹⁴ plus a small quantity of magnesite refractories on a pilot scale using local magnesite calcined intermittent kilns (due to low demand) and an expansion of the current capacity at Redcliff for monolithic refractories. The 1990 SADCC Mining Ministers Meeting resolved to assess the investment necessary for this option (yet another study).

In conclusion, it is clear that there is a surprising degree of complementarity in mining inputs manufacture in the region and that in general much of the imported inputs could be catered for without major investments. However, even when all of these items are manufactured in the region, and the mining companies are made aware of the regional suppliers, it is likely that they will continue to source their purchases from outside the region (unless they are manufactured in their own country), as once they have been allocated the foreign currency they will feel no compulsion to buy in the region and often the forex is tied to purchases from a donor country under a commodity import programme.

Mineral Beneficiation and Transformation

The rationalisation at a regional level of mineral beneficiation⁹⁵, whereby ores and concentrates could be further refined in another member country before export, was the first area of possible cooperation in mining suggested in the original document proposing that mining became a sector for SADCC coordination⁹⁶ and was one of the first projects to be put up for funding by the Mining Unit in 1984. It failed, however, to attract any interest from foreign donors until 1990 when a Finnish mining engineer was seconded to the Unit to carry out the project⁹⁷. Yet this is virtually the only area where there has been any tangible success in regional coordination in mining in the last ten years, although none of the projects had any input from the SADCC Mining Unit. The largest and most spectacular success in this regard is the refining since 1985 of about 13 kt of copper-nickel matte from Botswana (Selebi Phikwe) in Zimbabwe at the Empress Nickel Refinery (Eiffel Flats) and the Bindura Nickel Refinery since 1985, which keeps about 23 MUSD in the region⁹⁸. After the closure of the Empress Nickel Mine, the refinery would have shut if matte had not been secured from Botswana⁹⁹. From 1989 the Empress Refinery started taking a further 2.4 kt/an of copper-nickel matte from the Selkirk Mine in Botswana that had been toll-smelted by BCL (Selebi Phikwe) for toll-refining, and from 1993, a further 6.5 kt/an of matte will be toll-refined in the same way from the future Phoenix Mine in Botswana.

Other examples of regional integration in minerals beneficiation are the smelting and refining of copper concentrates from Mozambique (Mundonguara) at Alaska¹⁰⁰ in Zimbabwe and the production of

aluminium sulphate in Zimbabwe at Zimphos from Mozambican bauxite (Manica). A problem with the successes in regional rationalisation of mineral beneficiation thus far is that in nearly all the cases the value-added takes place in one member country, Zimbabwe. There are, as yet, no cases of plans for Zimbabwean minerals to be beneficiated in other SADCC countries, though limited possibilities do exist.

In general there is not much further scope for further cooperation in mineral beneficiation as the major mineral producers (Zambia, Zimbabwe and Botswana) are situated in the interior of the region with long distances to sea ports to export their minerals; in order to increase the value to weight/volume ratio of their minerals they have actively pursued domestic policies of downstream beneficiation. This has resulted in a situation where very few minerals leave the region in an unrefined form. In fact the SADCC region has higher export beneficiation ratios for most minerals than South Africa¹⁰¹. The main exception is the 40 kt/an of copper-nickel matte from Selebi Phikwe that is refined at Kristiansand (Norway) by Falconbridge Nickel (now owned by Noranda)¹⁰². Because of Botswana RST's huge debt, they could never raise the capital build a refinery and RTZim have no plans to expand the Empress refinery to take all of the matte (from 15 kt/an to 55 kt/an), possibly because of the risk of having the feed come from another country and fears of repatriating their profits. However, with the new Zimbabwe investment code they may reconsider, but it is more likely that a refinery will be built in Botswana due its attractive investment regime and lack of forex problems.

Nevertheless, there are still some areas that could benefit from regional rationalisation of mineral beneficiation such as the refining of Zimbabwe's precious metal slimes (Alaska and Bindura) at the ZCCM Precious Metals Plant in Ndola, the smelting of Zambian and Tanzanian cassiterite (tin) concentrates in Zimbabwe (Kamativi), the refining of all gold bullion production in Zimbabwe (Fidelity), the future possibility of smelting and refining nickel concentrates from Zambia (Munali) and Tanzania (Kabanga) in Zimbabwe (Bindura) and the future possibility of refining the copper/gold/silver matte from Kahama (Tanzania) in Zambia (Ndola).

The most promising project for further beneficiation in the sub-continent, but not in the SADCC, would be for the local refining of the approximately 280 kt/an of copper blister exported from Zaire¹⁰³ to Belgium, as the Zambian refineries next door are operating well below capacity¹⁰⁴. The reason why it is refined in Belgium rather than Zambia, is not known, but the behaviour of Zaire in matters such as this often has more to do with the interests of the governments and corporations of Europe and the USA than the people of Zaire or Africa¹⁰⁵. In addition, in 1988/9 Zambia smelted 25 kt of copper in concentrates from Zaire¹⁰⁶, of total Zairean concentrate exports of 58 kt, the difference (33 kt) of which could also be smelted and refined in Zambia.

Zinc concentrates from the Rosh Pinah mine in the extreme south of Namibia are railed to Iskor¹⁰⁷ in the Transvaal (South Africa). These would be an ideal feed to keep the Kabwe smelter and refinery running, now that they have run out of ore, but unfortunately the only rail link is the long haul via South Africa which is unlikely to be economic. The SADCC has numerous deposits of heavy mineral sands (titanium sands) on the coast of Tanzania and Mozambique and Lake Nyasa/Malawi (Malawi and Mozambique) which have been exploited in the past in Mozambique where a major new development is planned to start in 1991. Based on these resources, in 1988 the SADCC Mining Sector took on a project to assess the feasibility of establishing a titanium oxide plant in the region, to beneficiate the sands, which still awaits funding. It would appear to be premature to consider the beneficiation elsewhere of a mineral that is not yet mined and which is situated on the coast diluting any potential transport advantage.

However, although opportunities in the region for further mineral beneficiation before export may be limited, the scope for further transformation of beneficiated minerals is substantial. Many cases of actual, planned or potential mineral-based products to substitute for current imports have already been discussed under the section on “Substitution of Mineral and Mineral-Based Imports”, above, and mineral-based fertilizer manufacture is also discussed separately. In addition some aspects of a regional strategy for the further transformation of ferrous products has been discussed under the section on iron and steel, above, and several mineral-based products consumed by the mining industry have been covered in the section on “Mining Inputs Manufacture”, above.

A SADCC study in 1988¹⁰⁸ identified four main constraints to the establishment of mineral-based industries in any single country, namely:

- 1) Inadequate domestic markets for mineral-based manufactures,
- 2) Lack of technological capability,
- 3) Policies of transnational corporations, and
- 4) Shortage of finance

A regional strategy could go a long way in overcoming all four of these constraints. Firstly, the much larger regional market allows for the manufacture of mineral-based products that would not be viable in one domestic market. Secondly, the regional technological base is broader than that of any single member country as it brings together the technological strengths of each member country and it allows for the establishment of research and development facilities that would not be feasible in any single country. Thirdly, although the global strategies of the transnational mining corporations are often opposed to the further transformation of minerals in the Third World producer country, as it will locate its own transformation facilities in the countries that provide the highest return, the regional body is much larger with respect to a TNC and is in a stronger position in negotiating with the TNC for further value-added in the region. In addition the regional context may make further transformation more attractive for the TNC in terms of the availability of cheap raw materials and inputs for the transformation process and the existence of an immediate guaranteed regional market for at least part of the output. Fourthly, the larger regional financial base would allow for the mobilisation of greater quantities of local finance and would allow for the raising of larger loans from abroad.

Another constraint to a mineral-based manufacturing strategy is that very few individual countries possess the range of mineral resources for an integrated industrialisation strategy, but the regional context provides for a both wider variety and larger quantity of minerals resources. In this regard the SADCC region possesses almost all the mineral resources necessary for industrialisation.

In terms of value the most important mineral produced in the SADCC region is crude oil, entirely from Angola. Although there are five refineries in the region¹⁰⁹ only three are operational¹¹⁰ and only the Luanda refinery treats crude from the region. In 1988 the region produced 22.28 Mt of crude oil, of which 94% was exported without further treatment, and imported 1.3 Mt of crude from outside the region¹¹¹. In addition, in 1988 the region imported 2.25 Mtoe¹¹² of petroleum products, mainly diesel, gasoline and jet fuel, and exported 630 Mtoe out of the region. The region's five refineries have a total capacity to treat 5.16 Mt of crude per year, or nearly a quarter of total crude production, but unfortunately two of the refineries have closed down and, considering their old technology, are unlikely to reopen, leaving a regional operational capacity of 3.5 Mt/an (16% of output). However, although there appear to be immediate advantages to be gained from the regional rationalisation of oil refining, the two refineries outside Angola were designed for a crude substantially different to that of Angola, meaning that conversion would be costly and output would not match the consumption pattern of their markets for oil products. In addition there is no oil pipeline linking the Angolan fields to the rest of the SADCC.

To supply the SADCC refineries Angolan crude would have to be shipped around the Cape to Dar es Salaam, then piped down the Tazama pipeline to Ndola in Zambia.

However, Angola could potentially provide for all the petroleum products imported into the region by expanding the Luanda refinery, but these would have no transport advantage over oil products currently imported from the Gulf, sometimes on concessionary terms. A pipeline from Luanda to the Copperbelt for both crude and product would be a first step in a regional petroleum strategy, but no project for the study of the feasibility of this as yet exists in the SADCC Energy Sector programme¹¹³, possibly due to the current security situation in Angola. In addition, a petrochemical industry based in Angola to supply products for the whole of the region might be viable, particularly if the exports were guaranteed. The possibility of an integrated fertilizer plant based on Angolan natural gas and phosphates has already been discussed in the section on "Fertiliser Minerals".

The second most valuable mineral produced in the SADCC region are diamonds from Botswana, Angola, Tanzania, Swaziland, Lesotho and, since 1990, Namibia. Current and planned value-added in terms of diamond cutting in the region is minuscule compared to the huge regional production of over 16 Mcarats in 1988. Diamond cutting is dominated by a few European cities and Tel Aviv, making it extremely difficult to break into the market. In addition, due to the fact that diamonds are the only SADCC mineral with an effective sales cartel to maintain real prices, there has not been the deteriorating terms of trade incentive to add value by downstream processing. Regional production facilities for mining inputs such as diamond cutting tools and drill crowns would marginally increase the local offtake for industrial grade diamonds, but would also be minuscule in terms of production. A SADCC Mining Sector project to study the feasibility of establishing a diamond tools manufacturing facility was approved in 1985 but still awaits funding¹¹⁴. Ultimately, even if all items containing diamonds used in the region were to be produced in the region, it would still only constitute a tiny proportion of production, as the SADCC region is particularly well-endowed with both kimberlite pipe and alluvial resources of diamonds, and in 1988 produced over 16% of total global output.

The third SADCC mineral in terms of value is copper and in 1988 the region produced 463 kt, 91% in Zambia, accounting for six percent of world supply. Although 96% of copper production is beneficiated to pure refined copper cathodes or high grade wire bar before export¹¹⁵, less than 2% is further transformed into copper semis¹¹⁶ and manufactured items¹¹⁷. Zambia is by far and away the largest copper producer in the region and also produces the principal copper alloying metals (zinc and lead), but Zimbabwe transforms a higher tonnage of copper. What is even more surprising is that a large proportion of the Zimbabwean capacity, mostly in direct competition with Zambia, was installed in the mid-eighties, in the face of the SADCC initiative. This has resulted in a regional overcapacity for most copper semi-products such as rod and shapes. A study published in 1987 estimated the regional SADCC market for wire and wire rod at 5.3 kt/an and put the potential consumption at 6.5 kt/an, but the regional market potential for imports was only between two and three thousand tonnes, as the largest consumer, Zimbabwe (3 to 4 kt/an), already had its own production facilities¹¹⁸. The regional consumption of bars, sections, etc... was put at 650 t/an, but here again only about 200 tonnes are imported into the region as the largest consumer, Zimbabwe (400 t/an), has its own production facilities. Regional consumption of tubes and pipes was estimated at 300 tonnes, but imports were only about 60 tonnes, but for strip, sheet and foil the potential regional market was put at 800 tonnes of which possibly 500 was imported. A Zimbabwean company, Radiator and Tinning (Pvt) Limited, has already installed the region's first copper and copper alloy rolling mill which could produce all of the region's needs. The regional market for a new copper semis producer is therefore extremely limited and there is in fact substantial regional overcapacity for extruded products. Given the huge copper production relative to regional industriali-

sation, only a small proportion could be consumed even if all copper and copper alloy based products were made locally.

However, as touched upon in the “Mining Inputs” section, a regional facility producing electric motors might be viable if the region accepted some sort of standardisation, thereby limiting the range in use, and deserves further investigation. If there was a regional currency union then standardisation would not directly be necessary, as the consumers would adjust to the limited range available in local currency due to the problem in obtaining forex. This form of “forced” standardisation exists with several locally produced products in countries in the region.

The fourth most valuable mineral produced in the SADCC region is nickel for which there is virtually no downstream transformation and in fact half the regional output leaves in the form of a sulphide matte. The main use of nickel is in the production of stainless steels¹¹⁹ and as Zimbabwe already produces the other constituents, ferrochrome and steel, the possible production of stainless steel there is under consideration in a general sort of way, mainly by attempting to attract foreign producers to set up plant in Zimbabwe¹²⁰, but such a venture would have to be on such a scale as to make the limited regional market irrelevant. Small amounts of stainless steel castings are already produced in Zimbabwe for the local market, but the largest imports are for stainless steel sheet, which would require large capital expenditure to produce locally. In addition, stainless steel is usually made from ferronickel while the high grade (99.99%) nickel produced in Zimbabwe is generally used for direct applications such as nickel plate and nickel wire¹²¹. Also, the stainless steel plants in the industrialised countries use a significant proportion of scrap¹²², for which the chromium and nickel units contained receive a discount, which is not available in the SADCC region. There would thus be almost no value added by making stainless steel rather than high grade nickel, steel and ferrochrome. A project to consider the feasibility of producing nickel wire for export has been looked into by Bindura Nickel Corporation, but without any follow up and one of the ferrochrome producers, Zimalloys, has considered the possibility of producing high grade stainless precision castings for export, but this project has been shelved due to the carbide/polymers project. As the regional market for stainless steel is very small, the regional dimension does not add much in terms of the establishment of a stainless steel plant which would have to survive on the export market. This could however be feasible in the future given the steady growth in global stainless steel consumption, provoking scrap shortages and the disappearance of the discount, and increasingly rigorous anti-pollution laws in the industrialised countries, where most plants are currently located.

The fifth SADCC mineral in terms of value is ferrochrome which, like nickel, is almost entirely used in the manufacture of stainless steel, discussed above. The other uses of chromite are for the manufacture of refractories, discussed above under “Mining Inputs Manufacture” and chromium salts. A feasibility study on the manufacture of chromium salts in Zimbabwe, principally in the tanning industry, has been carried out and is under consideration for investment by the Industrial Development Corporation¹²³. A small quantity of chromite is also used in the foundry industry for as chromite sands for moulds.

Almost all of the region’s gold output is refined in Zimbabwe, but almost none is further transformed. However much of global gold production remains as ingots in the vaults of the banks in industrialised countries. The principal other uses for gold are jewellery, electronics, dentistry, official coinage and medallions¹²⁴. The regional SADCC market for these uses is minuscule. As most SADCC countries have soft currencies with parallel exchange rates, there are problems of smuggling associated with the further transformation for the local market of a commodity that is as negotiable as hard currency, particularly the manufacture of jewellery. Thus it is unlikely that there will be any appreciable increase in gold transformation in the medium term.

The further transformation of steel is dealt with under the section on “Iron and Steel” and coal utilisation has been covered under the section on “The Substitution of Mineral and Mineral-Based Imports”. None of the regional cobalt production is further transformed, though the further expansion of the production of specialised steels should consume a small amount. However, given that the region accounted for 16% of world supply in 1988, it is unlikely that a significant proportion will ever be consumed locally, even if the region was fully industrialised. Asbestos is used in several countries in the region for the manufacture of asbestos-cement sheeting (roofing), tubing, containers and other products, and for the manufacture of brake and clutch pads. The regional market would allow for a substantial expansion of this output, but it would still only constitute a fraction of the annual regional production of 200 kt. There are also plans under consideration by the IDC in Zimbabwe for an asbestos spinning facility based on a small proportion of local long fibre chrysotile production, but the company has had problems in locating and procuring the necessary technology¹²⁵. The regional market would, however, not be able to support a facility of this type which would have to be based on exports.

Zinc from Kabwe mine in Zambia is already extensively used in the region for the manufacture of zinc dust and shavings for gold extraction¹²⁶, for galvanising wire and other steel products and for alloying with copper to make brass¹²⁷. The full regional market for brass products and zinc plating (galvanised iron) could possibly increase the regional offtake of Kabwe to about half of production (13 kt in 1989). Ziscosteel in Zimbabwe plans to have its sheet mill and galvanisation plant operational by 1993. However, the large unrefined production from Rosh Pinah in Namibia is unlikely to ever be consumed in the region and in any event, the immediate strategy in this regard would be for it to be at least value added by being refined in Namibia. The Zimbabwean state mining company, ZMDC, is currently considering the establishment of a small zinc mine at Copper Queen just to supply the local market, to reduce dependency on supplies from its neighbour, Zambia and, in future, Namibia.

A small amount of silver production is used in the region for the plating of silverware in Zimbabwe but by far the majority is exported. Likewise a small amount of tin production (less than 10%) from Kamativi is used for the manufacture of solder and white metal at the mine, but with the establishment of a sheet mill at Ziscosteel, it will be possible to produce the region's tinplate requirements. Ziscosteel does not plan to set up its own tinplate facility and is instead relying on one of the several Zimbabwean metal working companies to invest in a plant. A large proportion of lead production from Kabwe is consumed in the region, particularly Zambia, for the manufacture of electro-refining equipment and wet cell batteries. However, lead reserves at Kabwe are almost exhausted and in future regional requirements will have to be sourced from Namibia, if feasible, given the lack of a rail link to the rest of the SADCC.

The SADCC Mining Unit has commissioned very few studies on mineral transformation industries as this area falls under the SADCC Industry and Trade Sector in Dar es Salaam, except where the products of such industries would be of direct import to the regional mining sector such as the manufacture of mineral-based mining inputs (see above section on “Mining Inputs Manufacture”). However, in 1988 a project was approved for an “Assessment of the SADCC Hotel and Household Whiteware Industry” to identify possibilities for establishing a ceramics industry based on local high grade clay deposits, for the regional and export markets, but which still awaits funding.

The mineral with by far the largest current downstream transformation and which offers the best potential for further transformation is, however, iron and steel, particularly steels for engineering applications, for which the region imported almost half a million tonnes annually. This is further discussed above under the section on “Iron and Steel”.

Manpower Training

The SADCC mining and mineral processing sector employs about 150 thousand people and is still heavily dependent on expatriate manpower. The shortage of skilled professional and managerial personnel has been cited as being one of the main constraints to the downstream processing of minerals. A study on the iron and steel industry found that a major reason for the low rolling mill capacity utilisation was the “inadequacy of skilled manpower”¹²⁸ and a study on the production of copper semis in the region concluded that the “...lack of skilled manpower in the middle and higher levels often keeps production far below capacity”¹²⁹. This shortage is in part due to the colonial legacy which left most SADCC countries with almost no skilled professional and managerial manpower, particularly in the ex-Portuguese colonies (Angola and Mozambique). The racist policies of all the colonial governments made it virtually impossible for locals to be promoted to any middle or upper management positions. But some countries in the region have now been independent for up to three decades and therefore cannot continue to blame colonialism for the current low level of local management in the mining industry. Stamico’s appalling record of minerals development, excluding Williamson Diamonds, is principally due to a lack of good management and competent professionals while in Zambia, seventeen years after independence, over 800 expatriate professionals and managers are still employed by ZCCM.

However, the shortage of skilled and competent manpower does not only exist at the professional and managerial levels, but is sometimes even more acute at the skilled artisanal or “diploma” levels¹³⁰. Due to the long history of migrant miners from the region working on the mines of South Africa, there is a huge regional pool of labour with substantial mining experience in the semi-skilled categories, though this resource is not generally in countries with a large mining industry. In addition, overall, the regional mining labour force has contracted in the eighties meaning that there is a local surplus of experienced workers in most countries. Another factor mitigating against the rational regional deployment of personnel is that the on-the-job qualifications such as for blasters and underground surveyors are not recognised from one country to another, though it appears that the South African qualifications are accepted across the region. In several countries (Angola, Mozambique, Botswana and Zimbabwe) training programmes are tax deductible, which has encouraged several companies to run their own apprentice programmes. In some cases mining companies run apprentice programmes for more than their needs (for industry in general) such as Zimalloys in Gweru.

Given the large expenses involved in setting up effective training for mineral exploration, mining and mineral processing personnel, strategies for the establishment of regional training centres would appear to be appropriate, but unfortunately this has only happened in a small way. The major new development in mining manpower training of the eighties was the setting up of two new departments at the University of Zimbabwe, of Mining Engineering and Metallurgical Engineering, duplicating facilities already operational at the School at Mines of the University of Zambia (UNZA). The expansion of the Zambian School of Mines to cater for Zimbabwean students was not, to the knowledge of the author, even considered, though the 1982 paper on regional coordination of the mining sector¹³¹ mentioned that the School was the only facility of its kind in Black Africa and that it had been chosen as a centre of excellence at a continental level by the Association of African Technological and Scientific Institutions (ANSTI).

In 1986 an EEC funded survey of the regional mining skilled manpower¹³² was carried out by Eurequip of France¹³³ for the SADCC Mining Sector which estimated that about 14% of personnel in the mining and mineral exploration industry could be classified as skilled and that over half the regional general and middle managerial staff in mining were expatriates and just under a third of professionals and senior

supervisors¹³⁴. The study forecast that by 1996 the industry would have to fill 19,500 skilled manpower positions, mainly due to turnover of nationals (14,000), new jobs (3,000) and replacement of expatriates (2,500), of which 12,500 would require a university or technical education. The high turnover in the mining industry of skilled nationals (7% to 10% per annum) has been attributed to a number of factors including the isolated location of most mining operations and relations between management and employees.

All SADCC countries have facilities for training geologists and chemists at undergraduate level, except for Lesotho, and in fact geologists are over produced, but there is a regional shortage of geologists with a post-graduate education (mineral exploration, geochemists, geophysicists). Only Zambia and Zimbabwe have facilities for training mining engineers and metallurgists, at the Universities of Zambia and Zimbabwe, and both countries have institutions catering for skilled diploma level technicians (Bulawayo School of Mines and the Zambia Institute of Technology). The regional potential supply in 1996 of mining engineers (43), mineral process engineers (28) and geologists (55) is considered adequate for projected demand but inadequate to make up for the backlog and to replace expatriates, except for geologists. At the technician level there will still be a shortfall in mining technician supply (42/an) of about 20, while there is a current supply surplus for both geological technicians and survey technicians, but a shortfall for both in terms of making up the inherited backlog¹³⁵. The SADCC mining manpower survey suggested that the short term shortfall could be made up by a combination of expanding intake at existing institutions, training outside the region, implementing new conversion/upgrade courses, increased in-house training and, in one case, by creating a regional facility¹³⁶.

The SADCC Mining Sector elaborated several projects based on the findings of the regional mining manpower survey, only one of which has potentially secured funding, namely the appointment of a SADCC Mining Sector Human Resources Liaison/Development Officer, to be funded by the EEC, and three which still await funding, namely the setting up of a "SADCC Mining Sector Industrial Training and Development Advisory Unit", the "Redesign and Development of SADCC Mining Technician Course Facilities" and the "Strengthening of Regional Mining Sector Educational Units".

But since the survey was carried out the regional institutions for the training of technicians have contracted rather than expanded, due to critical staffing problems caused by increasingly uncompetitive salaries. The Bulawayo School of Mines has not been able to implement the recommended upgrade course to mining engineer, but has initiated a Mine Manager Higher Certificate that would be roughly equivalent, and an expatriate professional is designing the recommended distance courses with EEC funding. However, due to the deteriorating staff situation they may be forced to suspend both the metallurgical technician and the surveying courses. Negotiations are currently underway to make the Bulawayo School of Mines a parastatal under the Ministry of Mines so that it will be able to pay more competitive salaries, possibly "topped-up" by the Chamber of Mines¹³⁷. The School of Mines has had a limited regional role in that it has trained students from Botswana and, in 1990, Namibia, but due to the staffing problem it has not been able to cater for all applications from the region. The staffing situation at the Zambia Institute of Technology is even more critical, and by 1990 output had fallen to 16 students per year out of a potential of 100/an. Given this dire state of affairs it would seem to be necessary to consider a solution similar to that proposed in Zimbabwe, namely that the ZIT becomes a parastatal, possibly with funding from ZCCM.

The University of Zambia's School of Mines has a capacity to produce 100 graduates annually, but due to substantial falls in the real salaries of staff with resultant resignations, in 1990 output will only be 10 graduates¹³⁸, one quarter the 38 projected in the 1986 survey¹³⁹. Supply of graduates from the

University of Zimbabwe's Departments of Mining Engineering and Metallurgical Engineering has kept pace with the survey projections and about 30 will graduate in 1990, but as these two departments are still under the German aid programme to establish them, which includes short term expatriate lecturers (about 50%), they may still have to face staff shortages when the programme finishes in 1993.

Thus by 1990 the regional supply of skilled mining manpower was way behind the levels predicted as being necessary in the 1986 survey which, due to the upturn in base mineral prices in the late eighties, probably erred on the low side. This has resulted in rapid increases in salaries for mining professionals in industry which has drawn personnel away from the teaching institutions, reducing their capacity to supply graduates, thereby further aggravating the problem. The difficulty in setting up regional training institutions is further worsened by the fact that candidates from countries without a facility prefer to go on the numerous scholarships available for study in the industrialised countries, as the First World would rather subsidise their own institutions, by providing Third World scholarships, than aid a regional training facility. To overcome this a bold regional strategy would be necessary that commits the member states to joint funding of regional institutions, possibly via a quota system of regional scholarships, and distributes the facilities in the principal mining countries of the region. A possible regional mining manpower training distribution could be:

- 1) Under-graduate geology in all countries except Lesotho;
- 2) Post-graduate earth sciences in Botswana (hydrogeology), Zimbabwe (geophysics, geology), Zambia (mineral exploration, mineral economics, geochemistry) Tanzania (geology);
- 3) Under-graduate Mining Engineering and Mineral Processing Engineering at the UNZA School of Mines;
- 4) All technicians at the Bulawayo School of Mines.

But, to do this, the regional facility should have a certain degree of autonomy from the national university to allow it to adjust remuneration to attract suitable staff to maintain a regionally acceptable standard of tuition. It would evidently be easier to have a more evenly balanced distribution of regional institutions if all training was rationalised at a regional level through the SADCC Manpower Development Sector (Swaziland). The fees charged for students from SADCC countries would have to be standardised and the possibility of having a regional "Scholarships Clearing House" could be looked into to avoid forex payment problems, whereby, on a bilateral basis, countries could have equal numbers of students studying without payment at each other's institutions, which could be "topped-up" for imbalances, possibly through aid donors.

Mineral Exploration and Research & Development

An obvious area of regional collaboration is that of mineral exploration and geological mapping in border areas. Geological structures do not generally coincide with political borders and therefore it could be useful to carry out joint mineral exploration of geological features common to two or more countries, or at least exchange data on such areas. Thus far there have been no joint exploration projects, but there has been a willingness to exchange geological information, partly as a result of the SADCC initiative. In addition the compilation of large scale maps of various geological aspects of the sub-continent, could be undertaken at a regional level. In this regard the SADCC Mining Sector has a World Bank funded project for the compilation of a hydro-geological map of the region¹⁴⁰ which is part of a larger project on the hydro-geology of Africa; it has secured Finnish funding for a feasibility study on the setting up a regional seismic network and data centre and a project for producing regional geophysical maps has been drawn up together with the ESAMRDC¹⁴¹ in Dodoma, but still awaits funding.

An area that could potentially gain more from regional rationalisation is that of research and development facilities for mineral exploration, mining and mineral processing. In this regard the Central Isotope Geochronology Laboratory for the SADCC Region in Zimbabwe, funded by the EEC, is in fact the only tangible facility under the SADCC Mining Sector after nine years of existence, but it was already operational and serving the region before it was put on the SADCC Mining Sector shopping list to secure further funding for regional earth scientists to use the facility for the dating of their rocks. It can therefore hardly be claimed as a SADCC Mining Sector success. In 1986 the SADCC Mining Sector approved a project to set up a national coal laboratory for Malawi funded by the French government which the SADCC Mining Sector Coordinating Unit subsequently decided to call a regional facility. However, a SADCC Energy Sector project, transferred to the Mining Sector in 1986, proposed that a Regional Coal Data Centre and Laboratory be established at the already operational Institute of Mining Research (IMR) in Zimbabwe. The Mining Coordinator it appears decided to rather have the Coal Centre in Malawi even though the Malawi facility only covers standard coal analyses (which are already available at several coal laboratories in the region) and not the specialised capabilities not available in the region which was proposed in the original SADCC Energy Sector project¹⁴². However the IMR has in effect become a regional facility, used regularly by several SADCC countries, and has trained several SADCC nationals including the coal chemist from Malawi. The reason why the SADCC Mining Sector Coordinator rejected making the clearly superior Zimbabwean facility the regional centre can most probably be attributed to Zambia's, partly justified, "bambazonke" complex¹⁴³.

Other regional facilities on the SADCC Mining Sector programme are a Geochemical and Geophysical map compilation facility, together with the ESAMRDC, to be based in Maputo and the proposed regional seismic data centre referred to above. Both of these still require funding. A project for the setting up of a Centre for Agro-Minerals Research is under consideration by the SADCC Mining Sector, together with the SADCC Agricultural Sector. The PTA, which covers all SADCC countries except Botswana, plans to set up an ambitious Metallurgical Technology Centre (MTC) for the PTA region in Zimbabwe to be housed initially at the Institute of Mining Research and ultimately at Ziscosteel in Redcliff. The project is supported by UNIDO and it is envisaged that the centre, which will carry out applied research in both ferrous and non-ferrous metallurgy, will finally have about 70 professional staff. This, by far the largest proposed mining sector research facility, has inexplicably had no input from, or coordination with, the SADCC Mining Sector.

A project for the "Remote Sensing of Mineral Resources in the SADCC Subregion using Spot Satellite" originally proposed by an EEC official, has been on the SADCC Mining Sector shopping list since 1985 and might now be taken up by the Canadian company McDonald Detwiller funded by the Canadian government, but with the reference to "SPOT Satellite" removed as they are likely to use the American Landsat images. Originally, in 1985, the possibility of having an EEC funded receiver for SPOT images located in the SADCC was considered, but when the French space agency installed this facility in South Africa the idea was quietly dropped and the EEC support disappeared. The SADCC Mining Sector made no comment even though the transferring of the receiving equipment technology to South Africa went directly against the SADCC's founding principles.

Regional minerals sector research and development centres would fall under the broad area of regional infrastructure and services, an area for which the SADCC step-wise project oriented approach has proved to be particularly successful, especially in the agricultural sector where there are several regional research facilities. The almost total failure of the Mining Sector to establish regional research and development facilities, except for securing funding for the running of the already operational geochro-

nology facility, is partly due to the late start of the Sector (1984), but principally due to the organisational weakness of the Coordinating Unit. The “bambazonke” problem¹⁴⁴ would not be a particularly strong aspect in mining, as Zambia has several research facilities for their large mining sector that could have formed the basis for regional facilities, such as the NCSR¹⁴⁵, the School of Mines at UNZA, Minex¹⁴⁶ and MITS¹⁴⁷, the last being probably the largest mining facility in the region. The failure of the SADCC Mining Sector in this area is most probably indirectly due to the low priority given to the Unit by the Zambian government (see chapter on the “SADCC Mining Coordinating Unit”) resulting in the lack of dynamism and initiative of the Unit. There are numerous areas where the regional mineral exploration and mining sectors could have benefited through the creation of regional research and development facilities such as the area of metallurgy (MTC) and other areas such as remote sensing, analytical laboratories, centres for the development of appropriate mining machinery and mineral processing equipment, a facility for the localisation (adaptation) of imported mining technology, a regional minerals data centre, facilities to investigate alternative methods of mining and processing local difficult ores and the downstream transformation of local minerals, etc.. Mintek¹⁴⁸ in South Africa has successfully developed new technologies to exploit previously uneconomic South African resources such as the UG2 chromite/platinum/nickel/copper horizon in the Bushveld Igneous Complex (BIC). The SADCC has several such mineral resources that are sub-economic using current technology and the creation of a facility similar to Mintek to tackle the numerous mining and mineral processing problems of the SADCC region could be a viable project for the SADCC Mining Sector.

A Mining Sector project for the development of small scale minerals beneficiation is to be funded by Germany, but this type of development would best be undertaken by a regional facility rather than a European company so that the research capacity remains in the region. The West evidently has the capacity to resolve most of the SADCC region’s technical problems in mining, but the issue is to be able to resolve these problems in the region and for this regional facilities need to be created and funded; unfortunately the aid donors generally prefer to give money for their companies to execute the project, rather than local organisations. This problem is common to many of the SADCC projects that are carried out by organisations/companies from the industrialised countries, namely that, although they often do a good job, the skills gained during the execution of the project remain in Europe. Most of the numerous studies carried out by the SADCC Mining Sector could have been done by organisations or individuals in the region, yet all have gone to agencies in the West. A good example was the SADCC “Inventory on Geology, Minerals and Mining” study which was carried out by Bonifica of Italy in 1986 and rejected by the SADCC Council of Mining Ministers in 1987 and subsequently completely redone by an individual in the region¹⁴⁹, for 4% of the original fee paid to Bonifica by the EEC, which was accepted in 1988 by the Council of Ministers without amendment. In another instance a Zimbabwean institute¹⁵⁰ tendered to do the small scale mining study, funded by the EEC, but the Lusaka Coordinating Unit awarded the study to Klockner of Germany. The study was done in 1986 but it was rejected in 1987 whereupon Klockner approached the same Zimbabwean institute to redraft it. Yet the Mining Unit was aware that Zimbabwe has a vibrant small scale mining sector and Germany has almost none. A factor that contributes to this attitude is that some officials in the SADCC believe that a good study can only be done by a company from the industrialised countries and another factor is intra-SADCC nationalist rivalry, where they would rather have the study done by an outside party than by their neighbour.

Officially, the SADCC Mining Sector’s function is to reduce dependence on the West and foster collective self-reliance, although the built in donor-funding of projects increases dependence. Nevertheless the sectoral coordinating units are meant to promote projects that facilitate the attainment of the SADCC founding objectives, so that if there genuinely are no SADCC facilities to carry out research

on the region, appropriate projects should be formulated (albeit with donor funding) to strengthen existing research facilities or to create new facilities in the region with the capacity to undertake the job; but this has not been the approach of the Mining Sector Coordinating Unit who have been only too willing to use agencies from outside the region rather than create the conditions for local execution. In addition, the SADCC Mining Sector could attempt to get donors to agree to a stipulation that tenders for regional studies should, where possible, have a local organisation as a counterpart¹⁵¹, though this would have to be strictly monitored or local “paper companies” will appear which will not actually contribute anything, but will take a cut (pay-off) from the OECD company. Similar to the Energy Sector, the Mining Sector could consult with the other member countries on which tender to accept, rather than the present practice of the selection being done wholly in Zambia.

Another area, related to research, where the SADCC, regional, approach would be beneficial is that of regional professional bodies in fields such as geology, geophysics, mining, metallurgy, etc... This has happened in other disciplines, such as biology, political science and agriculture where SADCC-wide bodies have been formed, but there has been nothing in the minerals sector. The Mining Sector Coordinating Unit could encourage and facilitate the formation of bodies of this type which could publish periodicals with research on regional phenomena, organise seminars and conferences on themes common to the mining and mineral exploration sectors of the region, organise regional workshops for scientists and technicians to gain new skills and generally enhance the standard of their field. The only SADCC mining sector initiative in this field has been to administer a scholarship scheme for earth scientists from the SADCC to study in Europe. The SADCC Energy Sector has been publishing a quarterly magazine, “SADCC Energy”, since 1983, which acts as a forum for researchers dealing with energy matters and covers the energy minerals (oil, coal, uranium), but the SADCC Mining Sector has come up with nothing, not even a newsletter, and has no plans for any form of publication.

In order to be able to research and plan strategies for the regional mineral sector, the Coordinating Unit needs to have accurate data on the minerals sector of each country. A study carried out in 1987 for the SADCC Mining Sector on regional data systems¹⁵² divided geological, minerals and mining data into two types, bibliographic data and raw data. The former relates to documents (articles, books, etc...) on the minerals sector and the latter consists of actual minerals data (reserves, production, location, etc...). The study recommended that the bibliographic data be centralised at a national level at the Geological Survey Departments (or equivalent), which are currently the main repositories of minerals-related documents, and that other repositories/ libraries in the country use the same computerised indexing system (software package¹⁵³) and send duplicate files to the Geological Survey Department. Researchers at the national level would thus rapidly be able to locate all the literature on a specific subject located in the country. The national files could then be centralised on a microcomputer at the SADCC Mining Sector Coordinating Unit so that researchers in the region would be able to locate all the documents in the region relating to a specific mining or mineral matter. In this way, documents on the resolution of mining/mineral problems in one country would be available to workers in another country. In addition, personnel in the Unit would be able to find out what documents were available on any mineral-related subject across the region. The regional database could also link into one of the international databases, with references to literature on geology, minerals and mining worldwide, such as the CIFEG Pangis¹⁵⁴ system based in Paris¹⁵⁵ or the Image¹⁵⁶ system in London, giving researchers in the region access to abstracts of documents published internationally. The SADCC Unit could also maintain a database on repositories of international periodicals and documents throughout the region, to avoid having to obtain copies from the West.

The study also recommended that the second type of data, raw minerals and mining data, be centralised nationally at the Ministry of Mines (or equivalent) as it is usually the repository of this data, and that the data be divided into mineral occurrence files, files on mines/smelters/refineries and mining labour/safety files. The computerisation of this data at a national level is an essential aid for mineral policy making and for developing mineral strategies at the national level¹⁵⁷. The study recommended further that all the national data be centralised at the regional level at the Mining Sector Coordinating Unit¹⁵⁸ to enable it to carry out effective regional planning for the mineral sector. A Mining Sector project for the implementation of these recommendations¹⁵⁹, approved in 1988, still awaits funding. However, with help from the Institute of Mining Research in Harare, the Unit has set up a smaller version of the recommendations with a database on regional mineral production and regional macroeconomic data relating to the minerals sector. In addition, as mentioned above under the section on "Mining Inputs Manufacture", expatriate technicians have arrived at the Unit who will set up databases on mineral processing facilities, mining machinery and spares manufactures, machinery and spares manufactured and machinery and spares imported into the region with a view to the regional rationalisation of mineral beneficiation and mining machinery/spares manufacture¹⁶⁰.

Mineral Finance and Minerals Marketing

Mining ventures require large outlays of capital for exploration, to locate and delineate the deposit, for the extensive infrastructure, due to the isolated nature of mining, and for the actual mine and mineral processing plant. This has been the principal reason why the mining sector in the SADCC has historically been more dominated by TNCs than other sectors¹⁶¹. Most major new mining prospects in the SADCC will cost more than 100 MUSD to bring into production¹⁶², an amount generally in excess of the capacity of domestic capital in any one country. Similarly, most of the projects for downstream transformation of minerals currently under consideration in the region are projected to cost in the 200 to 500 MUSD range¹⁶³. The regional context would theoretically allow a pooling of the finance available in each individual country which would allow for the mobilisation of the large sums necessary for new mining ventures without TNC funds or with TNCs as minority shareholders, but this would require a high level of regional economic integration.

The United Nations operates a revolving fund for minerals development in the Third World under the UNRFNRE¹⁶⁴ system whereby it funds mineral exploration and feasibility assessment and, if the deposit goes into production, about 1% of turnover is paid back to the fund, but if it is not found to be viable the exploration costs are written off. A proposal has been made to set up a SADCC Mining Sector Trust Fund, a sub-fund of UNRFNRE, to finance mineral exploration in the region under the SADCC Mining Sector. The Japanese Government, who are already the main contributors to UNRFNRE, have indicated that they would be willing to contribute 30 MUSD to the fund and the Nordic countries have also shown interest. A fund of approximately 100 MUSD is envisaged. Once operational, this initiative is likely to be by far and away the most important regional facility under the SADCC Mining Sector as it is one of the few financing mechanisms that can operate under the SADCC's project orientated regional integration system. Most other regional financing systems would require a fairly high level of economic integration. If the selection of exploration targets is under regional control¹⁶⁵, it will allow for the development of mineral deposits for the regional economies and not necessarily deposits to supply the First World funders. However, once operational, the mine must export a small proportion of production in order to earn the forex to pay back the fund. This will inevitably bias allocations towards export minerals, unless the government concerned is willing to pay the fund back with forex from other sources. It will, however, only finance exploration and not mineral extraction, beneficiation, transformation or mining input facilities.

Another method of regional financing is joint equity participation in minerals development projects with a regional impact, such as the Sua Pan development in Botswana where initially it was proposed to have Zimbabwean companies participating by obtaining equity through the supply of plant and equipment¹⁶⁶, but it appears that this idea has floundered because the mechanism was found to be too cumbersome. At the 1990 SADCC Mining Ministers Meeting the Botswanan minister invited other SADCC states to participate in the equity of the project but mentioned that direct payment in forex rather than payment in kind would be preferred. A similar proposal to develop the Luzinada bentonite deposit in Mozambique for the Zimbabwean market, whereby the Zimbabwean company¹⁶⁷ would become a partner with the Mozambican mining company¹⁶⁸ by providing plant, equipment and management, also came to nothing due to the numerous forms of approval involved. A study on intra-SADCC cross border investment¹⁶⁹ noted that there had been extremely few post 1980 cases of investment mainly due to forex constraints and the lack of security mechanisms. To overcome the problems associated with the myriad of soft currencies in the region, the study recommended that a cross border revolving facility be created to allow for the transferability of intra-SADCC investment flows. The proposed CBIF¹⁷⁰ would be located in one of the region's Central Banks and would supply the initial hard currency and local currency seed finance for the investment with repayment to be made from the future remittable profits of the venture. The hard currency seed would be financed by donors and the local currency seed would be financed by the country hosting the investment. The proposal is still under consideration, but even if approved by all the SADCC states, cross border investment will still be complicated and cumbersome. Ultimately, the best method of encouraging and facilitating intra-SADCC investment would be to have intra-SADCC currency convertibility and, possibly, a regional stock exchange. The main constraint would then be in acquiring the hard (extra-SADCC) currency component of the investment, as is the case with investment within any SADCC country.

Another regional strategy to finance mineral development would be the creation of a Mineral Development Bank for funding new mines, mineral beneficiation plants and the downstream transformation of minerals, but there is no reason why such a funding facility should be sectorally based, as a regional development bank with a mining department would possibly be a better mechanism. In the early days of the SADCC a Southern African Development Fund, to be located in Zambia, was proposed¹⁷¹ but the idea was subsequently abandoned. The resuscitation of a regional development bank to finance mineral development for the regional market should be reconsidered and if found not to be acceptable, the alternative of setting up a development fund for new mining projects to service the region should be considered. In addition, the extension of the proposed SADCC revolving fund for mineral exploration to cater for financing the feasibility of downstream mineral transformation projects and mining inputs manufacture projects, could also be explored.

Minerals marketing was an area of regional importance identified in the original document proposing the coordination of the SADCC mining sector in 1981¹⁷² and again in the *Zambian document* of 1982¹⁷³ outlining potential areas of cooperation. However, it had mysteriously disappeared by the time the SADCC Mining Sector Coordinator drew up the first study projects for regional funding in 1983¹⁷⁴ and has been consistently ignored subsequently by the SADCC Mining Coordinating Unit, except for a small project on gemstone buying, processing and marketing (that came out of the Small Scale Mining Study¹⁷⁵) and a proposal for a market survey for SADCC ornamental stone projects, both of which have failed to secure funding. The reason for this apparent lack of interest by the Unit for this obviously important area could be that, as alluded to below, the Coordinator considered the area to be too contentious.

Most of the mineral marketing of the region currently comes under some degree of state control or at least monitoring. In Zambia and Zimbabwe all minerals must be sold through state marketing authorities¹⁷⁶, while in Botswana marketing of diamonds is done by the CSO on a renewable five-year contract and in Angola the state partner in oil exploitation with the TNCs, Sonangol, monitors all oil marketing, through its marketing subsidiary in London. The principal reason for setting up minerals marketing authorities was to limit transfer pricing by the mining companies whereby they could locate value outside the country by selling cheap to their own subsidiaries and by paying exorbitant agent fees to their marketing subsidiaries.

Regional strategies in this regard could include the marketing of a minor mineral in one country by another country where it is a major mineral rather than both countries setting up marketing mechanisms. In this way, for example, Zambia could market Zimbabwe and Botswana's copper exports, Zimbabwe could handle gold exports and Botswana could monitor the CSO's marketing of diamonds from all countries in the region. It would however be difficult to get one country to trust another country enough to market its mineral/s and in this regard another regional strategy that deserves attention is the setting up of a small regional minerals marketing audit office which would have the task of performing spot checks on the hundreds of minerals marketing deals concluded annually between the region and its customers. A regional minerals marketing audit office of this type would then only need the member countries to agree to legislation that obliged local sellers to provide documentation to the office on request. If the office was initially funded with donor funds and was able to secure forex savings well above its running costs, it should not be too difficult to subsequently get the member countries to jointly shoulder the running costs. However there are many powerful fingers in the minerals marketing pie, both TNC and local, who would strongly oppose the creation of a task force of this nature to monitor their activities. Just as state marketing authorities limit the ability of the companies to transfer price, they give the government (political elite) access to "transfer pricing" possibilities (transfer of part of the sales or fees to a Swiss bank account). Ultimately, regional integration should allow for the complete rationalisation of minerals marketing by the creation of a single regional minerals marketing authority, with methods of checking such as an marketing audit task force.

The minerals marketing authorities in each country suffer from the drawback that for minor minerals (for that country) they generally do not have personnel that adequately understand the markets. In fact one person is usually assigned several minerals that are produced on only a small scale in the country concerned. This problem is particularly bad for the complex marketing of industrial minerals which often have numerous grades. A TNC, on the other hand, would be marketing the same mineral from small operations in several countries on a scale that would justify the employment of a full-time specialist in the field. A regional marketing authority, handling the output of ten countries, would be able to take advantage of similar economies of scale.

Unfortunately the SADCC does not export enough of any mineral to contemplate the formation of producer bodies or cartels, but could only be effective in concert with other, extra-regional, producers, particularly, in the future, with a post-apartheid South Africa and the Soviet Union for chromite/ferrochrome, diamonds, the platinum group metals and uranium¹⁷⁷.

Another regional strategy in the field of marketing could be the creation of a research unit, at an existing facility or a new facility, to do research into the marketing of problematic minerals such as gem stones, ornamental stone and industrial minerals. In this regard...

“It is possible to argue that ... the emphasis in industrial minerals development is increasingly directed towards a philosophy of ‘find a market and look for a mineral’ rather than ‘find a mineral and look for a market’.”¹⁷⁸

The proposed unit could review the current demand for industrial minerals and match markets with known deposits in the SADCC. It could also advise on the numerous grade criteria and physical properties criteria for satisfying the diverse markets for industrial minerals. It could also look into the huge problems associated with the marketing of gem stones in the region, where by far the larger part of regional production of semi-precious stones is traded on the so-called “black” market, and devise strategies for dealing with this problematic sector. The SADCC Mining Sector has a project to look into this problem, but even once it has secured funding, it will be a “once off” look at the problem, rather than the creation of an ongoing capacity to analyse the area, such as would be attempted through the creation of a regional research facility.

In conclusion there are two levels of strategies apparent for regional minerals finance and marketing. The one level is that of assuming the present SADCC project approach where a series of complicated financing mechanisms using revolving funds are possible and some limited minerals marketing rationalisation and strategies might also be feasible. Then there is the level of assuming that the SADCC will move to ever increasing economic integration which would ultimately allow for a single financial market capable of mobilising large amounts of capital for minerals development and a level of regional integration where a single minerals marketing authority would be possible.

Legislation, Investment and Mining TNCs

Since the formation of the SADCC the mining and investment legislation of most of the member countries has undergone fundamental revision. This has principally been caused by the fall in new investment in mineral exploration since the seventies, the collapse of mineral prices in the early and mid-eighties and the resultant fall in mineral forex earnings. This revision has generally decreased the controls on mining companies, increased the percentage of remittable profits and decreased state participation, in an attempt to make the country more attractive to foreign investors. Unfortunately each country has carried out this revision on its own without any regional coordination or help from neighbouring countries with more experience in the complex and pitfall-ridden field of bargaining with mining TNCs.

The issue of mining finance and technology was raised in the original 1981 paper proposing the mining sector for regional coordination¹⁷⁹ and appeared again with the issue of mineral legislation, including taxation, mineral rights and labour, in the 1982 “Report on Cooperation in the Utilisation of Mineral Resources for Development”¹⁸⁰ by the Republic of Zambia; but by the time the first list of mining projects had appeared in 1983, the area of legislation and finance had disappeared, and only reappeared, in part, in 1989 when the SADCC Mining Sector approved a World Bank originated and funded “Study of Investment in Small and Medium Mining in the SADCC Region” which will be undertaken in 1990 by a regional consultancy firm¹⁸¹.

The almost total lack of importance given to this crucial area by the SADCC Mining Sector can again only be ascribed to the perceived contentious nature of this field or to a total lack of insight into what areas were important to the regional mining sector, even though in 1987 the SADCC Mining Sector Coordinator turned down an offer to organise a SADCC workshop on the subject by a research institute in the region¹⁸². It is even more strange that mining legislation only appeared on the SADCC Mining Sector agenda through the offices of the World Bank, given the controversial role of this organisation in restructuring of African economies.

A minimum regional strategy on minerals legislation would be to create a forum for the member countries to exchange notes and experience and thus to gain from the mistakes and successes of their neighbours. The SADCC Energy Sector has compiled a document consisting of the petroleum legislation of six of the SADCC states¹⁸³ which it distributed across the region, but the SADCC Mining Sector has no plans for a similar exercise. Some SADCC countries such as Zimbabwe, Zambia and Botswana have gained considerable experience in the formulation of minerals legislation and in bargaining with mining TNCs, that could be of great benefit to the other SADCC members. A common strategy towards the TNCs, or at least a knowledge of each other's strategies, would minimise the current power of prospective investors to play countries off against each other in order to gain further concessions. New mining TNCs in Zimbabwe are quick to tell government about the new concessions in Mozambique and to hint that their investment might go there if the government does not improve their fiscal regime.

An optimum regional strategy would be to have a common legislative regime with added incentives for investing in underdeveloped areas (countries) including a regional system for the provision of infrastructure to take into account that investment is less likely to go into less developed countries with rudimentary infrastructure, but this would be unlikely given the current level of regional integration. However, there is still some headway to be made within the current level of integration by rationalising legislation where possible, on a country by country basis. It would also be useful to charge one of the numerous university legal faculties in the region or one of the mining/minerals research bodies with the responsibility of setting up an ongoing research project on regional minerals legislation. In time, local experts from the project could act as advisors to governments when they revise their legislation.

The importance of mining TNCs in the region has been on the decline since the early seventies except for Botswana (diamonds) and Angola (oil), due to the spate of nationalisations of mining companies in the late sixties (Zambia) and seventies (Tanzania, Mozambique and Angola). In 1988 mining TNCs directly controlled about half of the region's mineral production, compared to over 90% in 1969 before the nationalisation of NCCM¹⁸⁴ and RST¹⁸⁵ in Zambia, the oil companies (50%) and Diamang in Angola, MTD (Mangula)¹⁸⁶, KTM¹⁸⁷ and Risco¹⁸⁸ in Zimbabwe and Companhia Carbonifera de Moatize and Minas Gerais in Mozambique. In fact there was almost no state ownership in the region in the sixties. But, due to the decline in mineral exploration and investment and the fall in mineral exports and revenue, all of the SADCC countries are now actively trying to encourage the mining TNCs to invest in their countries¹⁸⁹.

A recent study by the World Bank¹⁹⁰ notes that very little new TNC investment in mining has gone to Africa since the sixties (most has gone to Latin America and Asia) and that the real value of mineral output from Africa has grown at half the rate of Latin America and Asia. African investment in exploration is only one-third of the 350-400 MUSD needed annually just to maintain current output. This is blamed on the lack of TNC investment and in a 1989 World Bank survey of mining TNCs¹⁹¹, the companies indicated that one of the reasons for not investing in Africa was the lack of adequate information on mineral investment opportunities, but more importantly, the lack of an attractive investment climate except for a few countries (including Botswana and Zimbabwe in the SADCC). The companies indicated that in Africa they expected a 20 to 25% after tax return, compared to 13 to 17% for industrialised countries, and a 2 to 4 year pay-back period, compared to 5 to 6 years in industrialised countries. The higher rates of return and shorter pay-back period were justified as being necessary to compensate for the higher risks of investing in Africa. They also considered the right of the state to take a majority equity holding particularly prohibitive to investment, but were not against a minority private or state shareholding and considered any limitation on profit repatriation to be a major prohibiting

factor. It is argued that the lack of these and other¹⁹² conditions has led to a decrease in investment by mining TNCs in Africa and the relative decline of the African mining sector.

“...the domestic private sector in Africa does not have the resources to meet ... (the necessary)... level of financial requirements. Thus, only foreign private investors are capable of providing the large amounts of risk capital required for African mining development.”¹⁹³

“Overall, African governments need to build a new, more balanced partnership with foreign investors. The alternative approach -- state mining companies using domestic or foreign expertise -- has performed poorly in the past and is best avoided in the future.”¹⁹⁴

Is there thus no other way to resuscitate the African mining sector other than to capitulate to the demands of the mining TNCs and effectively return to the colonial fiscal and legislative regimes of the fifties and sixties? Or does the regional context allow for alternative strategies in this regard?

Firstly, regional economic integration would increase the relative size of the “domestic private sector” which would then be in a position to take on many small to medium mining ventures not possible in any one country and would be able to draw on a much larger financial market. Secondly, there are methods of attracting foreign capital other than using the mining TNCs: for example in South Africa the large domestic mining companies¹⁹⁵ raise capital for a mine¹⁹⁶ by floating the mine as an independent company on the international stock exchanges, taking only a minority stake¹⁹⁷, thereby attracting the foreign finance without having to offer all the other concessions¹⁹⁸, though a competitive and remittable return on investment will have to be offered.

To do this in the SADCC the local operator will, over time, have to build up a reputation as a reliable investment which will most probably require a high rate of return initially, after which investor would be willing to accept a return a few percentage points above the average rate in the industrialised countries. This method would require the existence of relatively large and technically competent domestic (regional) mining companies to carry out the initial exploration, deposit delineation and mine feasibility study, initially, to float the project and, subsequently, to manage the project. The high risk exploration finance could possibly be supplemented from a regional revolving fund, such as the one outlined above under “Mineral Finance”.

A new mining phenomenon in the 1980's was the appearance of Junior Resource Companies (JRCs), mainly in gold mining, mainly in Australia, Canada and the USA. These small to medium sized mining companies were responsible for a large proportion of the spectacular growth in gold production from these three countries and have lately become mini-TNCs by spreading into Third World countries such as Indonesia, The Philippines, Brazil and the SADCC countries, particularly Zimbabwe (gold and PGMs), Tanzania (gold) and Mozambique (titanium sands and diatomite). These companies attract finance through floating prospective mineral projects on their local stock exchanges (in the developed mineral exporting countries) and could serve as both an example for the formation of regional SADCC mining companies and as partners with local mining companies. For the former it is essential that there be intra-regional cross border investment facilities and for the latter it would be important that the joint ventures retain local control, though not necessarily through the state. The establishment of a regional stock exchange would however be the most important factor in facilitating the formation of such SADCC JRCs, though this would require a level of regional economic integration well beyond even the most ambitious objectives currently proposed by the SADCC.

A proposal was made at the Harare UNECA meeting in 1990 to "...encourage and facilitate the establishment of African transnational mining and mineral related corporations for the development of African mineral resources."¹⁹⁹ This bold proposal clearly also offers an alternative to re-penetration of the region by the mining TNCs for, but will require high level of commitment at a continental level. However, the creation of such African TNCs would most probably stand a better chance with fewer countries at a sub-continental or regional level (such as the SADCC) and would be greatly facilitated by a measure of regional economic integration to enable the necessary transferences of regional currency rather than hard currency, to operate and expand. Within the SADCC there are enough state-owned companies to create a few commodity specific regional mining companies, and with the centralisation of scarce technical and managerial skills, possibly enough manpower to run them efficiently. A possible grouping could comprise the following companies or relevant departments of companies:

copper/cobalt/lead/zinc:	ZCCM (Zambia) MCM (Zimbabwe) Magma (Mozambique) (BCL (Botswana))
diamonds/gemstones:	Endiama (Angola) Mwadui (Tanzania) Magma (Mozambique)
coal:	Wankie (Zimbabwe) Maamba (Zambia) Carbomoc (Mozambique) Songwe Kiwira (Tanzania)
hydrocarbons:	Sonangol (Angola) ENH (Mozambique) TPDC (Tanzania)
iron/steel:	Bimco/Zisco (Zimbabwe) Ferrangol/Siderugia Na. (Angola) Magma/Cifel (Mozambique) Zimco/Scaw (Zambia) NDC/Alaf (Tanzania)

The creation of such supra-national companies in which the member countries together held a controlling share, would necessarily cause a dilution of the individual state's control resulting in a significant loss in national sovereignty to the regional body and would therefore require a high level of commitment from the partners in the joint venture. However, the national operations of the intra-regional company would still be under the local laws meaning that any one country would still receive the same revenues, forex, etc... Given the present level of integration in the SADCC this would be extremely difficult to achieve and with the lack of intra-regional currency convertibility, it would be difficult for such hypothetical regional companies to operate without resorting to a hard currency for intra-regional financial flows.

One of the reasons that countries are often forced to use the large mining TNCs is that they have, or can apply, the often complicated technology necessary for modern cost effective mineral exploration, extraction, processing, smelting and refining, but a positive development over the last twenty years has been, firstly, the appearance of the Junior Resource Companies with the ability to transfer and apply modern mining techniques and, secondly, arrangements whereby mining technology companies are willing to accept a minority share in a project on condition that their in-house technology is used²⁰⁰. This option, of regional mining companies with a minority TNC technical partner, should only be taken in combination with two other strategies, to avoid perpetual dependence on the foreign technology and the servicing of that technology. These are, firstly, the creation of a strong regional mining research facility to "unpackage" the technology and to develop alternative, possibly more appropriate, technologies over time and, secondly, the development of a strong regional mining machinery and equipment

manufacturing sector, with their own R & D²⁰¹ departments, to make the unpacked and adapted technology available to the mining industry.

Finland gained independence in 1917 and in the 1930's the state mining company Outokumpu Oy acquired a new, state-of-the-art electric copper smelter at Imatra, using Norwegian, British and German technology²⁰², but by the 1960's this company was itself one of the main exporters of smelting technology which is currently used by several smelters in the SADCC region, such as Selebi Phikwe and Bindura. How then was a state mining company in a relatively small country able to transform itself from a foreign technology importer to a technology exporter in one generation? This has been ascribed to, among other factors, the active role of the state, the return of Finnish mining engineers working abroad (in the early years), an aggressive and long term education policy for training professionals abroad by the company²⁰³ and, of crucial importance, a consistent and long term investment in R & D by the company. A factor that allowed the Finnish copper industry to weather the Great Depression and other price falls, and of relevance to the SADCC situation, was the integration of the sector into other sectors of the economy such as the supply of sulphur to the paper and pulp industry (this was a crucial form of income during the depression) and, later, the establishment of a steelworks based on the pyrite cinders from the Imatra smelter. These co-products were integrated into the local economy at local, stable, prices. A similar example of integration is for the SADCC sulphide mineral industry (copper, nickel) to supply sulphur for a regional fertiliser industry, but the main point of presenting this Finnish success story was to highlight the crucial importance of investment in manpower development and R & D for the creation of an indigenous mining and metallurgical capacity.

A minimum regional strategy regarding mining investment, the mining TNCs and mining legislation would thus be the sharing of national strategies and experiences to facilitate the harmonisation, where possible, of mining legislation, the creation of a research centre on mining legislation, investment in regional mining technology research facilities and in manpower training, the encouragement of regional mining companies and mining equipment companies through revolving funds and cross border investment facilities and the compilation of investment prospectuses for promising mineral prospects. At a regional level the SADCC Mining Sector could compile documents on minerals legislation and act as a central facility for the compilation and distribution of dossiers of mineral investment opportunities in the region.

A maximum regional strategy in this regard would be the implementation of a single regional mining legislative and fiscal policy, with checks and balances aimed at equalising investment across the region, the creation of a regional stock exchange with intra-regional currency convertibility for the floating of regional mining companies, the rationalisation of the current state companies into a few regional mining companies, the setting up of mechanisms to attract foreign investment in locally controlled and run mining projects and the creation of regional facilities for manpower training and mining technology research.

In conclusion there are evidently numerous minerals that could be developed for the regional market or where current production could be expanded for regional demand, and, equally numerous possibilities for regional facilities to supply mining inputs, but the principal problem remains that the member states do not have the hard currency to import from their neighbours. There are also many mineral-based commodities that could be produced for the regional market, if it existed. Ultimately the SADCC will have to move towards some form of trade integration with monetary convertibility in order to realise these markets for the orderly planning and development of the regional mineral resource base. Such regional planning should take on the problem of strategic mineral depletion rates as a matter of urgency.

Nevertheless, for certain crucial areas such as the regional production of fertilisers and the regional supply of iron and steel products, a strategy that commits the members to purchase from a regional facility, although cumbersome and difficult to implement, might still stand a chance of success due to the large benefits that would accrue to agriculture, the most important sector in the region, and other sectors, particularly manufacturing (in the case of iron and steel).

The IDU fertiliser study notes that, although a principle aim of the SADCC is for self-sufficiency based on local resources, several factors will limit this goal:

“Not the least of these will be the fact that ... national interests will prevail in most if not all of the SADCC member countries, as they strive individually for self-sufficiency and maximum use of (and benefit from) their own indigenous raw material resources, etc”²⁰⁴.

This observation clearly applies to all regional resource-based industrial initiatives, not only to fertilizers. The political and economic pressures towards self-sufficiency are powerful and are reinforced by distrust of their neighbour's capability of reliable supply. Preliminary negotiations in 1986 between the IDC of Zimbabwe and the ENH²⁰⁵ of Mozambique on the possibility of a joint venture, for the production of urea from Pande gas to replace the expensive Sable electrolysis process in Zimbabwe, finally came to nothing, principally due to Zimbabwe's desire for self-sufficiency and fear of Mozambique's security situation affecting supply²⁰⁶.

Footnotes to Chapter 18

- 1 Though this was never the official policy of the Mining Unit, such RSA mineral substitution projects were proposed by member countries, particularly Zimbabwe, as part of their interpretation of what the regional minerals policy should be.
- 2 Another alternative, of blending the Moatize coking coal with Sengwa coal and making the coke in Zimbabwe, has also been proposed (John Hollaway and Associates, personal communication, 1988).
- 3 Austroplan 1990b. 4 Interview with an AAC Zimbabwe executive in 1990.
- 5 Zimbabwe Iron and Steel Company Ltd.
- 6 The Zambian trial sample cost 2.5 times more, including transport, than the South African ore.
- 7 "Development of the Production of Boane Bentonite Mine (Maputo, Mozambique)", reviewed in SADCC 1990 as document SADMIN/TSC/1/90/09.
- 8 The Institute also provided a consultant to aid G & W Industrial Minerals in their negotiations with the Mozambican Ministry of Mineral Resources.
- 9 Tregers and Prodorite are two Zimbabwean companies that currently produce plastic products using imported PVC.
- 10 MDPA-Ingénierie 1990. 11 African Explosives and Chemical Industries.
- 12 Zimbabwe Phosphate Company, who also make sulphuric acid and phosphate fertilisers (owned by Chemplex, in turn owned by AECI of SA, in turn owned by AAC).
- 13 United Nations Department of Technical Cooperation for Development.
- 14 Austroplan 1990.
- 15 Imani Development subcontracted to John Hollaway and Associates (Pvt) Ltd.
- 16 Commonwealth Secretariat CFTC/IDU, "SADCC Region: Coal Utilisation", 1990.
- 17 Commonwealth Secretariat 1990, page 4-7.
- 18 It also has no link to either the SADCC Mining or Industry Units.
- 19 By minerals consultant John Hollaway and Associates (Pvt) Ltd.
- 20 see Jourdan & Allen 1986. 21 Kaoma 1988. 22 Jourdan & Allen, 1986.
- 23 SADCC 1981. 24 SADCC 1981, page 166. 25 See for instance Balkay 1984.
- 26 Commonwealth Secretariat 1984, vol. 1, page 90.
- 27 Commonwealth Secretariat 1984.
- 28 see Commonwealth Secretariat 1984 and 1988.
- 29 Commonwealth Secretariat 1984 and 1988.
- 30 Commonwealth Secretariat 1984, page 93. 31 see country chapter on Tanzania.
- 32 in 1989 Dorowa Minerals Limited had sales of 17.15 MZWD and produced 133.8 kt of phosphate concentrate (35%) giving a price of 128 ZWD/tonne (about 65 USD) compared to 46 USD/tonne for 70% Moroccan phosphate and 35 USD/tonne for 65% Tunisian concentrate. Dorowa 1990 and Industrial Minerals No. 267, December 1989.
- 33 African Explosives and Chemical Industries, an AAC company.
- 34 Commonwealth Secretariat 1988. 35 MDPA-Ingénierie 1990.
- 36 Austroplan 1990b. 37 SADCC Mining Sector 1990.
- 38 Balkay 1984, page ii. 39 UNIDO 1986.
- 40 As this is mainly determined by the capacity utilisation at Zisco which has not changed, it can be assumed that it also has not changed significantly for the SADCC PTA region.
- 41 UNIDO 1986, page 9. 42 UNIDO 1986, page 5. 43 Lebrun 1987.
- 44 Ndlela 1985. 45 In 1989 1 ZWD = 0.5 USD.
- 46 The two mills are to be purchased second-hand from Sweden.
- 47 The current mine, Buchwa, is almost exhausted. 48 UNIDO 1986, vol. 1, page 10.
- 49 Ndlela 1985.
- 50 see country chapters for a description of the steel production plans in each.
- 51 Ndlela 1985 and UNIDO 1986.
- 52 UNIDO 1986, vol. 1, page 11. 53 UNIDO 1986, page 15. 54 Ostergaard 1989a.
- 55 The engines for the Zimbabwean Zambezi tractor come in under an asbestos barter arrangement with India.
- 56 Regional market estimated at about 4000 units/an. Ostergaard 1989a.
- 57 Regional market about 8000 units/an.
- 58 The Zambezi tractor produced by Turnpan (Pvt) Ltd., a Lonrho company.
- 59 Balkay 1984, page iii. 60 Jourdan 1986a and 1986d.
- 61 Also, certain forex consumables such as oil products (petrol, diesel, lubricants) are available in local currency.
- 62 Commonwealth Secretariat 1986.

- 63 For full list see Commonwealth Secretariat 1986, Fig 5.2, page 5/3.
- 64 Commonwealth Secretariat 1986, page 4/1.
- 65 This mining engineer is on secondment from his company Outukumpo Oy of Finland and it remains to be seen to what extent he encourages the local manufacture of mining machinery and spares and to what extent he encourages the import of these items from Finnish manufacturers or the import of the capital goods to manufacture these items from Finnish manufacturers.
- 66 These are made in Zambia, but the other SADCC countries import them from outside the region, particularly from South Africa.
- 67 Except those that are imported via aid under commodity import programmes (CIPs)
- 68 See Jourdan, Makuni & Ncube 1988 and Jourdan & Maponga 1989a for a description of the database and analysis of allocations.
- 69 Load-Haul-Dump vehicles. 70 Commonwealth Secretariat 1986.
- 71 This would also include the agricultural sector. 72 Known as PaMaFa.
- 73 See Jourdan 1986a, page 45, for a full description of the project.
- 74 See Jourdan 1986a, page 46. 75 Commonwealth Secretariat 1986, page 6/10.
- 76 SADCC Industry and Trade Sector 1990b, page 8.
- 77 Commonwealth Secretariat 1987. 78 Nitro Glycerine 79 Lebrun 1988.
- 80 This factory, owned by Chemplex (AECI), will most probably be taken over by the IDU/Nitro Nobel company in 1990. 81 Southern African Customs Union
- 82 Ammonium Nitrate/Fuel Oil
- 83 Industrial Development Unit, Commonwealth Secretariat 1987.
- 84 Since the admission of Namibia there is a second zinc/lead producer in the region at Rosh Pinah
- 85 See section on mineral-based imports above.
- 86 carbon-in-pulp, carbon-in-leach, carbon-in-column.
- 87 The IMR in Harare has developed an activation furnace that has successfully activated coconut shells from Mozambique.
- 88 Heavy media separation.
- 89 Since 1987 Swaziland has also become a significant diamond producer (Dvokolwako, 100,000 carats/an)
- 90 The IMR in Harare has done extensive research in flotation reagents, some of it for a South African producer, Noristan, and one of the researchers has established a facility to produce talc depressants for the local market.
- 97 "Inventory and Optimisation of Regional Mineral Processing Facilities", Project 0.0.3, SADCC Mining Sector 1990.
- 98 Personal communication with Colin Steyn of RTZim, 1990, who, when asked if the SADCC Mining Sector Coordinating Unit had aided the project, responded that he never even knew that it existed.
- 99 In fact the refinery did shut for a year while the deal was being worked out. See Jourdan 1986b.
- 100 However, the loss-making Mundunguara operation will close in 1990. Mirem 1990.
- 101 Minerals Bureau 1989, page 205.
- 102 And, since the entry of Namibia in 1990, 60 kt/an of zinc in concentrate from Rosh Pinah which goes to Iskor in South Africa.
- 103 In 1987 Zaire produced 500 kt of copper blister and leach cathodes, of which 220 kt were refined before export. USBM 1989, volume III, page 970.
- 104 In 1976 Zambia exported 712 kt of refined copper, compared to 424 kt in 1988 indicating an apparent excess capacity of 288 kt, enough to take on all of the blister from Zaire. BGS 1981 and 1990.
- 105 Such as Zaire's constant support of the US policy of destabilising Angola, even if it meant having the cheapest route for its mineral exports (Benguela) out of action (see chapter on Angola).
- 106 ZCCM 1989, page 37. 107 South African Iron and Steel Company.
- 108 Commonwealth Secretariat 1988, page 74.
- 109 Angola (Luanda), Mozambique (Matola), Tanzania (Dar), Zambia (Ndola) and Zimbabwe (Mutare).
- 110 Luanda, Dar and Ndola. 111 SADCC Energy Sector 1990.
- 112 Million tonnes of oil equivalent. 1 toe = 42.6 GJ.
- 113 SADCC Energy Sector 1990b.
- 114 "Manufacture of Diamond Tools in the Kingdom of Lesotho", project 7.3.1.
- 115 About 18 kt/an of copper in Cu-Ni matte is refined in Norway.
- 116 Semi-manufactured products.
- 117 See Jourdan 1985e and 1986a for a discussion of downstream copper transforma-

tion in Zimbabwe and Zambia, and Meijer & van Manen 1987 for Zambian downstream transformation.

118 Marijnissen & Vingerhoets 1987.

119 A standard stainless steel is 18% chromium, 8% nickel and the rest iron.

120 Such as Metallgesellschaft (FRG) and Outokumpu Oy (Finland).

121 However, Zimbabwe also has large currently unexploited deposits of nickel silicate on the Great Dyke and the IMR has successfully used this as a flux to make a direct, one-shot, stainless or ferrochromenickel.

122 10% to 50%.

123 However, in the 1970's RTZim set up a pilot plant for the production of chromium salts which was subsequently abandoned as uneconomic.

124 Shearson Lehman Hutton 1989, page 116.

125 IDC 1989 and personal communication with IDC Projects Director 1990.

126 See section on "Mining Inputs Manufacture".

127 The brass rolling mill in Bulawayo only operates intermittently due to a shortage of zinc in Zimbabwe.

128 UNIDO 1986, vol. 1, page 34. 129 Meijer & van Manen 1987, page 193.

130 Eurequip 1987. 131 SADCC 1982, Annex P, page 129.

132 "Regional Skilled Manpower Survey", Project 6.0.5. 133 Eurequip, 1987.

134 Eurequip 1987, Vol. 1, pages 30 and 32. 135 Eurequip 1987, page 88.

136 Eurequip 1987, page 105.

137 The Chamber is already "topping-up" salaries at the School of Mines, but not enough to make the salaries competitive. Chamber of Mines Journal, page 45, vol. 32, no. 8, August 1990.

138 Chanda 1990, page 7. 139 Eurequip 1987, vol. 2, Country Table for Zambia.

140 Project 5.0.1 "Hydrogeological Investigations", coordinated by the SADCC Soil, Water and Land Utilisation Sector (Lesotho).

141 East and Southern African Mineral Resources Development Centre.

142 See Jourdan & Katsande 1988, on the possibilities for regional cooperation in coal research.

143 This attitude dates back to the days of the Central African Federation, when a large proportion of Zambia's copper revenues ended up in Zimbabwe.

144 In that it appears that the Mining Sector might prefer not to create a facility rather than locate it in Zimbabwe.

145 National Council for Scientific Research in Lusaka.

146 ZIMCO's Mineral Exploration Department.

147 ZCCM's Mining Industry Technical Services in Kalulushi.

148 Council for Mineral Technology 149 See Jourdan 1987b, 3 volumes.

150 Institute of Mining Research.

151 The EEC, for instance, permits organisations from both the donor area (EEC) and the recipient area (SADCC) to tender for EEC funded projects. It is therefore possible that they would agree to a stipulation that all EEC bids should be done jointly with a local organisation.

152 Jourdan 1987b.

153 Preferably a package that also runs an international database such as the CIFEG "micro-questel".

154 Centre International pour la Formation et les Echanges Geologiques (CIFEG), Pan African Network for Geological Information Systems (Pangis).

155 The Geological Survey Department in Harare are already part of this system.

156 Institution of Mining and Metallurgy (IMM). This system is already available at the IMR in Harare.

157 In Zimbabwe the IMR and the Minerals Development Unit (MDU) have computerised all mineral data since 1987 as a tool to analyse the mining houses and to plan for the sector.

158 In 1988 the prototype SADCC mining database, built by the IMR, was installed at the SADCC Mining Unit in Lusaka.

159 "Implementation of a Regional Bibliographic Data Bank and of National Geological and Mining Data Banks", Project 0.0.7.

160 All of these databases have already been created at the national level in Zimbabwe at the IMR.

165 And not under the Japanese dominated UNRFNRE.

166 A type of "equity barter" to get around the problem of obtaining forex for cross border investments.

167 G & W Industrial Minerals (an IDC company) who are the Zimbabwean bentonite distributors.

- 168 Magma, Minas Gerais de Mocambique.
169 MBCA 1989. 170 Cross Border Investment Facility.
171 The 1984/5 SADCC "Annual Progress Report" mentions (page 22) that the Government of Zambia had prepared Terms of Reference for the "Southern African Development Fund" which had been circulated to member states, but by the publication of the 1985/6 "Annual Progress Report", the item had disappeared.
172 SADCC 1981. 173 SADCC 1982. 174 SADCC 1983. 175 Klockner 1987.
176 Memaco and MMCZ/Reserve Bank.
177 See Jourdan 1988b and 1989a on SADCC alternative mineral resources to exports from South Africa and Jourdan 1990b on possible cartels with a post-apartheid South Africa.
178 IMM 1982, page 21/2, cited in Commonwealth Secretariat 1988, page 4.
179 SADCC 1981, page 170. 180 SADCC 1982, Annex P, page 127.
181 This will be the first SADCC Mining Sector study to be done by a local (regional) company.
182 Institute of Mining Research at the University of Zimbabwe.
183 SADCC Energy Sector 1989.
184 Nchanga Consolidated Copper Mines (AAC), copper, lead and zinc.
185 Roan Selection Trust (Amax), later Roan Consolidated Mines, copper, cobalt.
186 Messina Transvaal Development Company Ltd. Later renamed Mhangura Copper Mines (MCM).
187 Kamativi Tin Mines 188 Now Ziscosteel.
189 The country chapters give details of this new strategy in each member state.
190 Bolte 1990. 191 Bolte 1990.
192 Such as political stability, investment security, guaranteed mining rights before exploration and a stable tax regime.
193 Bolte 1990, page 4. 194 Bolte 1990, page 5.
195 Such as AAC, Rand Mines, Gencor.
196 A new deep gold mine in South Africa requires about 1 GUSD.
197 Usually about 10 to 20%.
198 Such as pay-back period, mining rights and majority ownership.
199 UNECA 1990, Draft Report, page 49.
200 They thereby get their return from the sale of the technology, the servicing of the technology, and from their minority interest dividends.
201 Research & Development. 202 Raumolin 1988. 203 Raumolin 1988, page 52/3.
204 Commonwealth Secretariat 1984, page 94.
205 Empresa Nacioanal de Hidrocarbonetos, National Hydrocarbon Company.
206 The author was the interpreter for some of these discussions.
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Chapter 18: Discussion of Strategies for Regional Planning

Introduction

General

In the chapter on the SADCC it was argued that the SADCC's regional integration strategy for achieving collective self-reliance, based on a consensus step-wise project approach without trade integration, worked relatively well for the rehabilitation of the regional infrastructure and for creating regional services, such as research facilities, but had failed dismally in the productive sectors of mining, agriculture and manufacturing. This was because these sectors could not take advantage of the main benefit of regional integration, that of the larger market, due to the lack of adequate intra-regional trade and payment mechanisms. It was also argued that since 1986 some statements and documents by SADCC seem to have recognised this lack and the organisation was trying to move in the direction of trade integration, but without much success.

In the discussion of regional strategies for the SADCC minerals sector it was shown that, contrary to popular belief, there are many areas of regional complementarity, not only in the minerals produced and mineral resources, but also in mineral inputs to manufacture and the transformation of minerals into products for the regional market. But to take full advantage of this complementarity for the promotion of intra-regional trade and for the minerals sector to benefit from the larger, regional, market, some form of trade and monetary integration would be necessary. What then are the options for strategies for the regional planning of the minerals sector? The answer to this question is probably best approached by presenting a series of scenarios ranging from a minimum situation that assumes that the level of regional integration will remain limited, to a maximalist situation that would allow the full realisation of the regional market. Also, due to the rapid changes in South Africa in 1990, the advent of a majority government in that country and the future of the SACU, will be looked at, but only speculatively as the inclusion of South Africa was not part of this study; and, finally, the effects on the mining sector of the SADCC of the recent changes in eastern Europe are touched upon.

The Minimum Strategy: The SADCC continues as is:

Although it will be difficult to realise the full fruits of regional integration under this scenario, there are nevertheless several areas where the regional mining and mineral processing industry might benefit. The first of these is the area of infrastructure and services. The minerals sector has already been the principal beneficiary of the substantial improvement in transport links particularly for export and there is still room for improvement in this area, particularly the rehabilitation of the Benguela line ("Lobito Corridor") and the Limpopo line. There is also room for further improvement in the minerals handling capacity of the ports of Beira, Maputo and Dar es Salaam. These kinds of projects have been shown to be possible under the current SADCC structure and will probably receive funding as they facilitate the export of minerals to the donor countries. However, the rehabilitation of the transport system would also make intra-regional trade in minerals, mineral based products and mineral inputs possible, except for the new SADCC member, Namibia, which has no rail link to the rest of the region. The, now shelved, project for a trans-Kalahari railway linking Namibia to Botswana for the export of the huge coal reserves in Botswana and, possibly, those of eastern Namibia, needs to be reassessed in the light of Namibia's independence and increasing oil and coal prices. A project of this type, if viable, would also most probably attract funding from potential First World customers.

The same applies to the regional electricity grid. Energy infrastructural projects aimed at interconnecting the SADCC region have proved to be successful under the SADCC project system and mining, as

the region's largest consumer of electricity (34% in 1988¹), will benefit from the more stable and possibly cheaper supply. The project to connect Cabora Bassa to the Zimbabwean grid will be of particular importance to the development of ferrochrome smelting in that country. Similar to infrastructure, projects for the establishment of research and development facilities to serve the region have been possible under the current SADCC system, particularly in agriculture. This has not occurred in mining, but it has been argued that this has been mainly due to the weakness of the SADCC Mining Coordinating Unit in Lusaka, rather than an inherent problem of the SADCC. With current and planned increased donor support to the Unit it is likely that more will happen in this regard. There are clearly numerous areas where the regional mining and mineral processing industry could benefit from applied research and there is also no shortage of locations in the region to base such facilities.

The numerous SADCC studies into the regional situation regarding productive areas such as mining inputs manufacture (equipment, spares, explosives, chemicals, etc...) and mineral transformation (particularly steel products and fertilizers) have shown that there exists a high degree of complementarity in these areas which, however, cannot be realised without regional trade and payment mechanisms. The current situation of soft currencies and acute forex shortages further inhibits the setting up of regional facilities as there is no means of guaranteeing the potential regional market. Some headway could be made using facilities such as the PTA clearing house for the expansion of existing plants to cater for some of the regional demand, but this type of reciprocal system has severe limitations in that trade must always finally balance. It also does not allow for a rationalisation of plants across the region to distribute the gains of regional integration more equitably, but rather has led to further polarisation of production with most gains accruing to the already established industrial centres, particularly Zimbabwe. An unfortunate characteristic of the current situation in mining inputs manufacturing plants and mineral transformation plants in the region is that of duplication and over-capacity meaning that many products could be supplied to the region with minimal extra investment if the goods could move freely across the region. Instead, for the same product, we have shortages in one country and under-capacity production in another.

With regard to mining inputs manufacture, demand is concentrated in Zambia, Zimbabwe and Botswana and supply manufacturing capacity in Zimbabwe and Zambia, hence a strategy involving just these three countries would cover the bulk of regional potential. The current SADCC system based on consensus might be more easily applied to a smaller sub-grouping, but Botswana's membership of the SACU would make any sub-regional mining inputs supply strategy difficult. However, in both inputs supply/demand and mineral transformation capacity/demand, there is a high degree of complementarity between Zimbabwe and Zambia which could be realised through a bilateral trade agreement in conjunction with a bilateral production strategy for the location of industry.

Without trade integration there are still numerous areas where the mining sector could benefit from the regional context such as the rationalisation of mining manpower training, particularly if a funding mechanism was created, possibly in the form of a regional scholarships clearing house. Limited regional cooperation in minerals marketing whereby larger minerals producers marketed the product of smaller producers could take place under the aegis of the Unit and a regional minerals marketing monitoring unit could be created, but a regional minerals marketing authority would not be possible under the current regional structure.

The proposed mineral exploration revolving fund (UNRFNRE) could facilitate an increase in minerals development, but without trade integration, new mineral developments will be principally for the overseas export market and possibly for the national market, but not for the regional market. Similarly,

regional development funds or revolving funds could be created under the SADCC to finance minerals extraction, processing and transformation, but these would mainly be national rather than regional projects due to difficulties in realising the regional market. Cross border mineral investment under the proposed revolving investment facility, though cumbersome, may be possible in some instances, but regional mining companies are unlikely to succeed under the current lack of a SADCC financial system.

The SADCC Mining Coordination Unit could initiate or operate several other regional strategies that would be viable under the current SADCC project system including the establishment of a regional minerals, mining and geology databank, the encouragement of regional geology, mining and mineral processing professional organisations, the organisation of regional conferences and workshops on minerals related issues to enhance the technical level of mining professionals, the facilitation of joint exploration programmes on geological features shared by two or more member countries, etc... These activities are already undertaken by other SADCC sectoral coordinating units, so there would appear to be no structural reason why they cannot be repeated in the mining sector.

A system whereby all the SADCC members undertake to purchase from a regional production facility should be pursued, but it would be difficult to manage as all the members would have to agree to any change in production range or volume and it would be extremely difficult to get members to honour their commitment if they could purchase the item cheaper on the world market. Nevertheless, for limited crucial areas with a large influence on the rest of the economy, namely fertilisers and iron and steel, regional rationalisation of existing facilities and the establishment of new facilities for the regional market, may be possible under an enforceable commitment to purchase system and in this regard it is recommended that a fertiliser board and an iron and steel board be created as these two areas straddle several of the current SADCC sectors (mining, industry and agriculture) and are vital to the development process.

A possible mechanism to overcome the payment problems associated with the establishment of a regional mineral-based manufacturing facility (such as a fertiliser plant) would be to devise a system whereby the forex content of the product is determined (with recourse to an independent referee) and payment is made in two parts: hard currency for the forex part (the facility would need to pay off its forex capital costs and limited forex running costs) and regional credits for the rest (the credit would allow companies in the country with the regional facility to import items from the rest of the region). In this way the forex cost of the product would almost certainly be cheaper than the full forex price of extra-regional sources. In addition the forex component will steadily decrease as the forex capital costs are paid off.

In conclusion, given the current level of regional integration in the SADCC, strategies for the mining sector will be principally limited to the improvement of the regional infrastructure and the creation of regional research and information facilities. The bulk of the regional potential for mineral based industries and mining input supply industries cannot easily be realised under the present SADCC system. Thus, given the recent statement by the SADCC Executive Secretary², to the effect that the SADCC did not plan to create its own structures for intra-regional trade, but would use those of the PTA, it would appear that the future development of the SADCC, if it were to take advantage of the regional economies of scale, would in fact depend on the successful development of the PTA towards a customs union, which, given its diverse membership and geographical distribution, is unlikely to happen in the near to medium term.

The Maximum Strategy: The SADCC moves towards a customs union with intra-regional currency convertibility

The classical theory of customs unions emphasises the aspects of trade creation and trade diversion³. Trade creation takes place when production (exports) from one of the partners displaces that of another, higher-cost, member. Trade diversion takes place when imports from a lower cost external (to the union) producer are replaced by a higher-cost union producer so the union theoretically ends up paying more, but the forex saving could compensate the extra cost. Thus if a union is on average trade creating rather than diverting it is considered beneficial and will increase “welfare”⁴. The main problem with these concepts, as far as they go, is that they were principally developed for the First World context assuming full employment and currency convertibility. If, for instance, Zambia’s grinding media manufacturer cannot produce for ZCCM due to a shortage of forex (which therefore cannot mill their ore and produce copper) then, if the steel were available from Zimbabwe under a customs union in local currency (kwacha), Zambia would not be paying more for an item that was not available before due to forex constraints, even if the steel from Zimbabwe was more expensive than an alternative, hard currency source. This situation is widespread throughout the SADCC where industrial capacity stands idle due to a shortage of raw and intermediate products (particularly mineral or mineral based), not because of a shortage of (local) funds to buy the inputs, but because there is no forex available. In this way many downstream industries are also affected because the local source of a vital input cannot produce.

The trade creation/diversion type of analysis also fails to appreciate the dynamic aspect of new industries being established that are only possible in the larger economies of scale, behind the joint outer tariff wall. In the context of an extremely underdeveloped region such as the SADCC, where many production facilities do not yet exist, this aspect is of even greater importance than groupings where facilities already exist (but would be rationalised). However, trade creation has two edges: On the one hand, by replacing the high-cost producer, the product becomes available to the union at a lower price, but, on the other hand, this entails the closure of the high-cost plant in one of the member countries (though, in the SADCC this would not occur much as often there are no facilities). This would be part of the polarisation effect where most facilities producing for the union will be drawn to the member with the already existing industrial base, whether this was an expansion of an existing industry (which might replace a competitor in another member, if one exists) or the establishment of a new industry for the regional market⁵.

Another aspect of a customs union and intra-union convertibility that is of importance to the Third World, is that it will increase the financial and technological economies of scale making regional (union) companies viable instead of having to rely solely on foreign TNCs for investment. Indigenous intra-regional companies (IRCs) are more likely to have policies that are in line with regional development policies than TNCs and, more importantly, they would not be repatriating their surplus outside the region. In addition IRCs would have much less opportunity for using other methods of exporting forex such as transfer pricing, as they would not have extra-regional subsidiaries. The current state companies in each country could be regionally amalgamated to form the core of regional IRCs. In mining this would most probably be best achieved by creating mining IRCs with mineral specialisation (a regional coal mining IRC, base metals IRC, etc...). Where TNC investment is still deemed to be necessary, the larger union could develop a common strategy and, because, of its larger economic size and resources, deal with the TNC on a more equitable basis, with greater alternatives (options). Finally, for mining, the larger union could set up a regional minerals marketing corporation to tighten up this traditional area of surplus leakage (transfer pricing) thus rationalising all the individual facilities in different countries

selling the same mineral and thereby increasing producer power by being able to sell larger quantities of any one mineral.

The most problematic issue that would face a SADCC customs union would be that of industrial polarisation (*bambazonke*). Without corrective measures, regional industrial development will centre on the already most developed member, Zimbabwe. Therefore an industrial location policy would be absolutely essential from the outset with industries being allocated to the partners on a more equitable basis, based on their raw materials. For instance, regional non-ferrous metallurgy could be based on the existing facilities in Zambia (Zamefa and Kabwe) while basic iron and steel production and engineering could be based in Zimbabwe (Zisco, Lancashire Steel, Zemco, Issels, Crasters, Connolys, etc...) with mini-mills throughout the region (Cifel, Scaw, AlAf, Siderurgia Nacional, etc...). Fertiliser plants could be established in Tanzania (Kilamco and Minjinji) and/or Mozambique (Pande and Evate). As Zimbabwe already possesses many mineral-based industries and mining input industries (albeit often on a small, high-cost, import substitution scale) a regional strategy would require the closure or relocation of some of these industries, such as high-cost fertiliser production (Sable and Zimphos) and non-ferrous metallurgy (such as Almin, Cafca and Radiator and Tinning). However, on the other hand, the lost employment and revenue could be compensated for by the expansion of its ferrous and engineering industries for the regional market and more efficient agriculture due to cheaper fertilisers. This would require a high level of regional planning and consensus which would need the creation of a permanent regional planning body to investigate the optimal distribution of regional production facilities with the highest degree of equity. It would also have to predict the relative gains and losses for each country for each project and could take corrective action in the further distribution of industrial plants. The polarisation effect could also be compensated for by giving the less developed members more than their share of revenues (such as in the SACU) and/or by setting aside a proportion of regional revenues for a development bank to fund projects in relatively depressed areas of the region and in other sectors.

Entry into a SADCC customs union, with some form of intra-regional currency convertibility, would clearly not be possible for the four members already in the SACU without the union effectively including South Africa. Botswana, Lesotho, Swaziland and Namibia would be forced to choose between the SACU and the SADCC, but for Lesotho joining would be virtually impossible as all trade would have to pass through South Africa. Maasdorp has proposed that one of the main reasons why the SACU has survived is that the BLS countries and Namibia have domestic markets that are too small to support any major import substitution industrialisation and thus the domination of South African goods has not killed any appreciable potential⁶. However,

“because they have larger populations, the other SADCC members have a greater potential for import-substituting industries and hence more to lose from competition with South African industries.”⁷

This is another reason why regional integration must have an industrial location mechanism: to enable each country to benefit from a few large industries serving the regional market in exchange for not having numerous, small, high-cost, import substituting industries. In addition, a customs union could cater for infant industry protection over a definite time period and the protection of certain “strategic” industries for the domestic market, as is the case for the SACU Agreement.

Forex constraints, for both current consumables and new projects, are most probably the main problem facing the mining industry of the SADCC except for Botswana and Namibia. The shortage of foreign

exchange to purchase essential mining inputs and spares, and for new equipment, has caused many of the mines in the region to operate below capacity, particularly in Zambia and Zimbabwe. Yet, as shown under regional strategies, there already are facilities in the region that can supply most inputs, and most of the raw and intermediate products that they consume are produced in the region, but the facilities and raw materials exist in different countries in the region meaning that any one country lacks the full range of production plants and raw materials. Hence the net forex spending of the region, if all items that could be sourced regionally were, is well below the sum of forex spending of the individual countries. Thus there would be a large forex saving and the overall percentage of export earnings that needed to be retained by the mining industry would fall substantially. There would most probably be enough forex to purchase inputs and equipment that must be sourced from outside the region, allowing the industry to work at full capacity and thereby earn more forex. The same applies in terms of downstream mineral transformation: If there were regional economic integration the overall regional forex requirements would be well below the sum of the current level of imports. In addition, the regional economies of scale would make it possible to establish facilities to produce mineral-based products and mining inputs not possible at present, thereby creating further forex savings.

Very few SADCC members would be likely to accept this maximum strategy automatically, of a customs union with compensatory mechanisms and intra-SADCC currency convertibility, due to current commitments (the SACU countries), feared loss of sovereignty over revenue collection or perceived loss from their present position. At an intuitive level, from the actions and statements of governments regarding the SADCC over the last ten years, it appears that Mozambique, Angola and, to a lesser extent, Tanzania, would favour a movement towards full economic integration; Swaziland would be opposed, as it seems to see more benefits from the SACU; as would Lesotho, mainly due to its geographic position; Malawi's position is unclear, but it is unlikely to oppose South Africa at present; Botswana might go along if there was an industry location system that compensated for the loss of SACU advantages; Zambia could also probably be persuaded if there was an industrial location system to protect and expand its industries, many of which also exist in Zimbabwe; geographically Namibia would have difficulty in joining and might therefore remain in the SACU, at least until such time as it has a rail connection to the rest of the SADCC; which leaves Zimbabwe as the crucial actor.

As Zimbabwe is already the main beneficiary of intra-regional trade it might rather attempt to extend its current lead through trade expansion without compensatory or corrective mechanisms, such as the PTA, rather than economic integration with corrective measures that might entail the loss of its dominant position in some sectors. In this sense it could be argued that Zimbabwe has both the most to gain and the most to lose, because it has almost the whole range of industries. It would be the only member that would have to give up some, but because certain sectors, particularly ferrous metallurgy and engineering, are already so advanced, they are in a position to gain immediately and substantially from free access to the regional market. Thus far it appears that the Zimbabwean government strongly favours the extension of their current trade domination, albeit limited by low regional forex availability, over regional economic integration, as, after ten years, it has not even gone to the trouble of initiating a detailed assessment of the advantages and disadvantages of the latter.

“In fact it would not be far-fetched to say that the Zimbabwean State and its think-tanks believe that national self reliance is more important than collective self-reliance while the Botswana State and its “bovine” technocratic “elite” espouse a kind of laissez faire attitude towards regional cooperation.”⁸

The underlying assumption throughout this study is that “countries” would benefit from the regional integration of the mining, mineral processing, mineral transformation and mining inputs manufacture

sectors because it would promote the development of these sectors, increase the generation of wealth and allow for the integration of mining into the local economy thereby increasing the “national” wealth (welfare) of each member. But the SADCC states are not homogeneous, they are made up of classes with conflicting interests, not all of which will be enhanced by regional integration. Governments are mainly run by elites who fear being subsumed into a larger entity as they might lose their current privileges and are therefore willing to remain big tadpoles in a small mud-puddle rather than small fish in a large pond.

The apparent coincidence between countries with socialist/egalitarian policies and commitment to regional integration does not necessarily mean that integration can only take place once the SADCC states have become socialist. Regional integration can also enhance the access to greater surplus by capitalist elites (as is the case with the EEC), but this requires an appreciation of the long-term gains (rather than the short-term losses) and more importantly, a freedom of action by the local elites. The SADCC states are structurally part of the world capitalist economy in which they occupy an inferior position and thus their room for manoeuvre is limited by their integration into the industrialised economies. In addition, within the national elites there are groups with more or less to gain from regional integration. In general the national bourgeoisie is likely to have more to gain than the foreign or comprador⁹ bourgeoisie. Yet this does not mean that only states where the elite is dominated by the national bourgeoisie will favour regional integration as the local capitalists are often the owners of the small, protected, high-cost industries that would suffer from integration, while foreign capital usually owns plants that are large and more cost-efficient and therefore more likely to benefit from the larger regional market¹⁰.

Thus, although the regional planning of the minerals sector of the SADCC may be in the interests of the SADCC “nations” not all the governments are likely to pursue this strategy as far as the creation of a customs and/or currency union, for both objective reasons, stated above, and subjective reasons, such as a lack of appreciation of long-term gains by local elites; the distrust of their neighbours’ ability to produce a product of adequate quality and quantity, and for timely delivery; distrust of their fiscal and exchange rate policies that would affect them in the event of trade integration and intra-regional currency convertibility; and, of great importance, their perceived loss of status. An important aspect of most of the SADCC government elites is that they are alienated from the production process (which is in the hands of settlers/TNCs) and thus political power is their only method of access to the national surplus. This leads to an anti-integrationist attitude as they need the national political context to accumulate. However, a union that included a cash payment to the local government (such as the SACU revenues) could in fact increase the amount of surplus that they had access to. This cash payment aspect could have been an important factor in the survival of the SACU up till now.

The possible demise of the apartheid system in South Africa will remove a major unifying factor in the SADCC and could thus further weaken the region’s commitment to integration and collective self-reliance. On the other hand, some authors within the region feel that change in South Africa presents opportunities as the task of delinking the region from international capitalism is so great that this could only be done by a unified sub-continent:

“...only through the liberation of South Africa will the SADCC begin to tackle the overall and more enduring problem of dependence on international finance capital.”¹¹

“...the reasons (why it has proved so difficult for SADCC to disengage economically from South Africa) are the same as those which make a liberated South Africa the centre of a possible viable and united Southern Africa regional economic union.”¹²

A Post-Apartheid SADCC: The extension of the SACU to include SADCC.

The recent rapidly unfolding events in South Africa have raised the possibility of the establishment of a post-apartheid government in the not too distant future, which has in turn raised the question of a post-apartheid South Africa's and SACU's relationship to the SADCC and vice versa. No detailed study of the South African mining, mineral processing, mineral transformation and mining inputs manufacturing industries has been presented nor have their complementarities with the SADCC states been analysed. What follows is thus not any form of comprehensive analysis of mining in a post-apartheid sub-continent, but merely a few comments in the form of a postscript to this study which principally concerns mining in the SADCC.

Under the current SADCC/PTA setup the obvious major change would be that South Africa would replace Zimbabwe as the dominant regional exporter and South African capital, particularly mining companies, would seek to re-penetrate the region¹³, particularly countries with unexploited mineral potential such as Angola, Tanzania and Mozambique. There would be very little change as regards the SACU except for the outstanding renegotiation for the payment lag and the raising of the stabilisation factor. However, South African exporters trying to penetrate the SADCC region would come up against the same problems as experienced by Zimbabwe: namely that, although the countries are desperate for their products, they are too forex poor to buy them and will thus to a large degree continue to import from the West through aid credits and commodity import programmes. Admittedly, South Africa, with its stronger economic base, would be able to offer more favourable terms than Zimbabwe¹⁴ but will probably have difficulty competing with the credit (aid) terms offered by the industrialised nations, though it will retain a substantial transport advantage.

If the full regional market were to be realised (most of which is located in South Africa), as is argued for the SADCC, the region would have to move towards a customs union with intra-regional currency convertibility. It would appear that the most logical method of achieving this would be through an extension of the already existing Rand area (CMA), and possibly SACU, which includes five out of the eleven states in the region. Yet a sub-continental CMA/SACU without protection and compensation mechanisms for the inevitable polarisation of industry towards South Africa, would have no chance of succeeding in the long run, or would impoverish areas. An extension of the SACU to include the SADCC would more than ever have to include a viable industry location mechanism and polarisation compensation. This could be achieved by a revenue over-compensation mechanism (such as the SACU 1.42 multiplier), by allowing an initial period of tariff protection for industries already existing in the SADCC, by the planned relocation of certain industries from South Africa into the SADCC region, by the long-term protection of certain "strategic" industries for national markets and by the creation of a major financing mechanism for the funding of new industries in less developed areas. The last could be done by creating a regional development bank, owned by all the states in the region that collected all of the revenue (thereby receiving the interest free loan instead of South Africa, under the SACU), which could set aside an agreed proportion for the funding of development and employment generation projects in underdeveloped areas and payout the remainder to all of the members according to an agreed weighting formula. The bank could also take on some of the current funding functions of the SADCC by handling donor funds for regional infrastructure and service projects¹⁵. In addition, in order to limit the further domination of the region by South African companies a regional policy could be enacted encouraging majority partnership by local companies through fiscal incentives such as tax reductions and, initially, a PTA type ownership rule could be applied whereby only goods produced by companies with greater than 50% ownership by nationals would be eligible to export under a tariff-reduced common list.

The effect on the regional minerals sector of the creation of a sub-continental customs union would be tremendous as South Africa is itself the home of some of the world's largest mining TNCs¹⁶ which have the financial, technical and managerial capability to carry out virtually any minerals development project and most mineral transformation projects. In addition, for countries that still require major mineral exploration programmes, such as Angola, Mozambique and Tanzania, South Africa has a long standing capability in this field. Almost all mining inputs are already manufactured in South Africa and therefore these industries in Zambia and Zimbabwe would most probably have to be protected and/or rationalised. Rather one factory producing low-cost crushers for the whole region than ten little high-cost facilities for the local markets.

The future form of sub-continental mining TNCs would depend on the nature and extent of the change in South Africa. Due to the huge influence of the mining houses in all aspects of the South African economy, the liberation movements are currently seriously considering full or partial state ownership, and/or dis-aggregation (into activity specific companies) to weaken their disproportionate power. The South African mineworkers union (NUM) is strongly in favour of full nationalisation. Given the extent of involvement of the South African TNCs in the whole of southern Africa, a future (post-apartheid) joint SADCC - South African strategy on the TNCs would be necessary. Even if the South African mining TNCs continue as they are, due to their already transcontinental operations, it is difficult to determine to what extent they are true TNCs and to what extent they are still committed to South Africa and South African shareholders or to the larger southern African region. One of the largest companies, De Beers, recently transformed itself overnight from being a South African TNC to a Swiss TNC (De Beers Centenary AG). This would be another area for future SADCC-South Africa collaboration: given the share of the region in gem grade diamond production (Botswana, South Africa, Namibia and Angola), if they were to work together they would probably control enough of supply to force De Beers to relocate to the region. But now that Botswana has a 5% stake in De Beers Centenary AG, it is not obvious that they would cooperate.

However, as pointed out by Ibbo Mandaza and re-emphasised by Balefi Tsie¹⁷, even in a post-apartheid "socialist" South Africa...

"The legacy of uneven and unequal development in Southern Africa could itself be the source of conflict and render any regional cooperation strategy vulnerable to imperialist intrigue."¹⁸

However Mandaza does recognise that, unlike in the SADCC states, the pattern of the future South African state policies and politics will in part be determined by the strong labour movement and mass organisations in that country. The working class and the peasantry could potentially be major beneficiaries from the regional integration of the sub-continent and the greater possibilities for self-sustaining regional development based on the abundant local resources, with the concomitant delinking from transnational capital and lessening of vertical integration into the western economies. They could thus be a significant force in favour of integration so long as they were aware of its advantages. Thus the politicisation of the largest and most developed section of the regional working class, the South African labour movement, on the necessity of regional strategies, would be essential in realising this force. In addition, a quarter of a million miners in South Africa are migrants from the region and could constitute a significant force in politicising the masses in the home countries on the need for regional integration to raise their living standards. However, the policy of the NUM on migrants is that all workers should have the right to settle at their place of work with their families which, as happened in Zimbabwe, would herald the end of the official migrant system.

The proportion of sub-continental (South Africa/SADCC) mineral production of global supply for certain minerals is such that a significant influence on price could be exerted to arrest declining terms of trade, particularly if the regional proportion of the world resource base is also taken into consideration. In addition to already cartelised diamonds, the main minerals in this regard would be chromite (ferrochrome), the platinum group metals (PGMs) and, to a lesser extent, uranium. The region also has huge resources of coal, titanium, copper and cobalt. It would also be reasonable to assume that the Soviet Union might be willing to collaborate with a post-apartheid region in the maintenance of the real value of minerals in which case together they would be able to control chromite/ferrochrome supply, PGM supply and strongly influence gold supply, manganese supply, uranium supply and vanadium supply.

In addition to the above similarities in resources and production there are also other major complementarities, such as South Africa's principal mineral import, oil. Current oil production from Angola exceeds sub-continental consumption. Due to South Africa's heavy reliance on high-sulphur coal for energy generation, in turn due to its oil vulnerability, it is currently facing a major ecological crisis (acid rain). The SADCC region has huge untapped hydropower potential, particularly in Angola¹⁹, which could be linked into the South African grid as was done for Cabora Bassa in Mozambique. Natural gas resources in the SADCC (Namibia, Angola, Tanzania and Mozambique) could be used to produce nitrogen fertilisers for the South African market and in this regard AAC has recently shown interest in the development of the Mozambican Pande deposit. The other essential "mineral" that South Africa lacks is water. The Lesotho highlands water scheme could ultimately export 70 cubic metres per second to South Africa by the year 2025²⁰ and provisional plans have been drawn up for the import of water from the Zambezi River.

To conclude, the formation of a post-apartheid sub-continental economic grouping would make even more economic sense in the long-run than the SADCC, but would have to resolve an even greater industrial polarisation problem. Yet the disproportionate strength of the South African economy and its convertible currency based on gold could also be a positive factor in that union would offer immediate advantages to the war torn and partially destroyed economies of Mozambique and Angola and might act as a binding factor so long as the regional location of industry was satisfactorily addressed.

Glasnost and the SADCC

This discussion is another postscript to deal with the recent rapid changes in eastern Europe and the Soviet Union; and some implications for the SADCC region. The Soviet Union and other socialist countries have never been enthusiastic about the SADCC most probably due to the strong involvement of the EEC in its formation²¹, but also because...

"Russia does not see why its valuable foreign exchange should end, like much economic aid to Southern Africa, in a Johannesburg bank."²²

Furthermore, one of the main reasons for western support of the SADCC has been put as being their desire to wean Mozambique and Angola away from the socialist camp. This strategy, together with South African destabilisation, has been almost entirely successful in Mozambique, but less so in Angola.

Nevertheless, although the socialist countries have not been directly involved in the SADCC projects, they have most probably been more important than the West in terms of SADCC's objective of reducing

South African influence in the region, through the enormous military support given to Angola and the intervention of Cuban troops, with Soviet equipment, to halt the South African invasion in 1975 and subsequent incursions, culminating in the withdrawal of South African forces after their failure at Cuito Canavale in 1988. The failure of the South African "securocrats" in Angola was a major factor in the decision to finally decolonise Namibia and the subsequent rise of F. W. Klerk in the Nationalist Party.

In addition, "glasnost" and the Soviet policy of diffusing the cold war since 1984 has made it increasingly difficult for the USA and the West, particularly Britain, to cast their support for the apartheid state in cold war terms and for South Africa to appeal for it on those terms. This, indefinable, aspect most probably also had a major influence on the advent of "pretoriastroika" in South Africa.

The immediate effect on mining in the SADCC of the changes in the eastern Europe have already been felt in Mozambique with the withdrawal of East German technicians from Moatize Colliery in Mozambique, but the larger, global, effect is best summed up by Fidel Castro in a speech in December 1989, in honour of Cuban internationalists who died in Angola. :

"It is a well-known fact that a large part of the developed capitalist world's wealth comes from the unequal terms of trade it maintains with the Third World countries. For centuries, those nations were plundered as colonies. Millions of their sons and daughters were enslaved; their gold, silver and other mineral resources were exhausted; they were pitilessly exploited; and underdevelopment was imposed on them. Underdevelopment was the most direct and clearest consequence of colonialism. Now, those nations are being squeezed dry by means of interest payments on an endless, unpayable debt, while ridiculously low prices are paid for their commodities and they are forced to pay ever higher prices for the industrial goods they import. Financial and human resources are constantly being drawn away from those nations through the flight of capital and the brain drain. Their trade is blocked by dumping, high tariffs, import quotas, synthetic substitutes produced through advanced technological processes, and subsidies for the developed capitalist countries' products when they aren't competitive. Now, imperialism is inviting the European socialist countries to join in on this colossal plunder..."²³

Thus in future the SADCC mineral exports may serve to subsidise both the west and east European economies as the latter move away from predominantly Soviet supplies. However, this will not lead to an increase in demand and temporarily higher prices as the Soviet production that was tied into the CMEA²⁴ will now be put onto the world market. However, there are also several possibilities for setting producer prices jointly with southern African producers, as outlined above²⁵.

In conclusion, the socialist countries have had a major impact on the ability of the region to resist South African aggression and this and "glasnost" have been major factors in the rise of "pretoriastroika" in South Africa, but the direct effect on the minerals sector of the SADCC has been minimal.

Footnotes to Chapter 18

- 1 SADCC Energy 1988.
 - 2 Simba Makoni, quoted in "The Herald" (Harare), 09/07/1990.
 - 3 Sodersten 1980, page 275.
 - 4 This is discussed by Viner 1953, cited in Maasdorp 1982 and Sodersten 1980.
 - 5 This is in fact what happened in the EAC (Kenya) and the CAF (Southern Rhodesia). See Ravenhill 1979 and Leys & Pratt 1969.
 - 6 Maasdorp 1982, page 112. 7 Maasdorp 1982, page 112. 8 Tsie 1989, page 13.
 - 9 Local agents of foreign capital.
 - 10 However, TNC penetration would most probably be limited with a rule forbidding the regional duty free export of goods that were not produced by a company that was majority owned by nationals, as already exists under the PTA system.
 - 11 Mandaza 1987, page 211. 12 Mandaza 1987, page 215.
 - 13 In this regard Anglo American has apparently recently created an exploration section on the rest of Africa to assess the mineral potential (this used to be coordinated from their Zambian office until they were nationalised there).
 - 14 In 1987 South Africa was offering up to 3 years credit for steel, while the best that Zisco could get from the Reserve Bank of Zimbabwe was 180 days.
 - 15 This is already being seriously considered for Debsa, by the aid community and the major liberation movement.
 - 16 AAC, De Beers, Rand Mines, Gencor. 17 Tsie 1989, page 12.
 - 18 Mandaza 1987, page 211.
 - 19 SADCC: over 200 GW-hours/an, Angola: 70 GW-hours/an (Balkay 1984, page 5).
 - 20 Hanlon 1986, page 126.
 - 21 Goodison (1987) argues that the SADCC was an EEC initiative and thus implicitly involved greater dependence on the West.
 - 22 Jenkins 1983, cited in Tsie 1989, page 8. 23 Castro 1989, page 10.
 - 24 Council for Mutual Economic Assistance.
 - 25 Also see Jourdan 1988b and 1990b on mineral supply complementarities with the Soviet Union.
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APPENDICES

Appendix I: Macro-Economic Country Profiles

ANGOLA	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	5.6	6.3	6.8	7.4	8.2	8.8	9.0	9.2	9.5	
Pop density	/km2	4.5	5.1	5.5	5.9	6.6	7.0	7.2	7.4	7.6	
Forex Rate	/USD	29.9	28.5	30.0	30.0	30.0	30.0	30.0	30.0	30.0	
CPI (1)		100.0									
GDP mp	G	108.5	118.0	109.4	126.3	167.5	167.4	175.2	197.0	216.4	
GDP/cap	USD	649	658	537	569	681	638	650	712	761	
Exports fob	G	56.3	55.5	48.7	54.5	60.8	67.0	39.1	64.9	72.0	
SADCC	G	2.00	.60		.05	.05	.05	.05	(83-6=6.6\$=.05Gkz/an)		
RSA	G	.0	.0	.0	.0	.0	.0	.0	.0	.0	
% RSA	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Imports cif	G	39.7	49.7	26.5	20.5	21.4	19.7	18.6	13.4	20.0	
SADCC'	G	.80	.70		.28	.28	.28	.28	(83-6=36.7\$=.28Gkz/an)		
RSA'	G	.0	.0	.0	.0	.0	.0	.0	.0	.0	
% RSA'	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Trade Balance	G	16.6	5.8	22.2	34.0	39.5	47.3	20.5	51.5	52.0	
GFCF (2)	G				12.0						
GFCF/GDP	%				9%						
Debt (3)	GUSD	.6	1.4	2.1	2.1	2.3	2.4	2.5	3.8	4.2	
Debt/GDP	%	17%	35%	57%	50%	41%	44%	42%	58%	58%	
Labour Force	k	620	630	640	650	660	668	670	670	670	
avg wage/an	k										
avg REAL wage/an											
Govt Revenue	G	76.9	93.5	72.1	55.6	82.3	90.5	86.2	87.4	95.6	
MINING*		(official mng GDP: 66.3 86.5 110.2)**									
GDP Mining	G	36.0	35.0	35.0	32.9	49.0	55.1	29.4	51.8	66.7	
GDP Oil		30.8	30.3	32.5	30.8	47.9	54.3	29.2	49.5	62.4	
GDP Minerals		5.2	4.7	2.5	2.1	1.1	.8	.2	2.3	4.3	
% GDP Mining	%	33%	30%	32%	26%	29%	33%	17%	26%	31%	
GFCF, Mining											
% Mng GFCF	%										
Min.Prod. (4)	G	57.3	55.3	47.7	57.0	62.8	66.8	38.0	65.0	80.0	
Oil		50.7	49.5	44.6	54.3	60.7	65.8	37.7	62.1	74.7	
Minerals		6.6	5.8	3.1	2.7	2.1	1.0	.3	2.9	5.3	
Min.Prod/cap	USD	343	308	234	257	255	254	141	235	281	
Min.Exports	G	51.3	48.7	41.9	51.6	57.9	64.5	36.8	63.5	70.0	
Oil exports		44.1	45.8	40.1	49.1	55.2	62.3	36.5	61.9		
Mineral exports		7.2	6.6	2.8	2.1	2.8	2.2	.3	1.6		
% Min. Export	%	91%	88%	86%	95%	95%	96%	94%	98%	97%	
Mng labour (5)	k							17.5			
Expat.labour								.5			
% Expat.	%										
% mng lab	%										
Min.Prod/lab											
avg wage/an'	k										
avg REAL wage/an'											
% mining											
Miners RSA (7)	k	.0	.0	.0	.0	.0	.0	.0	.0	.0	
Remittances (8)		.0	.0	.0	.0	.0	.0	.0	.0	.0	
Remit/miner	USD										
% remit.of exports											
Mng Revenue (9)			53.3	32.3							
% Mng Rev			57.0%	44.8%							
Area	1247 k.km2										
Currency	Kwanza AKZ										

** official (INE) mining GDP for 1986/7/8 is well above the value of production therefore an estimation of 80% production value was made.

Sources: BA 1986, MPA 1986, INE 1983/6/7/8, EIU 1986/7/8/9, SADCC 1989.

BOTSWANA	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	.88	.94	.98	1.01	1.05	1.09	1.13	1.17	1.21	
Pop.density	/km2	1.5	1.6	1.6	1.7	1.7	1.8	1.9	1.9	2.0	
Forex Rate	/USD	.74	.88	1.06	1.10	1.30	1.90	1.86	1.66	1.83	
CPI (1)		100	119	134	146	155	170	189	207	229	
GDP mp	G	.70	.78	1.03	1.28	1.52	2.14	2.45	2.61	3.27	
GDP/cap	USD	1074	942	995	1150	1116	1037	1170	1344	1472	
Exports fob	M	391	331	467	697	857	1383	1615	2645	2710	
SADCC	M	33.0	35.0	61.0	64.0	34.0	54.0	97.0	128.0		
RSA	M	26.0	57.6	56.0	58.6	75.8	77.7	91.1	110.7		
% RSA	%	7%	17%	12%	8%	9%	6%	6%	4%		
Imports cif	M	538	664	704	806	895	1095	1332	1572	2010	
SADCC'	M	36.1	42	45	59	78	81	101	121		
RSA'	M	466.6	581.3	608.8	669.9	698.1	814.0	1022	1251		
% RSA'	%	87%	88%	87%	83%	78%	74%	77%	80%		
Trade Balance	M	(146)	(333)	(236)	(109)	(38)	289	283	1.072	700	
GFCF (2)	G	307	305	320	338	484	412	450	484		
GFCF/GDP	%	44%	39%	31%	26%	32%	19%	18%	19%		
Debt (3)	GUSD	.15	.16	.21	.18	.18	.33	.39	.51	.50	
Debt/GDP	%	16%	18%	22%	16%	15%	30%	29%	33%		
Labour Force	k	83	97	100	101	110	117	130	150	169	
avg wage/an	k	2.35	2.47	2.71	3.08	3.59	3.85	4.35	4.64	4.96	
avg REAL wage/an		2.35	2.07	2.02	2.11	2.32	2.27	2.30	2.24	2.16	
Govt Revenue+ G	G	271	283	370	511	755	1085	1461	1758	2131	
SACU receipts		102	104	114	156	155	149	192	234	291	
% SACU rec.		38%	37%	31%	31%	21%	14%	13%	13%	14%	
MINING*											
GDP Mining	M	204	130	286	405	553	1005	1211	1175	1435	
% GDP Mining	%	29%	17%	28%	32%	36%	47%	49%	45%	44%	
GFCF, Mining	M			56.1							
% Mng GFCF	%			18%							
Min.Prod. (4)	M	304	288	478	618	961	1031	1245	1360	2155	
Min.Prod/cap		345	306	490	611	916	948	1104	1163	1778	
Min.Exports	M	319	225	325	538	684	1169	1323	2371	2350	
% Min. Export		81%	68%	70%	77%	80%	85%	82%	90%	87%	
Mng labour (5)k		8.1	8.5	8.8	9.0	9.2	9.4	9.5	9.6	10.3	
Expat.labour		.71	.72	.71	.70	.66	.66	.62	.65	.68	
% Expat.	%	8.8%	8.5%	8.1%	7.8%	7.2%	7.0%	6.6%	6.7%	6.6%	
% mng lab	%	9.7%	8.8%	8.8%	8.9%	8.4%	8.0%	7.3%	6.4%	6.1%	
Min.Prod/lab	kUSD	50.8	38.3	51.2	62.8	80.3	57.6	71.0	85.2	114.3	
avg wage/an'		2.23	2.67	2.99	3.69	3.78	4.21	5.58	5.85	6.28	
avg REAL wage/an'		2.23	2.24	2.23	2.53	2.44	2.47	2.95	2.83	2.74	
% mining		95%	108%	110%	120%	105%	109%	128%	126%	127%	
Miners RSA (7)k		21	20	19	19	19	20	21	20	19	
Remittances (8)		45	50	50	52	55	49	48	52	64	
% remit. of expts		11%	15%	11%	7%	6%	4%	3%	2%	2%	
Mng Revenue (9)+		101	77	99	194	376	581	845	1034	1327	
% Mng Revenue		37%	27%	27%	38%	50%	54%	58%	59%	62%	

Area 600 k.km2
 Currency Pula BP

Sources: CSO 1986//8/9, Dept of Mines 1987/8/9/90, WB 1985/6/7/8/9/90, BS 1988/90

LESOTHO	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	1.4	1.4	1.4	1.4	1.5	1.5	1.6	1.6	1.7	
Pop.density	/km2	44	45	46	47	48	49	52	53	55	
Forex Rate	/USD	.8	.9	1.1	1.1	1.5	2.2	2.3	2.0	2.3	
CPI (1)		100	115	126	148	165	189	222	245	275	
GDP mp	G	.297	.349	.369	.397	.471	.571	.647	.756	.930	
GDP/cap	USD	285	287	240	247	218	170	182	229	248	
Exports fob	M	46.6	44.6	40.6	34.6	41.8	49.3	58.0	94.7	136.7	
SADCC	M	.1	.2	.4	1.7	.2	.3	1.1			
RSA	M	18.9	20.8	17.1	30.0	39.0	43.3	50.2			
% RSA		41%	47%	42%	87%	93%	88%	87%			
Imports cif	M	331.9	415	505.1	559	649.1	707	772.4	925.2	1049	
SADCC'	M			.0	1.0	.5	.2	1.5			
RSA'	M	322.0		474.5	542.0	598.6	670.6	755.7	784.4		
% RSA'		97%		94%	97%	92%	95%	98%	85%		
Trade Balance	M	(285)	(370)	(465)	(524)	(607)	(658)	(714)	(831)	(913)	
GFCF (2)	M	100	111	128	134	151	183	229	279	362	
GFCF/GDP	%	34%	32%	35%	34%	32%	32%	35%	37%	39%	
Debt (3)	GUSD	.063	.077	.118	.133	.139	.172	.182	.237	.281	
Debt/GDP	%	16%	20%	35%	38%	43%	58%	53%	64%	68%	
Labour Force	k	41	43	45	47	49	51	50	50	50	
avg wage/an											
avg REAL wage/an											
Govt Revenue+	M	125.5	124.8	144.2	179.1	243.5	250.0	293.9	394.0		
SACU Receipts		71.4	70.8	79.4	109.9	151.5	161.1	144.3			
% SACU Rec.	%	57%	57%	55%	61%	62%	64%	49%			
MINING*											
GDP Mining	M	20.6	16.0	13.5	.8	.6	1.5	1.9	1.9	.8	
% GDP Mining	%	6.9%	4.6%	3.7%	.2%	.1%	.3%	.3%	.3%	.1%	
GFCF. Mining	M										
% Mng GFCF	%										
Min.Prod. (4)	M	25.0	18.0	15.2	1.1	.6	1.8	2.0	1.0	.9	
Min.Prod/cap		18.5	13.1	10.9	.8	.4	1.2	1.3	.6	.5	
Min.Exports	M	24.7	18.2	15.2	1.1	.6	1.8	2.0	1.0	.9	
% Min. Export	%	53.0%	40.8%	37.4%	3.2%	1.5%	3.6%	3.4%	1.1%	.7%	
Mng labour (5)	k	4.0	4.0	3.0	1.4	1.0	1.0	1.0	.8	.8	
Expat. labour											
% Expat.											
% mining	%	9.8%	9.3%	6.7%	3.0%	2.0%	2.0%	2.0%	1.6%	1.6%	
Min.Prod/lab	USD	6250	4500	5067	794	633	1772	1988	1292	1125	
avg wage/an'											
avg REAL wage/an'											
% mining sector											
Miners RSA (7)	k	120.7	123.5	117.6	115.3	114.0	116.2	121.5	125.9	119.0	
Remittances (8)		42.1	62.7	127.7	177.8	206.5	234.2	283.4	312.9		
Remit/miner	USD		573	990	1371	1230	900	1036	1221		
% remit. of expts			141%	315%	514%	494%	475%	489%	331%		
Mng Revenue (9)+					.1	.1	.3	.3	.2		
% Mng Revenue											
Area	30	k.km2									
Currency	Maloti		LM								

Sources: LB 1989. BSL 1988. EIU 1985/6/7/8/9/90. WB 1984/5/6/7/8/9/90.

MALAWI	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	6.0	6.2	6.4	6.6	6.8	7.1	7.3	7.5	7.7	
Pop density	/km2	50.9	52.5	54.2	55.9	57.6	59.8	61.7	63.6	65.6	
Forex Rate	/USD	.81	.90	1.06	1.17	1.41	1.72	1.86	2.21	2.56	
CPI (1)		100	110	120	136	151	174	200	253	339	
GDP mp	G	1.005	1.108	1.244	1.436	1.707	2.022	2.302	2.866	3.699	
GDP/cap	USD	206	199	183	186	178	166	170	173	187	
Exports fob	M	228	244	253	289	441	430	462	615	761	
SADCC	M	25.4	32.0	23.1	31.6	38.0	45.8	43.8	12.0	5.0	
PTA	M	24.5	31.8	21.4	24.7	31.6	38.6	23.0			
RSA	M	7.5	12.1	14.9	22.0	32.0	26.8	33.0	65.3	28.9	
% RSA		3%	5%	6%	8%	7%	6%	7%	11%	4%	
Imports cif	M	357	312	323	363	382	493	478	655	1,080	
SADCC'	M	22.7	26.9	30.6	38.4	48.2	40.6	33.5	53.0	29.0	
PTA'	M	21.5	25.7	29.5	37.3	46.4	39.9	31.8			
RSA'	M	131.5	103.9	116.5	141.1	153.5	187.3	138.7	226.4	131.2	
% RSA'		37%	33%	36%	39%	40%	38%	29%	35%	12%	
Trade Balance	M	(129)	(68)	(70)	(74)	59	(63)	(16)	(40)	(319)	
GFCF (2)		223.1	167.8	181.7	197.3	222.7	259.5	242.9	382.1	479.4	
GFCF/GDP	%	22%	15%	15%	14%	13%	13%	11%	13%	13%	
Debt (3)	GUSD	.647	.685	.700	.719	.731	.990	1.000	1.155	1.349	
Debt/GDP	%	52%	56%	60%	59%	60%	84%	81%	89%	93%	
Labour Force	k	348	315	327	388	381	411	428	407		
avg wage/an		.55	.64	.73	.72	.79	.75	.82	.97		
avg REAL wage/an		.55	.58	.61	.53	.52	.43	.41	.38		
Govt Revenue	M	198.8	214.6	230.6	272.6	311.0	383.6	464.8	505.8		
MINING*											
GDP Mining	M	5.9	5.4	4.7	6.1	7.5	6.8	6.7	8.6	10.0	
% GDP Mining	%	.59%	.49%	.38%	.43%	.44%	.34%	.29%	.30%		
GFCF, Mining											
% Mng GFCF											
Min.Prod. (4)	M**	8.8	8.0	7.0	9.1	11.1	10.0	10.0	12.8	15.0	
Min.Prod/cap		1.5	1.3	1.1	1.4	1.6	1.4	1.4	1.7		
Min.Exports	M	.0	.0	.0	.0	.0	.0	.0	.0		
% Min. Export		.0	.0	.0	.0	.0	.0	.0	.0		
Mng labour (5)k		.6	.6	.6	.5	.3	.3	.6	.7		
Expat.labour											
% Expat.											
% mining	%	.17%	.18%	.19%	.12%	.08%	.07%	.15%	.17%		
Min.Prod/lab											
avg wage/an' k		.34	.38	.42	.45	.85	.58	.62	.53		
avg REAL wage/an'		.34	.34	.35	.33	.56	.33	.31	.21		
% mining		62%	59%	58%	62%	108%	78%	76%	55%		
Miners RSA (7)k		14.2	15.2	16.0	15.8	18.2	19.6	20.0	20.0		
Remittances (8)		13.3	18.9	21.2	21.1	22.1	17.9	33.6	54.2		
Remit/miner	USD	1156	1382	1250	1139	861	530	903			
% remit. of expts		5.8%	7.7%	8.4%	7.3%	5.0%	4.2%	7.3%			
Mng Revenue (9)											
% Mng Rev	%										
Area		118 k.km2									
Currency		Kwacha		MKW							

** value of cement production until 1984 and cement + coal thereafter.

Sources: REM 1986/7/8/9, NEM 1986/7/8, EIU 1988/9/90, WB 1987/8/9/90, NSO 1988/9.

MOZAMBIQUE	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	12.1	12.6	12.9	13.3	13.6	13.8	14.2	14.5	14.9	15.5
Pop. density	/km2	15.2	15.8	16.2	16.6	17.1	17.3	17.7	18.2	18.2	19.4
Forex Rate	/USD	32	35	38	40	42	43	40	289	529	739
CPI (1)		100	102	120	155	202	261	362	953	1431	
GDP md	G	70.2	73.5	83.8	82.5	99.7	146.6	166.9	428.1	659.9	
GDP/cap	USD	179	165	171	155	172	246	291	102	86	
Exports fob	G	9.1	9.9	8.7	5.3	4.1	3.3	3.2	28.1	54.5	89.4
SADCC	G						.0	.0	.2	.5	
RSA	G	1.0					.1	.1	1.2	3.6	
% RSA	%	11%					4%	5%	4%	7%	
Imports cif	G	25.9	28.3	31.6	25.6	22.9	18.3	21.9	180.9	373.2	521.7
SADCC'	G	.0	.3	.7	1.1	.4	.2	.4	4.6	16.7	
RSA'	G	2.9	3.5	2.6	2.4	2.7	2.1	2.3	21.9	51.7	
% RSA	%	11.0%	12.5%	8.1%	9.6%	11.7%	11.7%	10.3%	12.1%	13.9%	
Trade Balance	G	(17)	(18)	(23)	(20)	(19)	(15)	(19)	(153)	(319)	(432)
GFCF (2)	G	14.8	16.3	17.9	9.1	11.4	10.1	16.2	101.8	214.2	
GFCF/GDP	%	21%	22%	21%	11%	11%	7%	10%	24%	32%	
Debt (3)	GU\$D	.3	.2	.3	1.2	1.2	3.0	3.5	4.4	4.4	
Debt/GDP	%	12%	11%	15%	57%	52%	90%	85%	294%	353%	
Labour Force	k							200.0	192.7	201.6	
avg wage/an	k								117	210	
avg REAL wage/an									40.4	39.8	
Govt Revenue	G	14.8	18.4	21.0	22.0	22.3	19.1	22.1	68.6	130.7	240.0
MINING*											
GDP Mining	G	.4	.6	.4	.2	.2	.1	.2	.9	1.0	
% GDP Mining	%	.5%	.8%	.4%	.3%	.2%	.1%	.1%	.2%		
GFCF Mining											
% Mng GFCF	%										
Min.Prod. (4)	M	700	966	778	510	362	234	236	375	1171	1526
Min.Prod/cap	USD	1.2	2.2	1.6	1.0	.6	.4	.4	.2	.2	.1
Min.Exports	M	437	421	220	98	76	26	110	188	1096	1087
% Min. Export	%	4.3%	4.2%	2.5%	1.8%	1.9%	.3%	3.4%	.7%	2.0%	1.2%
Mng labour (5) k								4.0	5.0	4.9	3.5
Expat.labour								.0	.04	.03	.1
% Expat.	%								.8%	.6%	1.5%
% mng lab	%								2.6%	2.4%	
Min.Prod/lab	USD								503	452	
avg wage/an	k								116.9	210.4	
avg REAL wage/an									40.4	39.8	
% mining	%								100%	100%	
Miners RSA (7) k		46	41	45	40	52	56	59	50	46	
Remittances (8)		1.7	2.3	2.4	3.0	2.4	1.8	2.0	16.8	37.8	
remit/migrant USD		1145	1576	1397	1879	1098	749	842	1154	1548	
% remit.of exports	%	19%	23%	28%	57%	59%	54%	63%	60%	70%	
Mng Revenue (9)											
% Mng Rev											
Area	799 k.km2										
Currency	Metical	MMT									

Sources: Mirem 1988/9/90, DNE 1986/7/8/9, WB 1987/8/9/90, EIU 1987/8/9/90.

NAMIBIA	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	.96	1.01	1.04	1.06	1.10	1.14	1.18	1.23	1.27	1.50
Pop.density	/km2	1.2	1.2	1.3	1.3	1.3	1.4	1.4	1.5	1.5	1.8
Forex Rate	/USD	.77	.89	1.09	1.11	1.48	2.19	2.27	2.04	2.26	2.62
CPI (1)		100	115	133	149	162	181	206	232	261	296
GDP mp	G	1.56	1.51	1.79	1.88	2.11	2.54	2.93	3.08	4.28	4.50
GDP/cap	USD	2107	1682	1588	1591	1301	1017	1093	1232	1492	
Exports fob	M	1138	947	1009	941	1101	1593	1994	1811	2126	2498
SADCC	M	0	0	0	0	0	0	0	0	0	0
RSA	M							498		425	
% RSA	%							25%		20%	
Imports cif	M	888	1067	1107	1024	1177	1269	1543	1808	1946	2250
SADCC'	M	0	0	0	0	0	0	0	0	0	0
RSA'	M							1110		1594	
% RSA'	%							72%		82%	
Trade Balance	M	250	(120)	(98)	(83)	(76)	324	451	3	180	
GFCF (2)	G	.44	.43	.41	.36	.33	.37	.42	.48	.65	
GFCF/GDP	%	28%	29%	23%	19%	15%	15%	14%	16%	15%	
Debt (3)	GUSD	.20	.20	.30	.30	.30	.30	.30	.30	.32	
Debt/GDP	%	10%	12%	18%	18%	21%	26%	23%	20%	17%	
Labour Force	k	206	203	206	197	194	191	188	186	185	
avg wage/an	k										
avg REAL wage/an		.00	.00	.00	.00	.00	.00	.00	.00	.00	
Govt Revenue+	G	.34	.29	.44	.57	.69	.96	1.20	1.31	1.45	
SACU receipts					350	350	300	350	350	394	
% SACU rec.					44%	36%	31%	29%	27%	27%	
MINING*											
GDP Mining	M	680	452	465	473	547	991	1144	779	1052	
% GDP Mining	%	44%	30%	26%	25%	26%	39%	39%	25%	25%	
GFCF, Mining	M	112.4	74.6	47.6	40.9	31.9	31.9	75.3	94.5	170.3	
% Mng GFCF	%	26%	17%	11%	11%	10%	9%	18%	20%	26%	
Min.Prod. (4)	M	970	627	764	703	840	1272	1629	1309	1528	
Min.Prod/cap		906	621	735	682	766	1116	1380	1064	1203	
Min.Exports	M	908	657	755	715	851	1285	1645	1322	1543	
% Min. Export	%	80%	69%	75%	76%	77%	81%	82%	73%	73%	
Mng labour (5)	k	19.8	19.2	17.3	16.6	15.6	14.9	14.0	13.0	13.1	
Expat.labour											
% Expat.	%										
% mng lab	%	9.6%	9.5%	8.7%	8.4%	8.1%	7.8%	7.4%	7.0%	7.1%	
Min.Prod/lab	kUSD	56.98	36.75	40.66	39.11	36.33	39.05	51.27	49.47	51.68	
avg wage/an'		5.51	6.28	7.64	8.42	5.93	10.28	11.47	14.00	18.51	
avg REAL wage/an'		5.51	5.46	5.74	5.65	5.51	5.68	5.57	6.03	7.09	
% mining											
Miners RSA (7)	k	0	0	0	0	0	0	0	0	0	
Remittances (8)		0	0	0	0	0	0	0	0	0	
% remit. of expts	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mng Revenue (9)+		183	151	55	87	133	242	317	315	270	
% Mng Revenue		54%	52%	13%	15%	19%	25%	26%	24%	19%	
Area		824 k.km2									
Currency		Rand SAR									

Sources: CMN 1987, WB 1985/6/7/8/9/90, EIU 1986/7/8/9/90

SWAZILAND	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	.56	.58	.60	.62	.64	.66	.68	.71	.74	.75
Pop.density	/km2	32.3	33.4	34.6	35.7	36.9	38.0	38.9	40.9	42.6	
Forex Rate	/USD	.75	.76	1.08	1.11	1.43	2.20	2.01	2.01	2.26	2.62
CPI (1)		100	114	129	148	164	199	230	252	289	327
GDP md	G	.42	.50	.55	.58	.66	.74	.96	1.10	1.35	
GDP/cap	USD	1,002	1,134	841	841	714	512	703	773	807	
Exports fob	M	287	340	332	324	332	373	644	826	990	1144
SADCC	M										
RSA	M	82.7	108.4	122.5	104.9	110.7		204.0	342.0		
% RSA	%	29%	32%	37%	32%	33%		32%	41%		
Imports cif	M	406	443	469	516	548	617	676	750	973	1112
SADCC'	M										
RSA'	M	361	433	467	512	605		621	692		
% RSA'	%	89%	98%	99%	99%	110%		92%	92%		
Trade Balance	M	(119)	(102)	(137)	(193)	(216)	(243)	(32)	76	17	31
GFCF (2)	G	148	140	153	170	209	225	229			
GFCF/GDP	%	35%	28%	28%	29%	32%	30%		0%		
Debt (3)	USD	.17	.16	.17	.18	.17	.18	.22	.27	.27	
Debt/GDP	%	30%	24%	34%	34%	37%	54%	47%	50%	44%	
Labour Force	k	85	90	88	90	89	85	92	95	95	
avg wage/an	k										
avg REAL wage/an											
Govt Revenue	G	126	150	182	165	213	245	255	337	428	477
SACU receipts				118	121	130	137	120	135	162	187
% SACU rec.		0%	0%	65%	65%	61%	56%	47%	40%	38%	
MINING*											
GDP Mining	M	14	16	14	16	12	16	21		26	
% GDP Mining	%	3%	3%	3%	3%	2%	2%	2%		2%	
GFCF, Mining	M			.1							
% Mng GFCF	%			0%							
Min.Prod. (4)	M	19	21	18	24	22	30	35	39	44	53
Min.Prod/cap		34	37	31	39	34	45	52	55	59	
Min.Exports	M	19	21	17	20	23	33	38	42	40	
% Min. Export		6.5%	6.2%	5.2%	6.3%	6.9%	8.8%	6.0%	5.1%	4.0%	
Mng labour (5)	k	2.6	2.6	2.5	2.2	2.4	2.4	2.4	2.4	2.1	
Expat.labour								.05			
% Expat.								2.0%			
% mng lab	%	3.0%	2.9%	2.8%	2.5%	2.7%	2.9%	2.7%	2.5%	2.2%	
Min.Prod/lab	USD	9832	10842	6819	9840	6340	5521	7197	8128	9278	
avg wage/an'						3.81	4.11	4.69	5.20	6.08	
avg REAL wage/an'						2.32	2.06	2.04	2.07	2.11	
% mining											
Miners RSA (7)	k	11	11	11	14	14	14	15	17	18	
Remittances (8)				9	12	13	13	14			
% remit. of expts				3%	4%	4%	3%	2%			
Mng Revenue (9)'											
% Mng Revenue											
Area	17 k.km2										
Currency	Lilangeni										
						M = 10 ⁻⁶					
						G = 10 ⁻⁹					

Sources: CSO 1987/8, DGSM 1985/6/7/8/9, WB 1985/6/7/8/9/90, EIU 1987/8/90.

TANZANIA	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	18.5	19.1	19.8	20.4	21.1	21.7	22.5	23.2	24.0	
Pop. density	/km2	23.1	23.9	24.7	25.5	26.3	27.2	28.1	29.0	29.0	
Forex Rate	/USD	8.2	8.3	9.6	12.5	16.3	17.2	37.8	64.8	99.3	
CPI (1)		100	126	162	206	280	374	495	643	868	
GDP md	G	37.5	43.9	52.5	61.0	76.3	99.3	131.3	198.1	277.8	
GDP/cap	USD	248	277	278	240	222	266	155	132	121	
Exports fob	G	4.7	4.8	4.3	4.2	6.1	5.7	11.0	18.5	38.4	
SADCC	G	.0	.0	.0	.1	.1	.1	.1	.5	.6	
RSA	G	.0	.0	.0	.0	.0	.0	.0	.0	.0	
% RSA	%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	
Imports cif	G	10.2	9.7	10.5	9.1	13.4	17.5	34.3	73.9	117.9	
SADCC'	G	.0	.1	.2	.1	.3	.3	.5	.3	1.3	
RSA'	G	.0	.0	.0	.0	.0	.0	.0	.0	.0	
% RSA	%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	.0%	
Trade Balance	G	(5.5)	(4.9)	(6.2)	(4.8)	(7.3)	11.7	(23.3)	(55.4)	(79.5)	
GFCF (2)	G	9.6	11.1	12.2	9.6	11.9	17.8	25.9			
GFCF/GDP	%	25.6%	25.3%	23.2%	15.7%	15.6%	17.9%	19.7%			
Debt (3)	GUSD	2.0	2.2	2.4	2.6	2.5	2.9	3.7	4.1	4.7	
Debt/GDP	%	43.7%	41.5%	43.6%	53.1%	53.6%	50.3%	106.6%	134.1%	169.0%	
Labour Force	k	555.7	574.6	675.2	686.9	732.2	747.7	746.9	750.0		
avg wage/an	k										
avg REAL wage/an											
Sovt Revenue	G	8.9	10.0	10.9	13.6	14.7	20.1	23.1	46.6	70.2	
MINING*											
GDP Mining	G	329	299	266	249	337	251	474	1137	1418	
% GDP Mining	%	.9%	.7%	.5%	.4%	.4%	.3%	.4%	.6%	.5%	
GFCF, Mining		46	41	41	104	70	105	155			
% Mng GFCF	%	.5%	.4%	.5%	1.1%	.6%	.6%	.6%			
Min.Prod. (4)	M	370	207	221	273	346	363	549	315	399	
Min.Prod/cap	USD	2.4	1.3	1.2	1.1	1.0	1.0	.6	.5	.4	
Min.Exports	M	300	538	406	486	519	377	416	603	1632	
% Min. Export	%	6.4%	11.2%	9.4%	11.5%	8.5%	6.6%	3.3%	3.3%	4.3%	
Mng labour (5)	k	4.3	4.3	7.2	7.6	8.3	8.6	8.2	3.5		
Expat. labour								.0			
% Expat.	%										
% mng lab	%	.8%	.7%	1.1%	1.1%	1.1%	1.1%	1.0%	1.1%		
Min.Prod/lab	USD	10515	5804	3214	2893	2544	2459	1636	1480		
avg wage/an'	k	9361	7873	7959	12321	12340	12600	13170			
avg REAL wage/an		9361	6266	4912	5985	4403	3373	2662			
% mining											
Miners RSA (7)	k	0	0	0	0	0	0	0			
Remittances (8)		.0	.0	.0	.0	.0	.0	.0			
remit/migrant	USD										
% remit.of exports	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mng Revenue (9)											
% Mng Rev											
Area	799 k.km2										
Currency	Shilling TSh										

Sources: BT 1987/8/9/90, BS 1986/7/8, WB 1987/8/9/90, EIU 1987/3, 9/90.

ZAMBIA	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	5.9	6.0	6.1	6.2	6.4	6.7	7.0	7.3	7.6	7.8
Pop. density	/km2	7.4	7.5	7.6	7.8	8.0	8.4	8.7	9.1	9.1	
Forex Rate	/USD	.8	.9	.9	1.3	1.8	2.7	4.2	8.9	8.2	
CPI (1)		100	114	128	153	183	251	381	544	847	
GDP mp	G	3.1	3.5	3.6	4.2	4.9	7.1	13.0	18.1	21.5	
GDP/cap	USD	659	669	635	538	428	388	447	280	360	
Exports fob	G	1.0	.9	1.0	1.0	1.2	1.5	5.4	8.1	9.8	
SADCC	M	6.8	8.1	4.0		56.3	24.2				
RSA	M	5.7	5.5	2.8		9.2	15.9	34.0			
% RSA	%	.6%	.6%	.3%		.8%	1.0%	.6%			
Imports cif	G	.9	.9	.9	.9	1.1	2.1	4.4	6.6	6.9	
SADCC'	M	12.3	6.2	6.4		2.7	20.3				
RSA'	M	136.5	139.6	134.6		233.5	387.0	824.0		1587	
% RSA	%	15.6%	15.1%	14.5%		21.1%	18.5%	18.5%		23.0%	
Trade Balance	G	.1	.0	.0	.2	.1	(.6)	.9	1.4	2.9	
GFCF (2)	M	558	610	618	615	623	725	1061	1772		
GFCF/GDP	%	18%	18%	17%	15%	13%	10%	8%	10%		
Debt (3)	GUSD	2.4	2.5	2.6	2.6	2.8	3.2	3.8	4.4	6.5	
Debt/GDP	%	61%	62%	68%	79%	101%	123%	122%	214%	249%	
Labour Force	k	381	374	368	364	365	362	361	362	361	
avg wage/an	k	2.0	2.8	2.8	2.9						
avg REAL wage/an		2.0	2.4	2.2	1.9						
Govt Revenue	G	.8	.8	.8	1.0	1.1	1.5	3.0	2.3		
MINING*											
GDP Mining	G	430	473	382	619	674	1102	2355	2689	2915	
% GDP Mining	%	16%	14%	11%	15%	14%	16%	18%	15%	14%	
GFCF Mining	M	37									
% Mng GFCF	%	16%									
Min.Prod. (4)	M	1179	960	861	1251	1527	2688	5793	3391	10425	
Min.Prod/cap	USD	253	194	152	161	133	147	200	130	174	
Min.Exports	M	326	903	911	1001	1109	1343	2826	7462	9119	
% Min. Export	%	36%	96%	96%	96%	93%	88%	53%	93%	93%	
Mng labour (5)	k	62.9	61.0	59.5	57.7	58.5	57.5	58.3	55.8	55.0	
Expat.labour		6.2	5.6	5.1	3.4	4.1	2.5	1.1	1.01	.88	
% Expat.	%	10%	9%	8%	6%	7%	4%	2%	2%	2%	
% mng lab	%	16%	16%	16%	16%	16%	16%	16%	15%	15%	
Min.Prod/lab	USD	23748	18123	15587	17324	14551	17239	23631	16914	23039	
avg wage/an'	k	3.6	3.8	4.0	4.1						
avg REAL wage/an		3.6	3.4	3.1	2.7						
% mining	%	192%	157%	180%	219%						
Miners RSA (7)	k	0	0	0	0	0	0	0	0	0	
Remittances (8)		.0	.0	.0	.0	.0	.0	.0	.0	.0	
remit/migrant USD											
% remit.of exports	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mng Revenue (9)		42	11	0	53	94	129	405	207		
% Mng Rev											
Area		753 k.km2									
Currency		Kwacha ZKw									

Sources: BZ 1987/8/9, CSO Zam 1986/7/8/9, WB 1987/8/9/90, EIU 1987/8/9/90.

ZIMBABWE	Unit	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
ECONOMY											
Population	M	7.4	7.6	7.6	7.7	8.0	8.2	8.4	8.6	8.9	9.1
Pop. density	/km2	18.8	19.5	19.5	19.8	20.4	20.9	21.5	22.1	22.1	
Forex Rate	/USD	.6	.7	.8	1.0	1.3	1.6	1.7	1.7	1.8	
CPI (1)		100	113	125	154	185	201	230	266	288	
GDP mp	G	3.4	4.4	5.2	6.3	6.4	7.0	7.7	8.1	9.2	11.1
GDP/cap	USD	741	813	893	804	616	535	550	561	592	
Exports fob	G	.9	1.0	1.0	1.2	1.5	1.8	2.2	2.4	2.9	
SADCC	M		90.8	88.7	107.8	142.4	170.9	200.3	258.0		
RSA	M	155.0	192.2	137.8	191.8	232.2	166.5	211.1	185.4		
% RSA	%	17.0%	19.8%	14.2%		16.0%	9.3%	9.7%			
Imports cif	G	.8	1.0	1.1	1.1	1.2	1.4	1.6	1.7	2.4	
SADCC	M		75.9	78.8	67.9	65.0	74.5	119.8	130.9		
RSA	M	223.0	279.7	339.5	259.9	231.8	273.2	351.2	361.5		
% RSA	%	27.6%	27.5%	22.1%		19.3%	18.9%	21.4%		.0%	
Trade Balance	G	.1	(.0)	(.1)	.1	.3	.3	.5	.6	.4	
GFCF (2)	M	1	1	1	1	1	1	1	1		
GFCF/GDP	%	0%	0%	0%	0%	0%	0%	0%	0%		
Debt (3)	GU\$D	.7	.8	1.2	1.5	1.5	1.5	1.8	2.0	2.7	
Debt/GDP	%	13%	13%	18%	24%	31%	35%	38%	42%	52%	
Labour Force	k	1,010	1,038	1,046	1,033	1,036	1,062	1,094	1,114	1,129	
avg wage/an	k	3.0	3.2	3.3	3.1	3.4	3.6	4.0	4.5		
avg REAL wage/an		2.0	2.0	2.2	2.0	1.8	1.8	1.8	1.7		
Govt Revenue	G		1.0	1.4	1.8	2.1	2.6	3.1	3.8	4.4	
MINING*											
GDP Mining	M	285	352	417	598	820	838	446	529	629	793
% GDP Mining	%	8%	6%	4%	6%	5%	5%	6%	7%	7%	
GFCF Mining	M	93	133	94	86	81	30	55			
% Mng GFCF	%	16%	16%	9%	7%	7%	3%	4%			
Min.Prod. (4)	M	415	394	383	470	546	630	699	816	986	
Min.Prod/cap	USD	39	72	66	60	53	48	50	57	63	
Min.Exports	M	429	354	410	482	535	702	932	1039	1290	
% Min. Export	%	47%	36%	40%	42%	40%	39%	43%	44%	45%	
Mng labour (5)	k	66.2	66.2	63.7	60.3	54.5	55.2	54.5	57.9	58.7	
Expat,labour								.05	.05	.05	
% Expat.	%							.09%	.09%	.09%	
% mng lab	%	6.6%	6.6%	6.1%	5.8%	5.3%	5.2%	5.0%	5.2%	5.2%	
Min.Prod/lab	USD	9936	8046	7859	7687	7672	7099	7677	8452	9319	
avg wage/an	k	1.8	2.3	2.8	3.1	3.6	4.1	4.3	4.7	5.2	
avg REAL wage/an		1.8	2.0	2.2	2.0	1.9	2.0	1.9	1.8	1.8	
% mining	%	88%	104%	101%	101%	106%	112%	106%	104%		
Miners RSA (7)	k	0	0	0	0	0	0	0	0		
Remittances (8)		.0	.0	.0	.0	.0	.0	.0	.0		
remit/migrant	USD										
% remit.of exports	%	0%	0%	0%	0%	0%	0%	0%	0%	0%	
Mng Revenue (9)											
% Mng Rev											
Area	391 k.km2										
Currency	Dollar		ZD								

Sources: CSO Zim 1987/8/9. RBZ 1986/7/8/9. WB 1986/7/8/9/90. EIU 1986/7/8/9/90.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	
LESOTHO																				
Diamonds	Mcts	.018	.007	.009	.009	.012	.003	.007	.023	.049	.052	.053	.042	.006	.007	.011	.006	.004	.005	

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
MALAWI																				
Coal	kt	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	1.79	10.5	18.7	29.4	41.7
Limestone	Mt	.111	.100	.120	.143	.131	.168	.137	.152	.166	.169	.116	.080	.098	.105	.092	.103	.107	.108	.121
Lime	kt	68.6	62.2	74.6	88.8	81.1	104.	85.0	94.0	103.	113.	77.9	53.4	65.5	70.1	61.7	69.7	72.8	84.9	102.
Lime, Cement	kt															1.92	2.77	3.13	2.48	

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989
MOZAMBIQUE																				
Asbestos	kt	.23	1.43	.54	.15	.19	.00	.00	.00	.04	.79	.72	1.46	.25	.41	.40	.05	.00	.02	.00
Bauxite	kt	7.10	7.70	5.40	5.60	6.00	5.00	5.00	2.64	16.1	27.6	6.7	8.2	6.0	6.8	.35	3.92	5.07	8.00	7.24
Bentonite	kt				2.99	4.70	1.40	1.60	31.0	5.43	8.20	3.62	3.51	1.05	1.05	.90	1.11	.94	1.00	.13
Beryl	t				5.5	10.2	9.2	19.4	7.16	236.	409.	535.	67.	59.	20.	.40	.08	.4	43.3	24.0
Bismuthite	t				2.00	.00	8.39	5.52	288.	.12	.24	.19	.22	.25	.28	.37	.27	.15	.15	.08
Coal	kt	351.	329.	310.	394.	428.	575.	653.	.00	.56	1.13	.88	1.06	1.19	1.25	1.77	1.30	.72	.70	.42
Copper	kt				.70	.70	.68	.03	.00	.12	.69	.19	.22	.25	.28	.37	.27	.15	.15	.08
Cu conc	kt				3.18	3.16	3.22	.15	.00	.56	1.13	.88	1.06	1.19	1.25	1.77	1.30	.72	.70	.42
Diatomite	kt		.05			.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Fe, Steel	kt				47.8	18.2	8.5	10.0	12.4	12.2	5.0	13.2	11.4	9.2	10.8	9.1	2.5	5.32	.00	.00
Felspar	kt		.00	.30	.83	.84	.00	.25	.82	.68	.59	.00	.70	.32	.13	.20	.07	.00	.00	.00
Fluorspar	kl		8.22	1.43	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00	.00
Garnet	l				3.54	3.15	2.41	2.25	1.79	1.90	1.28	1.80	1.64	1.27	1.26	.57	.15	.14	.00	.00
Kaolin	kt	1.48	1.59	1.66	.10	.18	.12	.20	.20	.18	.14	.274	.31	.29	.26	.57	.15	.14	.00	.00
Lime, Cement	kt	394	416	468	611	465	272	221	326	354	274	261	271	187	105	86	73	73	73	1140
Marble	m3				368	0	0	0	0	60	304	167	561	406	574	7860	1137	1137	1140	1100
Mica	kt	.95	.00	.23	.31	.85	.90	.52	.43	.11	.10	.30	.15	.31	.13	.00	.00	.00	.00	.45
Monazite	t				.0	2.1	12.0	3.5	10.4	5.6	7.1	4.3	3.1	4.1	1.7	1.9	.1	.1	.00	.00
Salt	kt	28.7	27.7	28.1	52.9	30.9	31.3	28.0	51.5	41.6	34.9	48.7	28.6	23.2	10.4	10.5	2.6	.00	.00	.00
Ta Microilite conc	conc				53.8	62.1	50.7	55.9	40.9	39.9	24.9	34.1	21.7	14.0	5.2	5.2	2.7	.00	.00	.00
Ta Tantalite conc	conc				30.3	45.9	51.1	29.2	37.6	39.9	25.9	34.1	21.7	14.0	5.2	5.2	2.7	.00	.00	.00
Tantalum	t				27.1	34.7	32.8	27.4	26.2	30.0	23.8	37.8	23.8	17.3	8.5	8.0	2.0	.00	.00	.00

		TANZANIA																					
		Unit	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	
Calcite	kt	.00	1.28	3.49	2.43	2.16	5.39	1.71	3.03	1.12	1.52	2.86	2.47	2.99	2.34	2.17	3.55	7.36	2.90	1.66	2.51		
Coal	kt	2.7	2.8	3.5	2.0	1.5	.9	.8	4.9	6.5	6.8	6.7	6.1	10.8	10.0	8.2	7.2	5.2	2.9	3.3	46.00		
Diamonds	Mcts	.637	.971	.595	.464	.453	.479	.401	.376	.282	.307	.256	.272	.262	.243	.266	.236	.181	.113	.082	.08		
Fe, Steel	kt	73.5	33.5	68.4	22.6	1.6	18.5	13.8	27.5	30.2	30.0	17.3	10.1	16.0	13.4	11.3	8.0	16.6	15.0	15.0			
Gemstones	t	1.07	1.57	1.04	4.96	1.37	.04	.30	.13	.13	2.81	5.75	1.20	1.26	10.1	.39	.65	.05	4.36	9.05	11.40		
Gold	t	.244	.005	.007	.005	.002	.000	.009	.001	.001	.002	.006	.007	.007	.007	.024	.097	.055	.085	.201	.164	.12	
Gypsum	kt	20.7	17.7	14.1	12.9	21.1	12.8	57.1	159	28.0	9.2	9.7	12.3	58.2	6.8	7.6	14.4	14.1	24.6	19.6	5.9		
Kaolin	kt	.46	.83	1.46	.87	.79	1.60	2.39	.26	7.34	12.5	5.38	2.92	1.61	1.62	1.72	1.64	2.27	1.45	1.55			
Limestone	Mt	-3																					
Cement	kt	167	178	237	314	296	266	244	245	251	299	306	390	370	370	273	369	376	441	489			
Lime	kt	5.20	1.86	5.99	4.82	.47	5.89	5.50	5.50	5.79	21.9	6.75	5.17	6.80	3.01	3.00	2.47	2.00	.000	.000	.249	.000	.000
Magnesite	kt	.775	.982	.058	.109	.000	.000	.019	.036	.023	.010	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Meerschbaum	kt	.010	.008	.018	.009	.003	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Mica, Sheet	kt	.057	.037	.018	.032	.009	.006	.013	.005	.015	.009	.004	.007	.003	.001	.000	.000	.000	.001	.000	.000	.000	.000
Oil, Prods.	Mt	.0	.0	.0	.0	.0	.0	.0	.61	.59	.47	.62	.52	.50	.50	.50	.49	.49	.49	.49	.49	.49	.49
P, Apatite	kt	41.9	37.3	32.5	38.4	39.2	41.7	58.4	34.4	34.9	33.6	37.0	42.2	32.1	29.7	29.9	21.1	22.1	41.1	30.0	20.00		
Salt	t	.034	.001	.001	.000	.001	.001	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Silver	kt	.162	.195	.074	.034	.068	.023	.002	.019	.014	.019	.011	.018	.009	.002	.000	.000	.002	.008	.005	.003	.001	
Tin *	kt	.013	.011	.006	.002	.001	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Tungsten *	kt	.150	.029	.000	.000	.020	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
Vernaculite	kt	.150	.029	.000	.000	.020	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
* concentrate																							
=====																							
ZAMBIA																							
Unit 1970 1971 1972 1973 1974 1975 1976 1977 1978 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988 1989																							
Beryl	t	200	200			54.2																	
Cadmium	kt	12.2	5.1	15.6	14.7	12.7	6.2	6.8	4.5	.0	1.75	.24	.0	10.12	21.67	4.03	21.91	3.08	24.12	1.89	1.75		
Caesiterite	t																						
Coal	kt	623	812	937	940	809	898	753	662	884	599	568.8	527.3	603.9	452.9	510.6	557.1	463.1	523.7	394.8			
Cobalt	kt	2.05	2.08	2.06	1.93	1.98	1.84	1.62	1.70	1.56	3.27	3.309	2.660	2.444	2.407	3.470	4.415	4.340	4.479	5.025	4.488		
Copper	kt	683	693	698	681	702	640	713	660	656	585	609.5	560.7	584.5	576.1	523.3	479.9	460.4	483.0	422.0	450.9		
Emeralds	t																						
Fe, Steel	kt																						
Felspar	kt																						
Gold	t	.170	.301	.355	.247	.278	.501	.341	.217	.259	.247	.329	.452	.362	.226	.184	.185	.214	.045	.120	.020		
Gypsum	kt				.48	3.77	7.54	3.60	6.18	1.74	1.18	11.30	12.00	.00	.00	.379	.350	.056	.350	.262	.149		
Lead	kt	27.3	27.7	26.0	25.0	24.5	19.1	13.6	13.3	12.7	12.8	10.00	9.90	14.70	14.80	13.30	8.00	6.65	7.98	6.39	3.95		
Limestone	Mt				.978	.840	.755	.709	.414	.486	.580	.698	.503	.427	.511	.916	.702	.705	.720	.999	.775		
Limst, Cement	kt																						
Limst, Lime	kt																						
Magnetite	kt																						
Manganese	kt																						
Oil, Prods.	Mt								na	.05	.39	.38	1.43	.80	.61	.60	.98	.55	.00	.50	.35		
Phyllite	t								.78	.83	.79	.73	.32	.31	.29								
Pyrite	kt	.0	.0	69.0	74.8	71.1	19.0	20.6	20.5	2.5	3.0	3.2	12.0	3.0	25.5	18.1	28.3	19.2	45.4	67.5	60.1		
Selenium	kt	.0	.0	.0	20.2	47.0	36.5	34.1	19.6	27.9	20.0	22.70	21.70	23.23	18.25	17.36	19.49	22.13	27.10	24.35	21.44		
Silver	t	47.8	39.4	3.4	15.8	36.6	31.1	33.1	33.3	28.4	23.75	22.22	27.60	29.03	24.74	18.88	26.78	29.88	29.33	19.80			
Sulphur	kt	0	0	0	0	0	0	0	0	110	75	92.4	90.2	85.1	107.3	97.2	99.0	99.0	99.0	99.0			
Talc	kt	1.33	.14	.16	.11	.00	.00	.00	.00	.00	.00	.00	.92	.27	1.31	.37	9.53	.27	.26	.07	.14		
Tin	kt	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000	.010	.022	.010	.004	.022	3.050					
Zinc	kt	53.5	57.1	56.0	55.4	58.4	46.9	50.4	40.2	42.5	38.2	32.69	33.30	39.19	37.88	29.20	22.90	22.49	21.03	20.22	12.91		

SADCC ASBESTOS

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Mozambique	.2	0	.1	.4	.1	0	.0	0	0%	.3	-100%	-100%
Swaziland	33.1	37.6	32.8	25.1	23.1	25.9	22.8	27.3	13%	31.6	-17%	-17%
Zimbabwe	188	262	251	174	164	193	187	187	87%	218	-0%	-25%
SADCC:	221	299	284	199	187	219	209	214	100%	250	-3%	-24%

SADCC DIAMONDS

(Mcarats)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Angola	2.5	2.2	1.5	.7	.3	.9	1.0	1.3	2%	1.5	-47%	-11%
Botswana	.6	2.4	5.1	12.6	13.1	13.2	15.2	15.3	21%	6.7	2516%	199%
Lesotho	.0	.0	.1	.0	.0	.0	.0	.0	0%	.0	-72%	-91%
Namibia	1.8	1.6	1.5	.9	1.0	1.0	.9	.9	1%	1.3	-49%	-39%
Swaziland	0	0	0	.0	.0	.1	.1	55.3	76%	2.8		
Tanzania	.6	.5	.3	.2	.2	.1	.1	.1	0%	.3	-88%	-70%
SADCC:	5.5	6.7	8.4	14.5	14.6	15.3	17.4	72.8	100%	12.7	1222%	769%

SADCC COAL

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Botswana	0	71	371	437	500	579	613	663	11%	303		78%
Malawi	0	0	0	2	10	19	29	42	1%	5		
Mozambique	351	575	409	20	4	43	24	62	1%	251	-82%	-85%
Swaziland	123	127	184	166	172	165	165	165	3%	146	34%	-10%
Tanzania	3	1	7	7	5	3	3	46	1%	7	1627%	585%
Zambia	623	898	569	511	557	463	524	395	7%	641	-37%	-31%
Zimbabwe	3520	3300	3134	3030	3359	4858	5064	4680	77%	3446	33%	49%
SADCC:	4619	4972	4674	4173	4608	6131	6422	6053	100%	4800	31%	29%

SADCC COPPER

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Botswana	0	7	16	22	21	19	24	23	4%	13		50%
Mozambique	1	1	0	0	0	0	0	0	0%	0	-92%	-45%
Namibia	29	39	42	48	50	38	42	38	7%	41	33%	-10%
Zambia	683	640	610	480	460	483	422	451	85%	590	-34%	-26%
Zimbabwe	30	48	27	20	20	19	16	16	3%	30	-48%	-42%
SADCC:	743	734	694	570	553	558	505	528	100%	675	-29%	-24%

SADCC COBALT

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Botswana	0	.09	.23	.22	.16	.18	.30	.22	4%	.17		-5%
Zambia	2.05	1.84	3.31	4.42	4.34	4.48	5.03	4.49	93%	2.86	119%	36%
Zimbabwe	0	.02	.12	.09	.08	.11	.13	.11	2%	.07		-3%
SADCC:	2.05	1.95	3.65	4.73	4.58	4.77	5.45	4.81	100%	3.09	135%	32%

SADCC GOLD

(tonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Botswana	0	0	0	.01	.03	.03	.02	.07	0%	.01		
Namibia				.19	.18	.17	.20	.34	2%	.21		
Tanzania	.24	0	.00	.06	.09	.20	.16	.12	1%	.05	-53%	5342%
Zambia	.17	.50	.33	.35	.06	.35	.26	.15	1%	.29	-12%	-55%
Zimbabwe	13.6	11.0	11.4	14.7	14.9	14.7	14.3	16.0	96%	12.9	17%	39%
SADCC:	14.0	11.5	11.8	15.3	15.2	15.4	14.9	16.6	100%	13.3	19%	41%

SADCC IRON ORE

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Angola	6091	5604	0	0	15	0	0	0	0%	1806	-100%	
Swaziland	2552	2240	0	0	0	0	0	0	0%	980	-100%	
Zimbabwe	813	1246	1622	1100	1110	1328	1021	1143	100%	1051	41%	-30%
SADCC:	9456	9090	1622	1100	1125	1328	1021	1143	100%	3748	-88%	-30%

SADCC NICKEL

(ktonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Botswana	0	6.4	15.4	19.6	19.0	16.5	22.5	21.3	65%	12.7		38%
Zimbabwe	8.6	9.1	15.1	9.9	9.7	10.4	11.5	11.6	35%	11.8	36%	-23%
SADCC:	8.6	15.6	30.5	29.4	28.7	26.9	34.0	32.9	100%	24.4	284%	8%

SADCC SILVER

(tonnes)	1970	1975	1980	1985	1986	1987	1988	1989	%	Avg	70-89	80-89
Namibia	38	43.5	105	83	90.8	95	108	138	77%	77	263%	32%
Zambia	47.8	31.1	24	18.9	26.8	29.9	29.3	19.8	11%	27	-59%	-17%
Zimbabwe	6.8	7.5	30	24.9	26.2	25.4	21.9	22.3	12%	19	226%	-25%
SADCC:	92.7	82.1	158	127	144	150	159	180	100%	124	94%	14%

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PRODUCTION: (Note: Diamond grade in carats/100t)

Year:	Ore (Kt)	% Mineral 1	% Mineral 2	% Mineral 3	Cost/t
1982:	:	:	:	:	:
1983:	:	:	:	:	:
1984:	:	:	:	:	:
1985:	:	:	:	:	:
1986:	:	:	:	:	:

Ore Destination (concentrator):

Revenue/t (if only mining is carried out):

Source:

Remarks:memo

MILLING & CONCENTRATION DATA FILE

The year that this data relates to: Currency:
 Name of Mill/Plant: Start-up Year:
 Incorporating (plant):
 Products 1: 2:
 3: 4:
 Address: Country:
 Tel. and Telex No: Manager:
 Main Owner: %Share:
 2nd Owner: %Share:
 Management/Tech. Service by:
 Plant Value (m): Employment:

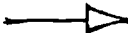
Plant Capacity (Kt/an):

Origin of Ore (mine):

Mine 1:

Mine 2:

Mine 3:


% Quantity: 

Year:	1982	1983	1984	1985	1986
Ore Milled (Kt/an):	:	:	:	:	:
Grade % Mineral 1:	:	:	:	:	:
% Mineral 2:	:	:	:	:	:

% Grade change over 5 years:

Concentration Process:

Year:	1982	1983	1984	1985	1986
% Recovery of	:	:	:	:	:
Mineral 1:	:	:	:	:	:
Mineral 2:	:	:	:	:	:



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PRODUCTION (Kt concentrates, diamond in k-carats):

Type 1:

Year	Qty (kt)	% Mineral 1	% Mineral 2	% Mineral 3
1982	:	:	:	:
1983	:	:	:	:
1984	:	:	:	:
1985	:	:	:	:
1986	:	:	:	:

Type 2:

1982	:	:	:	:
1983	:	:	:	:
1984	:	:	:	:
1985	:	:	:	:
1986	:	:	:	:

Destination of Concentrate (smelter):

Cost/ton (milling and concentration):

If only mining, milling, and concentration are carried out then,

Cost/ton treated:

Revenue/ton treated:

Source :

Remarks: memo

FORM 3

SMELTERS & LEACH PLANTS DATAFILE

The year that this data relates to: Currency:
 Name of Smelter: Start-up year:
 Incorporating (plant):
 Products 1: 2:
 3: 4:
 Address: Country:
 Tel.& Telex No: Manager:
 Main Owner: %Share:
 2nd Owner: %Share:
 Management/Technical Services by:
 Plant Value (M): Employees (incl. admin):
 Smelter Type (pyromet/hydromet):
 Process:
 Origin of Concentrate:

	: Plant	: Owner	: % Feed	: % Metal 1	: % Metal 2
Mine 1:	:	:	:	:	:
:	:	:	:	:	:
Mine 2:	:	:	:	:	:
:	:	:	:	:	:
Mine 3:	:	:	:	:	:

% Recovery, Metal 1: Metal 2: Metal 3:
 Capacity (kt alloy/an): Cost/t alloy for smelting:

Alloy production (tons):

Year:	1982	:	1983	:	1984	:	1985	:	1986
Qty.:	:	:	:	:	:	:	:	:	:



Alloy Grade (%) Metal 1: Metal 2: Metal 3:

Destination of Alloy (Refinery):

Destination	% of Total
1:	
2:	
3:	

Metal Content in Alloy (tons):

Year:	1982	:	1983	:	1984	:	1985	:	1986
Metal 1:	:	:	:	:	:	:	:	:	:
Metal 2:	:	:	:	:	:	:	:	:	:
Metal 3:	:	:	:	:	:	:	:	:	:
Metal 4:	:	:	:	:	:	:	:	:	:



If only mining, concentration and smelting/leaching are undertaken,

then: Cost/t treated : Revenue/t treated:

Data Source:

Remarks: memo

FORM 4

REFINERIES DATAFILE

The year that this data relates to: Currency:
 Name of Plant: Start-up year:
 Incorporating (plant):
 Products:1: 2:
 3: 4:
 Address: Country:
 Tel.& Telex No: Manager:
 Main Owner: % Share:
 2nd Owner: % Share:
 Management/Technical Services by:
 Plant Value (M): Employmees (incl. admin):

Type (pyromet/hydromet):

Process:

Origin of Alloy:

	: Plant	: Owner	: % Feed	: % Metal 1	: % Metal 2
Smelter 1:	:	:	:	:	:
Smelter 2:	:	:	:	:	:
Smelter 3:	:	:	:	:	:

Capacity (kt metal/an):

Recovery and Grade of Metal:

	: Metal 1	: Metal 2	: Metal 3
% Recovery:	:	:	:
Grade, (%):	:	:	:

Cost/t metal produced for refining:

PRODUCTION (tons):

Year:	1982	:	1983	:	1984	:	1985	:	1986
Metal 1:	:	:	:	:	:	:	:	:	:
Metal 2:	:	:	:	:	:	:	:	:	:
Metal 3:	:	:	:	:	:	:	:	:	:
Metal 4:	:	:	:	:	:	:	:	:	:

Destination of Metals:

Destination	Qty (tons)
1:	
2:	
3:	
4:	

Destination of Other concs. (slimes/slugs):

Total Cost/Revenue for mining, smelting/leaching & refining:

cost/t treated : Revenue/t treated:

Sources:

Remarks:memo

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FINANCIAL DATA (M)	1982	1983	1984	1985	1986
Capital Employed	:	:	:	:	:
Fixed Assets	:	:	:	:	:
Debt, medium & long term	:	:	:	:	:
Revenue (sales/turnover)	:	:	:	:	:
Operating Profit	:	:	:	:	:
Tax (total incl royalty)	:	:	:	:	:
Final Profit for the year:	:	:	:	:	:
Dividends paid	:	:	:	:	:
Profit expatriated	:	:	:	:	:
Management/Service Fees	:	:	:	:	:

Mines/Quarries/Mills/Concentration Plants Owned:
 Total Value of Mines/Concentrators Owned:
 Smelters/Leachplants/Refineries Owned:
 Total Value of Smelters/Refineries Owned:
 Total Value of Mining/Mineral Treatment Plants Owned:

PRODUCTION (tons, tons contained or kcarats; coal in kt)

Mineral/Metal:	1982	1983	1984	1985	1986
Product 1	:	:	:	:	:
Product 2	:	:	:	:	:
Product 3	:	:	:	:	:
Product 4	:	:	:	:	:
Product 5	:	:	:	:	:

Data Source:

Remarks:memo

Appendix IV: SADCC Mining Companies: Financial Data

PROFIT/CAPITAL EMPLOYED

Company		1982	1983	1984	1985	1986	1987	1988	Average
GOLD									
Blanket	Au	-1.3%	25.8%	20.3%	14.8%	19.8%	19.3%	16.1%	16.4%
Cluff	Au			59.0%	68.7%	51.2%	23.2%	23.8%	45.2%
Corsyn	Au	.7%	20.9%	13.1%	19.6%	17.0%	16.1%	33.3%	17.2%
Falcon	Au	27.6%	21.6%	19.7%	19.7%	16.9%	13.1%	-5.2%	16.2%
Independence	Au	6.4%	18.5%	16.7%	17.1%	13.5%	17.8%	13.6%	14.8%
Olympus	Au	55.2%	63.4%	17.3%	12.3%	49.6%	69.7%	66.2%	47.7%
RTZim	Au	-11.9%	11.0%	11.0%	19.0%	30.4%	26.7%	26.0%	16.0%
Sabi	Au	-1.0%	-10.3%	1.3%	107.6%	9.3%	-7.0%	-8.0%	13.1%
BASE METALS									
Bindura	Ni/Cu	-4.9%	-5.9%	3.0%	7.6%	-9.4%	-2.4%	48.0%	5.1%
Botswana RST	Ni/Cu	-42.6%	-36.0%	-76.6%	-165.2%	-4.6%	15.6%	-56.5%	-52.3%
Kamativi	Sn	-23.3%	-7.1%	-18.2%	-.0%	-95.5%	-122.1%	-132.9%	-57.0%
Lomagundi	Cu	-9.1%	-10.5%	-37.1%	-11.4%	-39.1%	-96.6%	-23.3%	-32.4%
Mhangura	Cu/Ag	10.5%	9.2%	-1.8%	4.6%	5.0%	-22.6%	7.4%	1.8%
ZCCM	Cu/Cc	-7.6%	.1%	.0%	-.4%	-2.6%	2.3%	9.8%	.3%
FERROUS									
Bimco	Fe	29.0%	-.4%	-15.4%	-5.7%	.4%	3.2%	5.8%	2.4%
Zimalloys	Fe-Cr	-8.4%	-8.9%	12.5%	6.9%	7.4%	13.1%	19.8%	6.1%
Zimasco	Fe-Cr	15.7%	6.3%	19.1%	36.2%	18.8%	29.4%	53.2%	25.5%
Zisco	Fe/steel	-35.3%	-57.4%	-63.6%	-35.3%	-8.0%	-57.1%	-45.7%	-43.2%
OTHER									
Dorowa	Phos	5.3%	-.4%	18.0%	21.9%	14.3%	7.9%	2.2%	11.3%
Bikita	Li/Ce	-47.1%	11.4%	52.4%	11.1%	32.5%	6.7%	9.0%	10.9%
ZGGM	graphite	-8.7%	14.9%	45.3%	59.2%	73.2%	42.4%	32.4%	36.9%
S & M Mines	Asbestos	-.1%	.2%	3.4%	7.0%	3.8%	.9%	2.9%	2.6%
Wankie	coal	2.0%	2.6%	3.0%	12.0%	14.7%	10.8%	9.9%	7.8%
Debswana	Diamonds	18.8%	38.6%	53.7%	94.9%	96.9%	101.9%	79.1%	69.1%

FINAL PROFIT BY MINERAL

Company		1982	1983	1984	1985	1986	1987	1988	Average
Blanket	Au	-.2	2.8	1.7	1.0	1.5	1.6	1.4	1.4
Cluff	Au			.5	.6	.6	.9	4.3	1.4
Corsvn	Au	.26	6.20	3.20	4.27	3.89	2.32	6.18	3.8
Falcon	Au	7.7	5.0	3.9	3.6	3.7	3.1	-1.2	3.7
Independence	Au	2.5	5.8	5.6	7.3	6.7	11.4	10.4	7.1
Olympus	Au	.6	.8	.2	.1	.5	.9	1.2	.6
Rio Tinto Zim	Au	-8.2	5.6	4.3	6.6	8.9	8.1	8.0	4.7
Sabi	Au	-.0	-.2	.0	1.6	.5	-.6	-1.1	.0
sub-total, Gold:		2.7	26.0	19.5	25.1	26.3	27.7	29.2	22.3
Gold profit/capital:		1.5%	17.7%	15.3%	20.0%	19.7%	19.0%	16.5%	15.0%
Bindura	Ni/Cu	-8.4	-9.1	3.7	7.2	-8.9	-2.3	49.3	4.5
Bots RST	Ni/Cu	-122.1	-92.8	-161.8	-153.2	-4.0	12.5	-82.8	-86.3
Kamativi	Sn	-4.0	-.7	-1.6	-.0	-3.1	-3.6	-3.2	-2.3
Lomagundi	Cu	-2.6	-2.0	-3.7	-.8	-2.2	-3.6	-1.3	-2.3
Mhangura	Cu/Ag	4.3	3.2	-.4	.9	.9	-3.3	1.2	1.0
ZCCM	Cu/Co	-106.8	.6	.4	-7.3	-55.8	39.6	134.3	.7
sub-total, non-Fe:		-239.7	-100.9	-163.4	-153.2	-73.0	39.4	97.5	-84.7
non-Fe profit/cap:		-12.2%	-6.3%	-8.9%	-7.0%	-3.0%	2.1%	5.9%	-4.4%
ex-Bots RST:		-6.0%	-.5%	-.1%	-.0%	-2.9%	1.4%	11.0%	.1%
Bimco	Fe	4.9	-.1	-1.2	-.5	.0	.2	.3	.5
Zimalloys	Fe-Cr	-8.8	-7.3	8.5	3.7	3.7	8.5	13.7	3.2
Zimasco	Fe-Cr	8.6	2.5	6.1	12.0	7.2	14.8	30.1	11.6
Zisco	Fe/steel	-57.8	-59.5	-52.1	-23.9	-6.1	-42.8	-35.1	-39.6
sub-total, Ferrous:		-53.2	-64.4	-38.7	-8.6	4.8	-19.3	9.0	-24.3
Ferrous profit/cap:		-15.7%	-26.9%	-20.4%	-5.3%	2.8%	-9.8%	4.3%	-11.3%
ex-Zisco:		1.4%	-2.1%	7.0%	9.4%	6.3%	11.9%	21.2%	7.1%
Dorowa	Phos	.6	-.0	1.2	1.1	.7	.5	.1	.6
Bikita	Li/Ce	-.8	.2	.7	.3	1.3	.3	.4	.3
ZGGM	graphite	-.2	.2	.6	.9	1.4	1.2	.9	.7
S & M Mines	Asbestos	-.2	.3	4.2	6.1	3.2	.8	2.2	2.4
Wankie	coal	2.6	3.6	3.2	9.9	11.3	8.9	8.5	6.9
Debswana	Diamonds	77.3	154.7	183.4	228.9	262.6	508.5	396.5	258.8
sub-total, various:		79.3	159.1	193.2	247.2	280.5	520.2	408.6	269.7
TOTAL		-210.8	19.8	10.6	110.6	238.6	567.9	544.2	183.0
Total profit/cap:		-6.4%	.7%	.4%	3.8%	7.6%	19.5%	20.1%	6.5%
TOTAL ex-Debswana		-288.3	-135.0	-172.8	-118.2	-23.9	59.6	148.0	-75.8
Prof/cap ex-Debswana:		-10.1%	-5.9%	-7.2%	-4.4%	-.8%	2.5%	6.7%	-3.0%
TOTAL ex-Debs & RST		-166.2	-42.2	-11.0	35.0	-19.9	47.1	230.8	10.5
Prof/cap ex-Debs & RST		-6.4%	-2.1%	-.5%	1.4%	-.7%	2.0%	11.2%	.4%

Millions of deflated 1982 US dollars

CAPITAL EMPLOYED BY MINERAL

Company		1982	1983	1984	1985	1986	1987	1988	Average
Blanket	Au	13.0	11.0	8.2	6.8	7.4	8.4	8.5	9.1
Cluff	Au			.9	.9	1.3	3.7	17.9	4.9
Corsyn	Au	35.86	29.65	24.35	21.84	22.84	14.40	18.58	23.9
Falcon	Au	27.9	23.4	19.9	18.1	22.0	23.7	22.2	22.5
Independence	Au	39.3	31.4	33.9	42.8	49.5	63.9	76.7	48.2
Olympus	Au	1.1	1.2	1.1	.8	1.0	1.2	1.7	1.2
Ric Tinto Zim	Au	69.1	50.6	39.1	34.7	29.1	30.3	30.6	40.5
Sabi	Au	1.1	2.1	2.5	2.7	9.5	16.9	28.7	9.1
sub-total, Gold:		187.4	149.4	129.9	128.7	142.6	162.6	205.0	157.9
Bindura	Ni/Cu	171.5	155.1	126.9	94.9	94.1	94.5	102.7	120.0
Bots RST	Ni/Cu	286.6	258.2	211.2	92.7	87.0	80.0	146.5	166.1
Kamativi	Sn	17.3	10.4	8.6	7.2	3.2	2.9	2.4	7.4
Lomagundi	Cu	28.8	19.3	9.9	7.0	5.6	3.7	5.8	11.4
Mhangura	Cu/Ag	40.7	35.2	24.4	19.7	19.0	14.6	16.4	24.3
ZCCM	Cu/Co	1413.3	1111.7	1461.6	1978.5	2187.8	1689.2	1370.2	1601.8
sub-total, non-Fe:		1958.1	1589.9	1842.7	2200.0	2396.7	1885.0	1644.0	1930.9
Bimco	Fe	16.8	13.4	8.1	8.3	9.6	7.2	5.8	9.9
Zimalloys	Fe-Cr	104.6	82.9	67.9	53.8	50.7	65.2	69.1	70.6
Zimasco	Fe-Cr	54.4	39.4	32.1	33.2	38.3	50.1	56.5	43.4
Zisco	Fe/steel	163.9	103.8	82.0	67.6	76.4	75.0	76.8	92.2
sub-total, Ferrous:		339.7	239.4	190.2	162.9	174.8	197.4	208.2	216.1
Dorowa	Phos	10.9	8.0	6.4	5.0	4.7	6.8	6.1	6.8
Bikita	Li/Ce	1.8	1.5	1.4	2.9	4.0	4.2	4.0	2.8
ZGGM	graphite	2.2	1.7	1.3	1.6	1.9	2.8	2.8	2.0
S & M Mines	Asbestos	234.4	171.4	121.5	86.7	85.2	85.0	76.5	122.9
Wankie	coal	134.6	140.0	108.6	82.9	76.6	82.7	86.4	101.7
Debswana	Diamonds	411.6	401.0	341.3	241.2	270.9	498.9	501.3	380.9
sub-total, various:		795.4	723.5	580.3	420.3	443.4	680.3	677.0	617.2
TOTAL		3280.6	2702.2	2743.1	2911.9	3157.6	2925.3	2734.1	2922.1
TOTAL ex-Debswana		2869.1	2301.2	2401.8	2670.7	2886.6	2426.5	2232.9	2541.3
TOTAL ex-Bots RST		2994.1	2444.0	2531.9	2819.2	3070.5	2845.3	2587.6	2756.1
TOTAL ex-Debs & RST		2582.5	2043.0	2190.6	2578.0	2799.6	2346.4	2086.4	2375.2

DEBT BY MINERAL

Company		1982	1983	1984	1985	1986	1987	1988	Average
Blanket	Au	5.0	2.3	1.1	.9	.8	.8	.7	1.6
Cluff	Au			.0	.0	.0	1.3	5.7	1.4
Corsyn	Au	2.02	1.47	1.10	.87	.00	.00	.00	.8
Falcon	Au	.0	.0	.0	.0	.0	.0	2.4	.3
Independence	Au	29.3	21.2	15.9	14.3	13.4	.0	.0	13.4
Olympus	Au	.0	.0	.0	.0	.0	.0	.0	.0
RTZim	Au	39.6	25.0	16.9	12.3	6.3	4.6	4.3	15.6
Sabi	Au	4.3	4.3	2.0	.1	3.2	7.7	10.1	4.5
sub-total, Gold:		80.2	54.4	37.0	28.4	23.7	14.3	23.2	37.3
Gold debt/capital:		43.1%	37.0%	28.9%	22.4%	17.7%	9.8%	13.1%	25.0%
Eindura	Ni/Cu	52.1	50.3	40.2	25.8	22.4	8.7	.0	28.5
Bots RST	Ni/Cu	509.7	558.2	617.4	627.5	627.5	645.3	740.0	617.9
Kamativi	Sn	6.5	3.3	1.8	1.4	.9	2.4	2.5	2.7
Lomagundi	Cu	8.9	4.5	2.5	2.0	3.1	2.0	1.8	3.5
Mhangura	Cu/Ag	12.5	11.6	7.1	5.2	4.4	3.9	5.9	7.2
ZCCM	Cu/Co	455.6	421.5	405.3	513.3	592.8	560.2	456.7	486.5
sub-total, non-Fe:		1045.4	1049.4	1074.3	1175.1	1251.1	1222.4	1207.0	1146.4
non-Fe debt/cap:		53.4%	66.0%	58.3%	53.4%	52.2%	64.8%	73.4%	59.4%
ex-Bots RST:		27.4%	30.9%	24.8%	24.9%	26.0%	30.6%	28.4%	27.4%
Bimco	Fe	24.3	16.1	11.4	10.2	10.8	8.9	6.9	12.6
Zimalloys	Fe-Cr	30.8	29.5	10.9	6.4	4.3	4.3	7.9	13.5
Zimasco	Fe-Cr	.0	22.7	14.1	3.9	10.0	1.6	.0	7.5
Zisco	Fe/steel	126.9	133.8	156.7	65.9	53.3	61.8	100.4	99.8
sub-total, Ferrous:		182.0	202.1	193.0	86.4	78.4	76.5	115.2	133.4
Ferrous debt/cap:		53.6%	84.4%	101.5%	51.3%	44.9%	38.8%	57.6%	61.8%
ex-Zisco:		16.2%	28.5%	19.1%	12.2%	14.3%	7.5%	7.4%	15.6%
Dorowa	Phos	.0	.9	.7	.6	.5	.5	.5	.5
Bikita	Li/Ce	.0	.0	.0	.0	.0	.0	.0	0
SGGM	graphite	.0	1.5	.5	.0	.0	.0	.0	.3
S & M Mines	Asbestos	48.4	34.4	16.0	.0	.0	.0	.0	14.1
Wankie	coal	55.5	77.7	60.7	35.3	33.0	37.4	26.6	46.6
Debswana	Diamonds	.0	.0	.0	.0	.0	.0	.0	0
sub-total, various:		103.9	114.6	77.9	35.8	33.6	37.9	27.0	61.5
TOTAL		1411.5	1420.5	1382.1	1325.7	1386.7	1351.2	1372.4	1378.6
Total debt/cap:		43.0%	52.6%	50.4%	45.5%	44.0%	46.5%	50.9%	47.6%
TOTAL ex-Bots RST		901.8	862.3	764.7	698.3	759.2	705.9	632.4	760.6
Debt/cap ex-Bots RST		30.1%	35.3%	30.2%	24.7%	24.8%	25.0%	24.8%	27.9%

Millions of deflated 1982 US dollars

FINAL PROFIT BY TYPE OF COMPANY

Company	Type	1982	1983	1984	1985	1986	1987	1988	Average
Bikita	pvt TNC	-.8	.2	.7	.3	1.3	.3	.4	.3
Bindura	pub TNC	-8.4	-9.1	3.7	7.2	-8.9	-2.3	49.3	4.5
Blanket	pvt TNC	-.2	2.8	1.7	1.0	1.5	1.6	1.4	1.4
Bots RST	pub TNC	-122.1	-92.8	-161.8	-153.2	-4.0	12.5	-82.8	-86.3
Cluff	pvt TNC			.5	.6	.6	.9	4.3	1.4
Corsyn	pvt TNC	.3	6.2	3.2	4.3	3.9	2.3	6.2	3.8
Debswana	pvt TNC	77.3	154.7	183.4	228.9	262.6	508.5	396.5	258.8
Dorowa	pvt TNC	.6	-.0	1.2	1.1	.7	.5	.1	.6
Falcon	pub TNC	7.7	5.0	3.9	3.6	3.7	3.1	-1.2	3.7
Independence	pvt TNC	2.5	5.8	5.6	7.3	6.7	11.4	10.4	7.1
Olympus	pvt TNC	.6	.8	.2	.1	.5	.9	1.2	.6
RTZim	pub TNC	-8.2	5.6	4.3	6.6	8.9	8.1	8.0	4.7
S & M Mines	pvt TNC	-.2	.3	4.2	6.1	3.2	.8	2.2	2.4
Zimalloys	pub TNC	-8.8	-7.3	8.5	3.7	3.7	8.5	13.7	3.2
Zimasco	pvt TNC	8.6	2.5	6.1	12.0	7.2	14.8	30.1	11.6
Sub-total TNC profit:		-51.2	74.6	65.4	129.7	291.7	571.9	439.6	217.4
TNC return on capital:		-3.5%	5.9%	6.3%	17.6%	37.9%	55.5%	38.6%	22.6%
ex-Botswana RST:		6.0%	16.6%	27.5%	43.9%	43.4%	58.8%	52.6%	35.6%
ex-Debswana:		-12.2%	-9.3%	-17.0%	-20.0%	5.8%	11.9%	6.8%	-4.9%
ex-RST & Debswana:		16.0%	15.3%	33.4%	38.0%	1.0%	-2.7%	16.8%	16.8%
ZCCM	pub state	-106.8	.6	.4	-7.3	-55.8	39.6	134.3	.7
Wankie	pub state	2.6	3.6	3.2	9.9	11.3	8.9	8.5	6.9
Sabi	pvt state	-.0	-.2	.0	1.6	.5	-.6	-1.1	.0
Kamativi	pvt state	-4.0	-.7	-1.6	-.0	-3.1	-3.6	-3.2	-2.3
Lomagundi	pvt state	-2.6	-2.0	-3.7	-.8	-2.2	-3.6	-1.3	-2.3
Mhangura	pvt state	4.3	3.2	-.4	.9	.9	-3.3	1.2	1.0
Bimco	pvt state	4.9	-.1	-1.2	-.5	.0	.2	.3	.5
Zisco	pvt state	-57.8	-59.5	-52.1	-23.9	-6.1	-42.8	-35.1	-39.6
ZGCM	pvt state	-.2	.2	.6	.9	1.4	1.2	.9	.7
Sub-total State Profit:		-159.7	-54.8	-54.9	-19.1	-53.1	-3.9	104.6	-34.4
State return on capital:		-8.8%	-3.8%	-3.2%	-.9%	-2.2%	-.2%	6.6%	-1.8%
ex-ZCCM:		-13.0%	-17.0%	-22.6%	-6.0%	1.4%	-22.0%	-14.2%	-13.4%
ex-ZCCM & Zisco:		2.0%	1.9%	-1.9%	9.4%	7.3%	-.6%	4.0%	3.2%
GRAND TOTAL		-210.8	19.8	10.6	110.6	238.6	567.9	544.2	183.0
TOTAL RETURN ON CAPITAL:		-6.4%	.7%	.4%	3.8%	7.6%	19.5%	20.0%	6.5%

Millions of 1982 US dollars

CAPITAL EMPLOYED BY TYPE OF COMPANY

Company	Type	1982	1983	1984	1985	1986	1987	1988	Average
Bikita	pvt TNC	1.8	1.5	1.5	3.2	4.5	4.9	4.8	3.2
Bindura	pub TNC	171.5	155.1	126.9	94.9	94.1	94.5	102.7	120.0
Blanket	pvt TNC	13.0	11.0	8.2	6.8	7.4	8.4	8.5	9.1
Bots RST	pub TNC	286.6	258.2	211.2	92.7	87.0	80.0	146.5	166.1
Cluff	pvt TNC			.9	.9	1.3	3.7	17.9	4.9
Corsyn	pvt TNC	35.9	29.7	24.3	21.8	22.8	14.4	18.6	23.9
Debswana	pvt TNC	411.6	401.0	341.3	241.2	270.9	498.9	501.3	380.9
Dorowa	pvt TNC	10.9	8.0	6.4	5.0	4.7	6.8	6.1	6.8
Falcon	pub TNC	27.9	23.4	19.9	18.1	22.0	23.7	22.2	22.5
Independence	pvt TNC	39.3	31.4	33.9	42.8	49.5	63.9	76.7	48.2
Olympus	pvt TNC	1.1	1.2	1.1	.8	1.0	1.2	1.7	1.2
RTZim	pub TNC	69.1	50.6	39.1	34.7	29.1	30.3	30.6	40.5
S & M Mines	pvt TNC	234.4	171.4	121.5	86.7	85.2	85.0	76.5	122.9
Zimalloys	pub TNC	104.6	82.9	67.9	53.8	50.7	65.2	69.1	70.6
Zimasco	pvt TNC	54.4	39.4	32.1	33.2	38.3	50.1	56.5	43.4
Sub-total TNC capital:		1462.0	1264.7	1036.3	736.8	768.6	1031.1	1139.7	1062.7
ex-Bots RST:		1175.4	1006.5	825.0	644.0	681.6	951.1	993.2	896.7
ex-Debswana:		1050.4	863.7	695.0	495.6	497.7	532.3	638.5	681.9
ex-Debswana & RST:		763.9	605.5	483.8	402.8	410.7	452.2	491.9	515.8
ZCCM	pub state	1413.3	1111.7	1461.6	1978.5	2187.8	1689.2	1370.2	1601.8
Wankie	pub state	134.6	140.0	108.6	82.9	76.6	82.7	86.4	101.7
Sabi	pvt state	1.4	2.0	1.8	1.5	5.0	8.6	13.1	4.8
Kamativi	pvt state	17.3	10.4	8.6	7.2	3.2	2.9	2.4	7.4
Lomagundi	pvt state	28.8	19.3	9.9	7.0	5.6	3.7	5.8	11.4
Mhangura	pvt state	40.7	35.2	24.4	19.7	19.0	14.6	16.4	24.3
Bimco	pvt state	16.8	13.4	8.1	8.3	9.6	7.2	5.8	9.9
Zisco	pvt state	163.9	103.8	82.0	67.6	76.4	75.0	76.8	92.2
ZGGM	pvt state	2.2	1.7	1.3	1.6	1.9	2.8	2.8	2.0
Sub-total State:		1819.0	1437.5	1706.2	2174.3	2385.0	1886.7	1579.7	1855.5
ex-ZCCM:		405.7	325.7	244.6	195.8	197.2	197.5	209.5	253.7
ex-ZCCM & Zisco:		241.8	222.0	162.6	128.2	120.9	122.5	132.8	161.5
GRAND TOTAL		3281.0	2702.1	2742.5	2911.1	3153.6	2917.8	2719.4	2918.2

Millions of deflated 1982 US dollars

DEBT BY TYPE OF COMPANY

Company	Type	1982	1983	1984	1985	1986	1987	1988	Average
Bikita	pvt TNC	.0	.0	.0	.0	.0	.0	.0	0
Bindura	pub TNC	52.1	50.3	40.2	25.8	22.4	8.7	.0	28.5
Blanket	pvt TNC	5.0	2.3	1.1	.9	.8	.8	.7	1.6
Bots RST	pub TNC	509.7	558.2	617.4	627.5	627.5	645.3	740.0	617.9
Cluff	pvt TNC			.0	.0	.0	1.3	5.7	1.4
Corsyn	pvt TNC	2.0	1.5	1.1	.9	.0	.0	.0	.8
Debswana	pvt TNC	.0	.0	.0	.0	.0	.0	.0	0
Dorowa	pvt TNC	.0	.9	.7	.6	.5	.5	.5	.5
Falcon	pub TNC	.0	.0	.0	.0	.0	.0	2.4	.3
Independence	pvt TNC	29.3	21.2	15.9	14.3	13.4	.0	.0	13.4
Olympus	pvt TNC	.0	.0	.0	.0	.0	.0	.0	.0
Rio Tinto Zim	pub TNC	39.6	25.0	16.9	12.3	6.3	4.6	4.3	15.6
S & M Mines	pvt TNC	48.4	34.4	16.0	.0	.0	.0	.0	14.1
Zimalloys	pub TNC	30.8	29.5	10.9	6.4	4.3	4.3	7.9	13.5
Zimasco	pvt TNC	.0	22.7	14.1	3.9	10.0	1.6	.0	7.5
Sub-total TNC debt:		716.9	746.1	734.2	692.4	685.3	667.1	761.5	714.8
TNC debt/capital:		49.0%	59.0%	70.9%	94.0%	89.2%	64.7%	66.8%	70.5%
ex-Botswana RST:		17.6%	18.7%	14.2%	10.1%	8.5%	2.3%	2.2%	10.5%
ZCCM	pub state	455.6	421.5	405.3	513.3	592.8	560.2	456.7	486.5
Wankie	pub state	55.5	77.7	60.7	35.3	33.0	37.4	26.6	46.6
Sabi	pvt state	4.3	4.3	2.0	.1	3.2	7.7	10.1	4.5
Kamativi	pvt state	6.5	3.3	1.8	1.4	.9	2.4	2.5	2.7
Lomagundi	pvt state	8.9	4.5	2.5	2.0	3.1	2.0	1.8	3.5
Mhangura	pvt state	12.5	11.6	7.1	5.2	4.4	3.9	5.9	7.2
Bimco	pvt state	24.3	16.1	11.4	10.2	10.8	8.9	6.9	12.6
Zisco	pvt state	126.9	133.8	156.7	65.9	53.3	61.8	100.4	99.8
ZGGM	pvt state	.0	1.5	.5	.0	.0	.0	.0	.3
Sub-total State Debt:		694.6	674.4	647.9	633.3	701.5	684.1	610.9	663.8
State debt/capital:		38.2%	46.9%	38.0%	29.1%	29.4%	36.3%	38.7%	36.6%
ex-ZCCM:		58.9%	77.6%	99.2%	61.3%	55.1%	62.8%	73.6%	69.8%
ex-ZCCM & Zisco:		46.3%	53.7%	52.9%	42.2%	45.8%	50.8%	40.5%	47.5%
GRAND TOTAL		1411.5	1420.5	1382.1	1325.7	1386.7	1351.2	1372.4	1378.6
TOTAL DEBT/CAPITAL:		43.0%	52.6%	50.4%	45.5%	44.0%	46.3%	50.5%	47.5%