

MINERALS INDUSTRY OF BOTSWANA

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# ***THE MINERALS INDUSTRY OF BOTSWANA***

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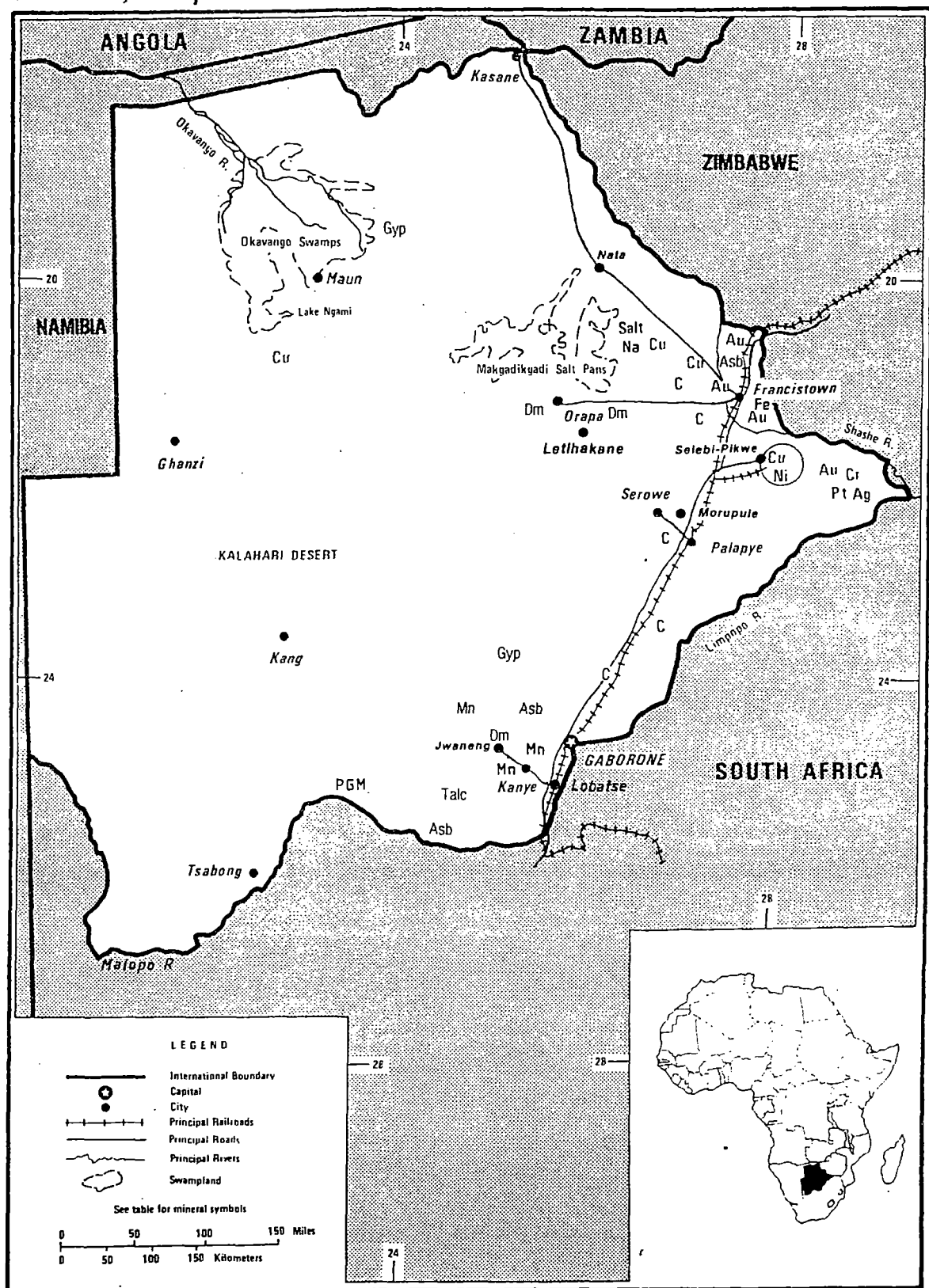
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Fig. 7

# BOTSWANA

AREA 570,000 sq km

MINERALS

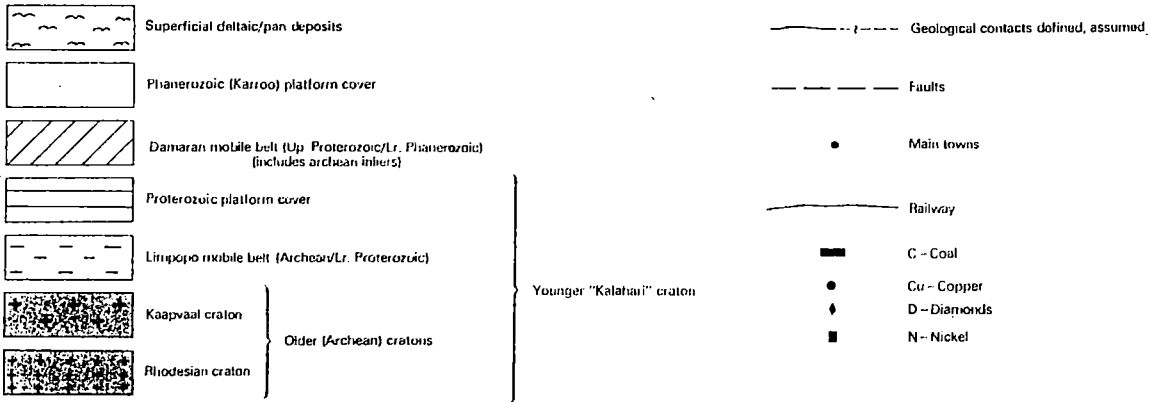
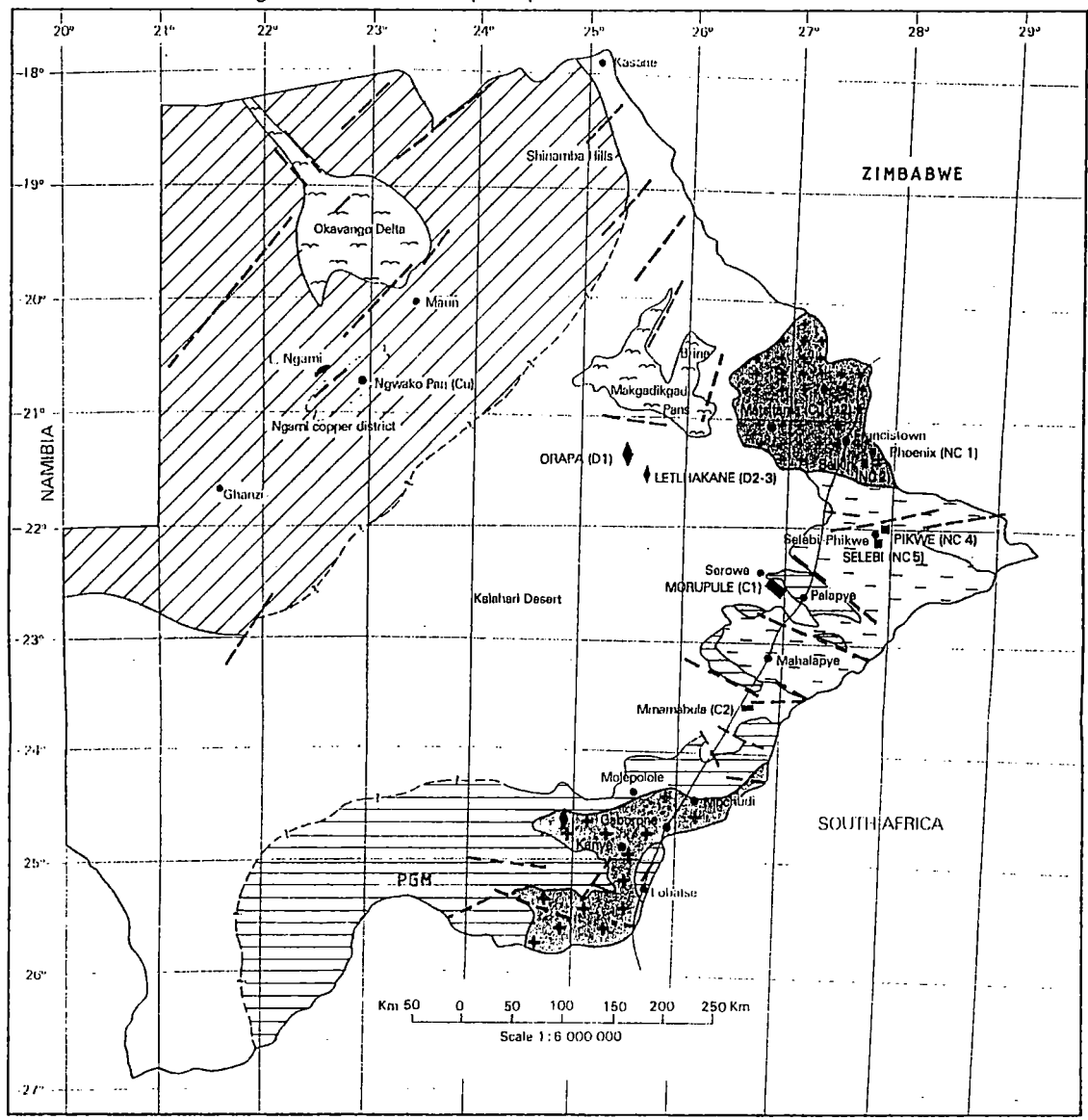


Source: USBM 1984

M 154

Fig. 8

Geological framework and principal mineral occurrences of Botswana



From : BALDOCK, J.W. 1977

# 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 country<sup>1</sup>.

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"<sup>2</sup> 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)<sup>3</sup>.

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 terms<sup>4</sup> 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 world<sup>5</sup> 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"<sup>6</sup>, 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/km<sup>2</sup>) in the region after Namibia (1.5/km<sup>2</sup>). 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.

Table 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 <sup>2</sup>	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 <sup>1</sup>		100	119	134	146	155	170	189	207	229
GDP mp <sup>2</sup>	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 <sup>3</sup>	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 km<sup>2</sup>, Currency: Pula, \*financial year to March 31

<sup>1</sup>consumer price index, <sup>2</sup>gross domestic product at market prices, <sup>3</sup>gross 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%.

Table 2. BOTSWANA: DEPENDENCE ON THE RSA.

		1980	1981	1982	1983	1984	1985	1986	1987	1988	Avg <sup>3</sup>
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 <sup>1</sup>	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 <sup>2</sup>	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 <sup>4</sup>		11%	15%	11%	7%	6%	4%	3%	2%	2%	7%

<sup>1</sup>financial year March 31, <sup>2</sup>migrants in RSA, <sup>3</sup>average for years with data, <sup>4</sup>remittances 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."<sup>7</sup>

## 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 456 MUSD but the less capital intensive industry there employed five times as many people (54,500 workers)<sup>8</sup>. The value of mineral output per miner is the highest in the SADCC region at 114,000 USD/miner in 1988.

Table 3. BOTSWANA, BASIC MINERAL SECTOR DATA (Pula)

		1980	1981	1982	1983	1984	1985	1986	1987	1988	Avg <sup>1</sup>
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. <sup>2</sup>	M	304	288	478	618	961	1031	1245	1360	2155	
Min. Exports	M	319	225	325	538	684	1169	1323	2371	2350	
% Min. Exports <sup>3</sup>	%	81%	68%	70%	77%	80%	85%	82%	90%	87%	80%
Min. labour <sup>4</sup>	k	8.1	8.5	8.8	9.0	9.2	9.4	9.5	9.6	10.3	
Expat. labour <sup>5</sup>		.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 <sup>6</sup>		9.7%	8.8%	8.8%	8.9%	8.4%	8.0%	7.3%	6.4%	6.1%	8%
M. Prod/lab <sup>7</sup>	kUSD	51	38	51	63	80	58	71	85	114	68
avg wage/an <sup>8</sup>	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 <sup>9</sup>	%	37%	27%	27%	38%	50%	54%	58%	59%	62%	46%

<sup>1</sup>average 1980-88, <sup>2</sup>mineral production, <sup>3</sup>mineral exports as a % of total exports, <sup>4</sup>mining sector labour, <sup>5</sup>expatriate labour, <sup>6</sup>mining labour as a % of total formal employment, <sup>7</sup>mineral production per labourer in kUSD, <sup>8</sup>average annual wage, <sup>9</sup>mineral 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 sector<sup>9</sup>. 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*



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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. Baldock<sup>13</sup> 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 (Kaapvaal 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 Copperbelt<sup>14</sup>.

The oldest platform cover rocks are those of the Ventersdorp and Transvaal Supergroups which extend over the border from South Africa, on the Kaapvaal 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”<sup>10</sup>

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 expatriates<sup>11</sup>.

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 damage<sup>12</sup>.

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.<sup>15</sup>

- 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 km<sup>2</sup> 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."<sup>16</sup>

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 Empire<sup>17</sup>. 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.

Table 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 <sup>1</sup>	79%
Cobalt	kt	.000	.092	.226	.222	.162	.182	.298	.215	.220 <sup>2</sup>	-5%
Copper	kt	.0	6.5	15.6	21.7	21.3	18.9	24.4	23.4	17.6 <sup>2</sup>	50%
Diamonds	Mcts	.6	2.4	5.1	12.6	13.1	13.2	15.2	15.3	7.4 <sup>3</sup>	200%
Gem Stones	t	13	45	20	14	5	40	38	146	40 <sup>3</sup>	630%
Gold	t	.000	.000	.000	.013	.025	.032	.021	.067	.024 <sup>4</sup>	
Lime	kt	.00	.00	.00	2.60	.23	.34	.23	.00	.46 <sup>5</sup>	
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 <sup>2</sup>	51%
Talc	kt	.04	.14	.08	.00	.00	.00	.00	.00		

<sup>1</sup>1976-88, <sup>2</sup>1974-88, <sup>3</sup>1970-88, <sup>4</sup>1981-88, <sup>5</sup>1982-88

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, Lethlakane 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 leases<sup>18</sup> and at Jwaneng, which is the richest kimberlite pipe in the world, opencast operations will continue for 40 years before production starts underground<sup>19</sup>.

Table 5. BOTSWANA, DIAMOND PRODUCTION

1989 Mine	Ore (Mt)	Diamonds (Mcarats)		Grade (cts/t)
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 output<sup>20</sup>.

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"<sup>21</sup>. Part of this 1.77 billion Rand (780 million USD) would have come from their operations in Botswana.

Table 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"<sup>22</sup>.

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 transaction<sup>23</sup>.

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/smeltering 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.

Table 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 Pula<sup>24</sup>.



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 Corporation<sup>25</sup>, for the supply 10.5 kt/ann 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/ann) 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 BCL<sup>26</sup> 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% Ni<sup>27</sup> and 1.3% Cu<sup>28</sup>. 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 ore<sup>29</sup> 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 production<sup>30</sup>.

The coal is classified as steam coal (ash 18-24%, CV 23-25 MJ/kg)<sup>31</sup>, in situ reserves amount to 8 Gt<sup>32</sup> and output has been expanded to 650 kt/annum, 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/annum by 1992 are being implemented<sup>33</sup>.

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 viable<sup>34</sup>, 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 brine<sup>35</sup> over a 200 km<sup>2</sup> 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..."<sup>36</sup> 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 people<sup>37</sup>. 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 link<sup>38</sup>.

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"<sup>39</sup>.

### *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 government<sup>40</sup>. 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 Africa<sup>41</sup>. 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%<sup>42</sup>.

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 strategy<sup>43</sup> 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 size<sup>44</sup> 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"<sup>45</sup>

- 1 Machacha 1985.
  - 2 Fage 1978, p338
  - 3 Oliver 1972.
  - 4 & 5 World Bank 1988.
  - 6 Hanlon 1986, p219.
  - 7 Carlsson 1987, page 35.
  - 8 Jourdan 1989, p12.
  - 9 CSO 1989.
  - 10 MFDP 1985, p227.
  - 11 MFDP 1985, p227.
  - 12 MFDP 1985, 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.
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  - 39 Mining Journal, Vol.312 No.8003, 20 January 1989, p55.
  - 40 UNRFRNRE 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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