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Environmental Regulation of the Mining Industry in Zambia

by

Kamwenje May Nyalugwe

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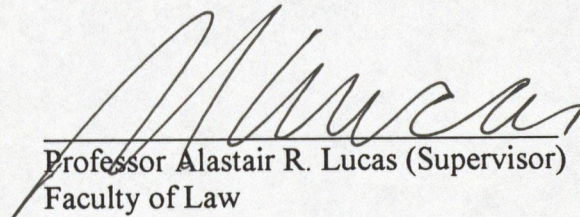
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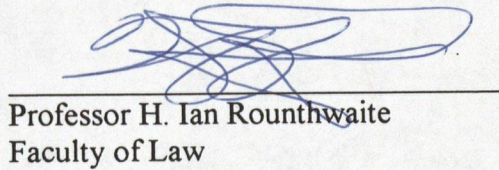
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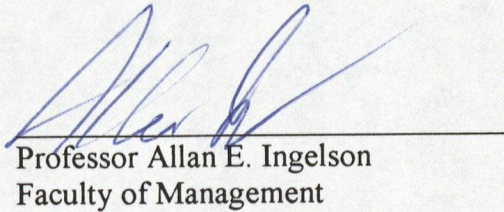
The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Environmental Regulation of the Mining Industry in Zambia" submitted by Kamwenje May Nyalugwe in partial fulfillment of the requirements for the degree of Master of Laws.



Professor Alastair R. Lucas (Supervisor)
Faculty of Law



Professor H. Ian Rounthwaite
Faculty of Law



Professor Allan E. Ingelson
Faculty of Management

22 June, 2002
Date

ABSTRACT

The mining industry in Zambia plays a very important role in the economic life of the country. With development in the country driven largely by revenue from mining operations, issues such as environmental protection have not always been adequately addressed. As a result, previous mining practices have had adverse effects on the environment.

Control and operating responsibilities of Zambia's major mining operations have been transferred from government to private companies, and there is the need to ensure that the necessary environmental considerations are incorporated in current mining operations. This thesis advocates the application of the principles of sustainability to the regulatory regime of the mining industry as a means of ensuring the necessary environmental protection. From an analysis of the relevant legislation against sustainability criteria, the thesis determines that some changes need to be made to the legislation and to regulatory practices to help achieve sustainable development in Zambia.

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DEDICATION

To my dearest daughter Musenge

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INTRODUCTION

This thesis examines the current environmental regulatory system that governs the copper mining industry in Zambia. Mining in general and the copper mining industry specifically plays a pivotal role in the economic development of Zambia, with proceeds from mining providing the bulk of the revenue needed for development programs in the country. An examination of the environmental impacts of copper mining in Zambia show that past mining practices have, to a large extent, compromised protection of the environment.

In 1992, Zambia embarked on an extensive privatization program that in 2000 saw all the core assets of Zambia Consolidated Copper Mines Limited (ZCCM)- the parastatal mining company- sold to private owners. In a bid to attract the needed capital investment in the mining industry, numerous legislative changes were enacted. Owing to the fact that copper mining is still the major vehicle for development in the country, there is an urgent need to ensure that the mining regulatory framework is structured in a way that prevents the continuance of past adverse environmental impacts. This thesis is premised on the belief that basing Zambia's mining industry on the concept of sustainability can bring about this change.

It is not possible to determine what "sustainable mining" or a "sustainable minerals industry" might look like in isolation from the rest of society. Sustainable development is a broad social transformation, which has global, national, regional and local and individual consequences. For Zambia, therefore, sustainability is a process. It is a process that will have consequences for the roles played by government and civil society. A process that will have consequences for the way that the mining industry does business,

and a process that will entail other social actors making changes to pave the way for the needed changes in the mining industry.

The main thrust of this thesis therefore is to determine whether the current environmental regime applicable to the mining industry promotes sustainability and if not what changes would be required. It is basically an examination of how the mining industry and its environmental regulation need to be designed- both through legislation and in practice- in order to contribute to sustainability in the country.

The first Chapter looks at global mining in general and then examines the Zambian mining industry specifically. In the Zambian context, the Chapter describes the geophysical characteristics, resources and the socio-economic and political conditions of the country, the relationship between the copper mining industry and the economy and then goes on to examine the environmental impacts of mining in the country. Lastly the Chapter introduces the concept of sustainability as a tool for environmental protection in the mining industry.

The second Chapter examines the theory of sustainable development. From an examination of the general principles of sustainability and a review of attempts to define or apply it in international law, conservation biology, and economics, the main tenants of the concept are discussed. This Chapter argues that despite the absence of global consensus regarding what sustainability actually means, it has an underlying message that is relevant to all nations, collectively and individually, and is therefore capable of specific application in varying contexts.

In Chapter three sustainability criteria against which the relevant Zambian mining legislation will be analyzed is developed. The framework against which the legislation is measured is derived from the Legal Principles for Environmental Protection and Sustainable Development developed by the WCED Experts Group on Environmental Law.

Chapter four sets out the main legislation in Zambia that regulates the mining industry and analyses it vis-à-vis the essential requirements for sustainability identified in Chapter Three. The Chapter also makes recommendations for the relevant legislation in Zambia to meet the required standards for sustainability in light of the discussion in Chapters One and Two and, and the requirements in Chapter Three.

The thesis concludes in the fifth Chapter with a brief overview of the concept of sustainability and how it may be applied, in general, in the Zambian context.

Methodology

Literature Review

My research methodology includes conducting of a detailed and comprehensive review of the relevant literature in the areas of sustainability and environmental regulation. In order to acquire a clear understanding of the implications of environmental regulation for the mining industry, texts and articles detailing the operations and practical concerns of the industry are also reviewed.

Review of legislation, regulations, reports of various governmental/industry task forces, as well as Environmental Council of Zambia (ECZ), Mine Safety Department (MSD) and Mining Advisory Committee (MAC) decisions, directives, informational letters, etc.

Following the general literature review, the focus is shifted to how the legislative and administrative framework within Zambia addresses issues of environmental regulation. This entails a critical examination of the applicable legislation, case law and board decisions as well as informational letters, interim directives and reports prepared by various governmental and industry Task Forces.

In reviewing this material, particular attention is paid to a list of questions that include at a minimum the following:

- What does the legislation actually say about environmental standards expected of mining operations in Zambia? What is the exact nature of these obligations? When do they take effect?
- Are obligations arising from separate statutes treated differently? Should the same environmental standards apply to different statutes? In what circumstances could overlap occur?
- What are the views of the relevant government and mining industry authorities as to what environmental standards/obligations should be in place? Have they developed a consistent policy reflecting this? If so, is it consistent with or supported by legislation? What considerations inform their policy? Are there any exceptions?

- Does the current environmental regime promote/sustain sustainability? If not what changes would be required?

Interviews

Personal interviews with members of the mining industry and the relevant authorities are used to supplement knowledge acquired through written materials.

Even though it does not address all of the sustainability issues faced by the Zambian mining industry, it is hoped that this thesis provides a start at identifying some of the issues, and getting processes underway, which may eventually lead to solutions.

CHAPTER ONE: MINING

Human welfare and mineral supplies have been linked for so long that scholars demarcate the ages of human history by reference to minerals: Stone, Bronze, and Iron. Cheap and abundant minerals provided the physical foundation for industrial civilizations. Societies' overall prosperity still correlates closely with per capita use of mineral products.

John E. Young, *Mining The Earth*.¹

If the originators of early mining practices were to visit today's mining operations, they would be surprised to find that their ideas are still being used. Many of today's mining methods were introduced as early as 1865.² For many years the six major technologies of mining, shown in Table 1.1, did not change. Not even the threat of obsolescence or the pressure of compliance with ever-stricter environmental standards motivated the industry to adopt big changes in mining. Today, however, the responsible stewardship of natural resources has assumed growing importance. As a result, mining practices, particularly as regards the disposal of liquid and solid wastes, which may have been prevalent even a decade ago, may now be unacceptable. Mining companies now have to devote increasing effort and resources to enhancing both their environmental standards and their community relations, and to adopting the best available practices.

¹John E. Young, "Mining the Earth" in Lester R. Brown *et al.*, *State of the World 1992*, (New York: W.W. Norton & Company, 1992) 100.

²Tony Eltringham, "Technology Changes Forge the Future of Copper Mining" (1997) 1: 4 On Cu. 1.

TABLE 1.1 Mining Methods

YEAR	METHOD	TECHNOLOGY
1865	Electrolytic Refining	Patent (Elkington)
1907	Froth Flotation	Australian Patent (Potter)
1909	Converting	Patent (Peirce & Smith)
1940s	Solvent Extraction	Uranium Purification
1949	Flash Smelting	First Outokumpu Furnace

Source: Eltringham: Innovations in Copper

The objective of this chapter is to provide an overview of the present condition and prospects of the global and Zambian copper mining industries and to discuss the industry's impact on the environment.

1. Trends in Demand for Mineral Products

The basic justification for the mining industry's continued existence is the demand for its products. Many of the fears of the late 1970's and early to mid 1980's about wholesome substitution away from minerals and metals have not materialized, and global demand for mineral products is expanding. There has unquestionably been substitution in some uses, and there is the continuing quest for lower costs throughout industry, not least by economizing on the usage of materials of all types.³ These influences on demand have, however, been countered by general economic expansion and by the needs of rising living standards, especially in the Asian countries. In the 1975-85 decade, demand was depressed by the repercussions of the sharp jumps in the prices of crude oil and energy

³ In the case of copper, the most notable substitutions are aluminium and glass fiber optic cables.

products that occurred in the early and late 1970's. Those encouraged cost reductions and weight savings that inevitably depressed demand for metals in particular. It took well over a decade for the full effects to work through, particularly where technical innovations and capital expenditure were required to implement the necessary changes.

On top of such structural influences, demand for mineral products is strongly cyclical. It varies directly with economic activity, as reflected in changes in real Gross Domestic Product (GDP) and even more by movements in industrial production. The consumption of materials is also governed by shifts in the composition of economic activity and of aggregate demand, both industrially and geographically.

After the long period of near stagnant demand in which the global economy was adjusting to the oil price rises of the early and late 1970's, the international mining industry enjoyed an extended, but uneven, boom from the mid to late 1980's onwards. This was punctuated for some products by the industrial countries' mild recession of the early 1990's and by the repercussions of the collapse of the Soviet Union and its European satellites. Those countries experienced dramatic falls in their consumption of most materials from the late 1980's. For example, the total demand for crude steel and aluminum in the former Communist economies (Comecon) countries had dropped to only a quarter of its 1987 level by 1996, and their consumption of copper to under one third.⁴ The simultaneous decline of these countries' domestic production softened the impact of this marked contraction of the global mining and metals industry. Also production of

⁴Phillip Crowson, "International Mining: A Perspective", (1999) 4: 3 CEPMLP Journal, online: CEPMLP Homepage <<http://www.dundee.ac.uk/ccpmlp/journal/html>> (date accessed: 3 August 1999).

many metals proved more resilient than consumption, and global markets rapidly had to absorb unexpected large exports from the former Comecon and particularly from Russia. Exports from current production were supplemented in cases by the disposal of stockpiles. Simultaneously, cutbacks in military procurement and the scrapping of redundant armaments adversely affected the markets for specialty minerals and metals.

The global consumption increase during the period when the Comecon countries' off-take contracted so markedly emphasizes the strength of rising demand elsewhere. Had the region's demand remained at its 1987 level, global consumption of copper would have been 10% higher than it was in 1996, aluminum demand over 12% higher and the consumption of crude steel over 21% greater. Prices would consequently have been higher, and the incentive to invest in new capacities sharpened. Although mineral demand in these countries may stagnate, or grow only modestly, it is hardly likely that they will act as a drag on global consumption. Furthermore, western trade patterns have adjusted to absorb continuing exports from Russia and other suppliers.⁵

China and the industrializing countries of the Asia-Pacific region were the mainsprings for rising global demand for minerals and metals throughout the late 1980's and into the 1990's. Over the past decade, Developing Asia's share of global consumption more than doubled for most products to between one fifth and one third of the total.⁶ Over the long term, such rates of expansion are not sustainable, as economic and political developments since the mid 1997 have amply demonstrated. Many of the newly industrialized countries

⁵*Ibid.* at 2.

⁶*Ibid.*

have run into economic difficulties, born of structural imbalances. For instance the currency crisis in South Korea and Indonesia as well as political instability in Indonesia.⁷ Their boom was fueled by credit based capital expenditure of all types, which created capacity well in excess both of present needs and in some cases, of likely future requirements. The demand of Asian economies for minerals and metals may not expand at the heady rates of the past decade, but will nonetheless remain healthy.⁸

2. Patterns of Exploration

Global spending on mineral exploration, and the formation of investment in new mines, rose substantially during the 1990's. The rise is partly cyclical, but it also reflects broad geopolitical changes. A mixture of push and pull drives total spending on exploration and its geographical focus. Buoyant market conditions, such as those of the late 1980's, increase the cash flows of existing producers and encourage investment in new capacity. Naturally the initial emphasis is on expanding operating mines and developing known deposits. During the long phase metal recession of the 1970's to mid 1980's however, exploration had been subdued and there was no large backlog of readily available and obviously economic deposits in the areas that had traditionally been regarded as politically safe.⁹ Companies only commit sizeable resources to exploration if they have a reasonable assurance that they will be able to develop any discovered ore deposits into profitable mines. Throughout the quarter century up to the late 1980's such assurance was distinctly lacking in most areas with significant mineral potential. Conditions have

⁷*Supra*, note 4 at 3.

⁸*Ibid*.

⁹*Ibid*.

changed markedly in the past decade at the same time, as exploration for new ore deposits was becoming economically justifiable. A few developing countries like Botswana and Papua New Guinea had remained receptive to foreign mining companies on reasonable terms throughout the period when natural resources nationalism was at its most virulent, but they were the exception rather than the rule.

As the 1990's progressed, exploration became less attractive in these traditional areas. New deposits of some minerals and especially of gold in North America became progressively harder to find and the prospective acreage more costly. There was also a perception that permitting procedures were becoming more bureaucratic, protracted and onerous, particularly as regards environmental considerations. The hurdles were being raised both for exploration and for new mine development. Indeed in recent years, the development of some technically viable deposits has been prevented by retrospective regulatory action in Australia, Canada and the United States. In Canada for instance, one million hectares of land surrounding the remote Tatshenshini River in northwestern British Columbia was preserved as a park by the provincial government. This decision put a halt to the proposed Windy Craggy copper mine development. The threat to the river and its fisheries from acid mine drainage was substantial, particularly since Windy Craggy was located in the most active earthquake zone in North America.¹⁰ Adding to tightened environmental regulations, the mining companies' access to deposits was

¹⁰Morgan Ashbridge. "New Environmental Assessment Law a Mixed Blessing" (1993) 17: 2 West Coast Environmental Law Research Foundation Newsletter 1. See also *British Columbia v. Tener* (1985) 32 L.C.R. 340 (S.C.C.).

further constrained by land rights regulation in favor of indigenous peoples:¹¹ often they have opposed mining on their land outright or have sought a much greater share of mine revenues than was originally offered. Disputes over the terms on which mining companies should obtain access to land, and even over whether mining should proceed at all, have become more common in most developed countries.

This push away from the industrial nations has been countered by greatly improved access for mining companies to many developing countries. The prevailing trend during the post war decades up to the early 1980's was for resource-rich developing countries to assert much greater control over their natural resources. These controls were usually extreme, particularly during the mid 1970's which saw foreign owned, and sometimes even domestically owned mining companies nationalized and exploration and new mine development severely circumscribed.¹² Taxation was raised to unremunerative levels for most projects as many traditional mining countries, especially in Africa and much of Latin America, regarded the established mining operations, now predominantly state-owned, as sources of revenue. They often supported an extended labor force and a superstructure of social and welfare services in addition to providing tax revenues for general government spending. Overly optimistic projections of metal prices, and the failure to recognize the inevitability of cyclical fluctuations, encouraged governments to overspend. Mines were then starved of funds for maintenance and replacement of

¹¹*Delgamuuk v. British Columbia* (1997) 3 S.C.R 1010. See also *Halferdahl v. Canada* (Mining Recorder, Whitehorse Mining District). [1992] 1 F.C. 813 (C.A.).

¹²For instance, in 1970 the Zambian government nationalized the mining industry by acquiring a 51% stake although management and marketing remained with the foreign minority shareholders until 1975 when the mines were placed under Zambian management.

equipment, let alone for raising productivity and expansion. Unfortunately, mines are literally wasting assets unless they are continually fed with new investment at least equivalent to their depreciation. The general consequence was that state owned mining companies at best stagnated and in many cases severely weakened.

The widespread failure of state ownership to deliver its expected economic and social benefits prompted a progressive withdrawal of government from detailed interference in economic management and control. Political fashion has swung strongly in favor of market-based systems of economic organization and management and of private ownership.¹³ For the mining industry, this has meant the reformulation of previously restrictive mining codes and greatly simplified and reduced systems of taxation targeted at inducing foreign investment in exploration and development. In many countries state-owned mining companies have been wholly or partly privatized,¹⁴ often through sale of their underlying assets to foreign owned mining companies. Resource rich developing countries have played a competitive game of leapfrog in their attempt to attract and retain direct investment in their mineral sectors.

Assuming that global activity expands at annual average rates of 3% to 4% per annum over the coming decades, demand for most metals should increase by 1% to 3% per

¹³In 1990 Zambia undertook a Structural Adjustment Program (SAP) to counter its rising economic problems. The SAP combined trade policy reforms, deregulation and exchange rate adjustment with stabilization policies designed to restore fiscal and balance of payments equilibrium and price stability. Interview with officials at the Ministry of Finance and Economic Development, Zambia (June 12, 1999).

¹⁴The privatization of ZCCM, which began 1996, was completed on 31 March 2000. Until that date ZCCM was a 60.3% state-owned mining conglomerate.

annum.¹⁵ That this demand will grow more slowly than economic activity reflects both the rising shares of income that are spent on services rather than goods, especially in the industrialized countries, and the continuing impact of technological innovation. The main driving forces are the needs of an expanding world population for basic goods and services and their rising of living standards in many developing economies.

3. Mining in Zambia

The Republic of Zambia is located in southern central Africa and has a population of about 10,285,631 persons.¹⁶ Zambia takes its name from the Zambezi River, which rises in the northwest corner of the country and forms its southern boundary. The landlocked country lies between latitudes 10 and 18 South and longitudes 22 and 33 East¹⁷ and borders eight other countries: Angola to the west, Botswana to the southwest, Democratic Republic of the Congo (former Zaire) to the north and north west, Malawi to the east, Mozambique to the southeast, Namibia to the southwest, Tanzania to the northeast and Zimbabwe to the south.¹⁸

Northern Rhodesia became the Republic of Zambia on October 24, 1964 with Kenneth Kaunda becoming the first president of the country. Zambia was the first British territory

¹⁵*Supra*, note 4 at 8.

¹⁶Preliminary Report of the 2000 Census of Population and Housing Population, Central Statistical Office Lusaka Zambia. April 2001.

¹⁷Zambia National Tourist Board (ZNTB) "Environment/Geography" online: ZNTB Homepage <<http://www.zambiatourism.com/travel/default.htm>> (last modified: 4 February 2002).

¹⁸*Ibid*.

to become a republic immediately upon attaining independence.¹⁹ The constitution promulgated on August 25, 1973 abrogated the original 1964 constitution and the new constitution together with the elections that followed in December 1973, were the final steps in achieving what was called a “one-party participatory democracy”.²⁰ In mid 1990, in response to growing popular demand, President Kaunda signed legislation allowing “multi-party democracy”. Zambia’s first multiparty elections for parliament and the presidency since the 1960s were held in 1991 and the Movement for Multiparty Democracy has held the reigns of political power since then.²¹

Zambia’s land area of 752,612 square kilometers consists for the most part of a high plateau, with an average height of between 1060 and 1363 meters (3500 and 4500 ft.) above sea level.²² Isolated mountain ridges rise to more than 6000 ft with an occasional peak above 7000 ft on the eastern border, the Nyika Plateau.²³ Over most of the country the surface tends to be flat, broken by small hills, the result of countless ages of undisturbed erosion of the underlying crystalline rocks. It is in these rocks that the bulk of the country’s wealth, in the form of minerals, is contained.

¹⁹Countrywatch “Zambia: History” online: Countrywatch Homepage
<http://www.countrywatch.com/cw_country.asp?vCOUNTRY=189> (date accessed: 31 July, 2001).

²⁰*Ibid.*

²¹*Ibid.*

²²Supra, note 17.

²³*Ibid.*

(a) Minerals Produced

Zambia has for many years now been an important source of gemstone to the worlds jewelry market.²⁴ However the vast deposits of copper make it, together with cobalt, the main mineral produced in the country.²⁵ Most of the copper in Zambia is mined in what has become to be known as the Copperbelt, an area of 31,328 square kilometers along the northwestern part of the country.²⁶ This area and numerous mining operations and projects plus their related service provision companies make up the bulk of the economic activity of the Copperbelt.²⁷ Peak production of copper occurred in 1969 when 720 000 tonnes of copper was produced making Zambia, at the time, the world's 4th largest copper producer. However, production has declined drastically since the- mid 70's mainly due to low copper prices and lack of investment. For instance copper and cobalt production have declined by 30% in the last decade, as shown in the graphs below, currently making Zambia the worlds 11th largest copper producer.²⁸

²⁴Zambia produces high grade emerald, amethyst, aquamarine, tourmaline, garnet, citrine, malachite, agate, heliodor and many other beryls. These minerals are mostly exported in the rough form, as there are very few lapidary operations in the country.

²⁵Forecasts at Nchanga Division, currently the largest producer of copper and cobalt in the country, show that at the end of 2006 when underground operations are expected to cease, resources in excess of 40 million tonnes of ore at 2.3% copper will remain. The Konkola Deep has reserves estimated at 100 million tonnes of ore at 4.33% copper. Interview with ZCCM officials (15 June 1999).

²⁶Supra, note 16 at 5.

²⁷Most notably: Kansanshi Mine; Konkola North Concession; Luanshya Division; Chibuluma Mine; Power Division; Chambishi Mine; Chambishi Acid and Cobalt Plants; The Nkana slag Dumps; Ndola Precious Metals Plant; Konkola Division; The Konkola Deep Mining Project; Nchanga Division; Nampundwe Mine; Mufulira Division; Nkana Mines, Concentrator and Cobalt Plant; Nkana Smelter, Refinery and Acid Plant.

²⁸ZCCM Financial Report 1996.

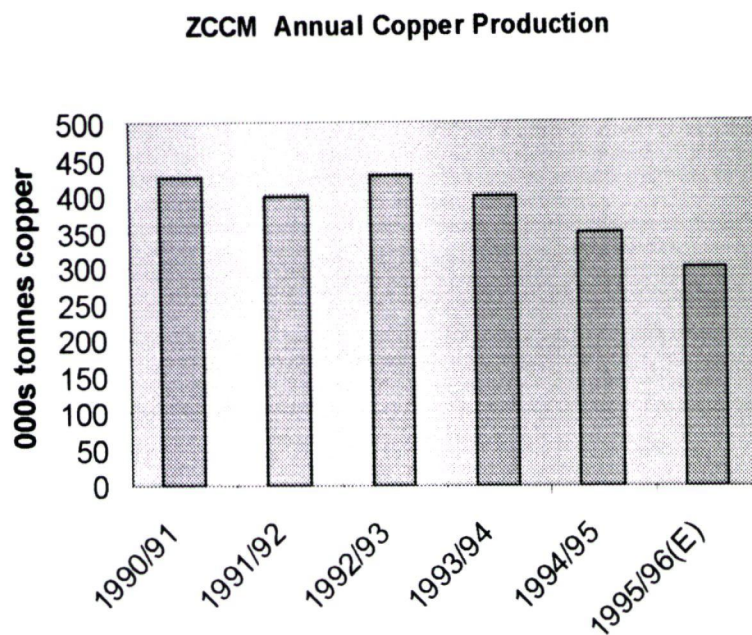


Figure 1.1: Annual COPPER Production (source: ZCCM Financial Report, 1997).

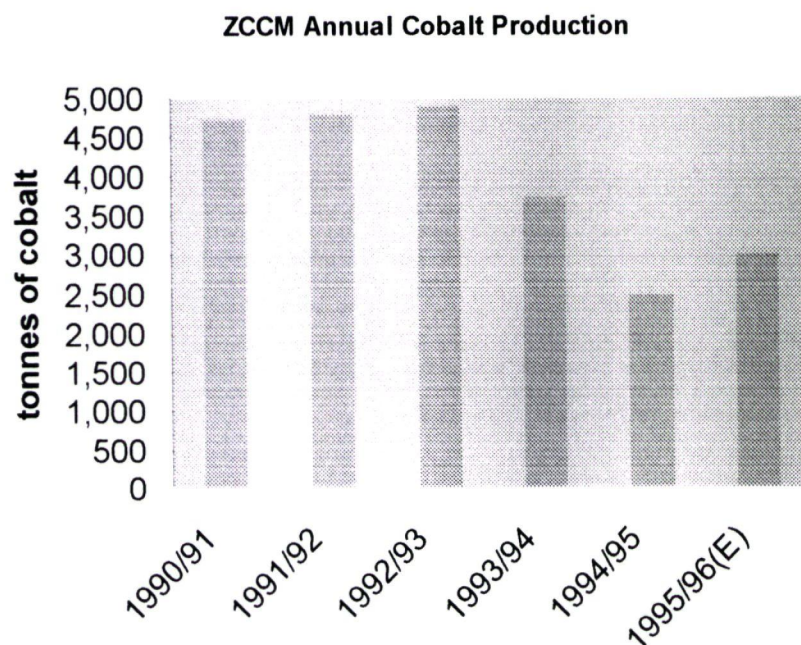


Figure 1.2: Annual COBALT Production (source: ZCCM Financial Report, 1997).

(b) Minerals and the Zambian Economy

Zambia's economy suffers from a very high debt service burden, as well as a history of excessive public sector direction of, and direct participation in, the production of goods and services. Soon after independence in 1964, parastatals and a one-party state dominated the economy. Rising copper prices helped Zambia to grow at an average rate of 2.5% over the subsequent decade. Since 1975, however, declining production and falling world prices of copper, the general deterioration in Zambia's terms of trade, coupled with the failure to develop a dynamic and diversified economy caused an extraordinary overall economic decline. Per capita income fell by more than 50% from 1974 to 1994, and attempts to support continued consumption through borrowing in the face of economic decline exacerbated the debt problem. Zambia now faces particularly difficult constraints as it attempts to turn the economy around and achieve sustainable economic growth. It has acquired an exceptionally large external debt burden: as at December 2000, Zambia's total debt amounted to US\$6.3 billion.²⁹

Another major constraint on Zambia's potential for economic growth is its heavy dependence on a single export product (copper). Despite the decline in copper

²⁹Budget Speech by the Hon. Minister of Finance and Economic Development to Parliament and the nation on Zambia's Year 2001 budget. January 2001.

It should be noted that the amount of US\$6.3 billion reflects a reduction of approximately US\$ 200 million. The external debt at the end of 1999 stood at US\$6.5 billion. The International Monetary Fund (IMF) and the World Bank Group's International Development Association (IDA) have agreed to support a comprehensive debt reduction package for Zambia under the enhanced Heavily Indebted Poor Countries (HIPC) Initiative. The total debt relief from all creditors is about US\$3.8 billion, which is equivalent to US\$2.5 billion in Net Present Value (NPV). This will mean that Zambia's annual payments will be reduced by about US\$260 million over 2001-2005 and below US\$100 million over 2006-15. This corresponds to reduction in debt service obligations of about 45%. See Grant Thornton "Budget Bulletin: Year 2001", Lusaka Zambia.

production,³⁰ copper and cobalt mining still contribute 10% of Zambia's Gross Domestic Product (GDP) representing approximately 80% of export earnings.³¹ The effect of this drop in production coupled with resultant drop in earnings on the Zambian economy is shown in Table 1.2.³²

Table 1.2: Estimates of Revenue –Year 2001

	2001 K' billion	%	2000 K' billion	%	1999 K' billion	%	1998 K' billion	%
Mineral Revenue	4.50	0.09	2.00	0.07	21.00	0.94	12.44	0.68
Income Taxes	729.79	14.84	585.00	20.65	459.00	20.60	371.75	20.44
Taxes on Domestic Goods and Services	892.00	18.14	610.64	21.55	532.26	23.90	426.82	23.47
Taxes on Trade	650.00	13.22	402.36	14.20	387.74	17.41	278.18	15.30
Tax Arrears	-	0.00	191.00	6.74	-	0.00	-	0.00
Non-Tax Revenue	36.71	0.75	37.00	1.31	60.00	2.89	89.56	4.93
Total Domestic Revenue	2,313.00	47.04	1,828.00	64.52	1,460.00	65.54	1,178.75	84.82
External Assistance:								
Project Financing	1,811.10	36.83	778.18	27.47	648.24	29.10	415.59	22.86
Non-Project Financing	792.95	16.13	226.80	8.01	119.48	5.36	224.00	12.32
Total External Revenue	2,604.05	52.96	1,004.98	35.48	767.72	34.46	639.59	35.18
Total Revenue	4,917.05	100.00	2,832.98	100.00	2,227.72	100.00	1,818.34	100.00

Source: Grant Thornton- Budget Bulletin 2001.

³⁰Zambia produced 256 000 tonnes of copper in 2000, down from 260 000 tonnes in 1999.

³¹International Finance Corporation (IFC) Country Information Center- Profile from the World Bank Group on Zambia: August 2001.

³²The table includes both the mineral revenue for 1998-2000 as well as the estimated mineral revenue for 2001.

In a bid to reverse this downward trend, the Government of the Republic of Zambia (GRZ), decided to add to the list of companies to be privatized, the Zambia Consolidated Copper Mines Limited (ZCCM), the country's copper mining parastatal. It was felt that the privatization would mobilize substantial un-encumbered foreign exchange earnings from cash considerations, which would help stabilize the Kwacha (the local currency). These amounts of committed new capital would ensure continuation of ZCCM's operations and provide financial relief for GRZ as it would no longer be required to back up the losses that the company was incurring. Not only would there be funds available for mining operations, privatization would also provide the necessary funds for developmental projects. It was hoped that this in turn would create more employment opportunities³³ and at the same time, allow for diversification of ownership of the Copperbelt assets and promote Zambian participation in the ownership and management of the mining assets.³⁴

Privatization also envisages non-monetary transfers of other resources- imposition of private sector discipline and management practices, technological knowledge, market information, material and supervisory personnel, organizational experience and innovations in products and production techniques- all of which were viewed as being in

³³ An inflow of private capital contributes to a country's development process by helping to reduce the shortage of domestic savings and by increasing the supply of foreign exchange. Similarly, it can also be argued that as the investment operates, the increase in real income resulting from such investment is greater than the resultant increase in the income of the foreign investor. Thus the presence of foreign capital may in this respect allow a large labor force to be employed as it increases direct employment due to expansion of activities and indirectly through the growing support industries.

³⁴ Under Stage 2 of the ZCCM privatization, GRZ will dispose of some or all of its 60.3% shareholding in ZCCM Investment Holding Company, with part of this shareholding earmarked for Zambian investors.

short supply in the mining sector. The management of the mines was a major issue for Zambia's international partners who had made the privatization of ZCCM a pre-condition to the release of funds under the balance of payments support.³⁵ It was felt this was a way of bringing about increased credibility for Zambia and a likely increase in investor confidence. The privatization was therefore necessary for the unblocking of the much-needed funds.

Other anticipated impacts of the privatization include increased copper and cobalt production and foreign exchange earnings through expansions, modernization and new projects, such as KDMP, Kansanshi, Konkola North, Muliashi North, Chibuluma South and other projects.³⁶ Increased Government tax earnings through growing and profitable private mining operations coupled with future dividend streams to the Government from the growing and profitable private mining operations were also envisaged.³⁷ Also expected was the general rejuvenation of the economy through local business development programs and spill over effects on the other sectors of the economy.

The importance of the mining sector to the Zambian economy, even in its privatized state, is best summarized by the words of the Minister of Finance, in his budget speech to the nation:

³⁵ According to the World Bank report "ZCCM Technical Review Mission Findings and Recommendations" dated 13 December 1995, under-investment *per se*, is not highlighted as the main cause of declining copper production. Rather it has been the poor return on the investment.

³⁶ Memorandum on the Privatization of Zambia Consolidated Copper Mines Limited submitted to the Committee on Economic Affairs and Labour of the National Assembly by the GRZ/ZCCM Privatization Negotiating Team 7 April 2000, Lusaka, Zambia.

³⁷ Continued GRZ participation is to be maintained through the ZCCM retained minority interests in the privatized companies.

“It is the Government’s sincere hope and desire that the investment plans agreed with the mining investors will be successfully implemented and help improve the financial viability and technical efficiencies to the benefit of the nation. The conclusion of the privatization of ZCCM is expected to positively impact on various sectors of the economy and lead to sustainable economic growth and uplifting of the standards of living of the people of Zambia.”³⁸

Whether the mining sector will be able to fulfil this enormous task depends primarily on the future of copper, which in turn depends on world demand. As noted earlier, world demand for copper depends on a host of factors, including the development of techniques of utilization, the processing of competitive metals, trends in supply and world prices.

Since Zambia has no downstream copper industry, the copper is exported as copper bars to the USA, Japan, France, Malaysia, India, Belgium, Thailand, Italy and Indonesia. The level of operation of the Zambian mines, therefore, is by and large determined by the business cycle in these consuming areas. Technical developments in these largely industrialized countries may have on balance a negative influence on their demand for copper. Improvements in telephone engineering, for example, especially the use of concentrators, reduce the volume of copper wire needed for a given message volume, while the increased use of microwave techniques and satellite cuts down the need for long distance cables.

³⁸*Supra*, note 29 at page 35.

The threat posed by other metals such as aluminum and substances like glass fiber optic cables is very real.³⁹ Aluminum is a relatively new metal, whose uses have not been fully explored but which already shows a surprising flexibility. One hundred years ago aluminum was a commercial nonentity of the metallurgical world.⁴⁰ It was used with copper to form aluminum bronze and for ornaments, but its other uses were specialized, such as the manufacture of artificial teeth. Today aluminum is used extensively in building and bridgework. Furthermore, bauxite is plentiful in the earth's crust and an innovation, which materially reduces the currently expensive cost of its processing, would have an adverse impact on the demand for copper.⁴¹

With approximately two years of operation since the first Zambian mines were privatized, infrastructure investment has been in excess of US\$ 250 million.⁴² According to ZCCM-IH while most of the mining companies have not yet attained full profitability, favorable results are expected in the near future considering the extent of the investment. According to the mining companies however, it may be quite a while before this happens. Almost all of the US\$ 250 million has been used to rehabilitate existing infrastructure, with very little going into actual operations. For instance, day-to-day operations at Konkola Copper Mines (KCM) the new owner of four ZCCM divisions are currently being sustained by short term funding from its shareholders. This coupled with the fact that ZCCM is one of the highest cost producers in the world despite being well integrated

³⁹*Supra.* note 1 at 47.

⁴⁰*Supra.* note 4 at 8.

⁴¹*Ibid.*

⁴²ZCCM Investment Holdings Plc. (ZCCM-IH) accounts for 15 months ending June 30, 2001.

with low cost smelters and refineries, which benefit from cheap labour and electricity. This has obvious consequences regarding its competitiveness in world markets. ZCCM's productivity levels per employee are amongst the lowest in the world, also seriously eroding ZCCM's competitive advantage in labour costs.

The tumbling world copper and cobalt prices have not made matters any easier for the new mine companies. Prices have fallen from 87 cents down to 61 cents per pound in less than a year, a development which has cost KCM US\$ 130 million in lost revenue during that period.⁴³ The pressure has been so intense that KCM announced recently that it was scaling down on non-productive areas to concentrate on profit generating ventures. One casualty has been the US\$ 500 million KDMP. At the current copper prices, KCM has not been able to raise finances required for the project and as such could not meet the timetable to start construction in January 2002 and complete by March 31 2007. Once completed, KDMP was expected to increase the underground workings at Konkola Mine and increase production from two million to six million tonnes per annum, yielding approximately 200,000 tonnes of copper.

4. Mining in Zambia: Post Privatization

Since 1992, the government has initiated a series of ambitious market-oriented reforms aimed at reducing state participation and control of economic activity. While these economic reform programs recognize the need to diversify, expand the economic base and increase agricultural production, copper is still the backbone of the Zambian economy.

Following the completion of the privatization of ZCCM in March 2000, the Zambian economy is beginning to show some signs of recovery. The economy grew 3.5 percent in 2000 with an increase in non-mining GDP by 4.1 percent.⁴⁴ Economic outlook is expected to improve with increased investments in the copper mines and rising copper prices. GDP is expected to grow 5 percent by the end of 2001. In December 2000, Zambia qualified for debt relief under the HIPC initiative.

Copper mining in Zambia will undoubtedly continue for a number of years. It is therefore up to the Government, the new owners of the mining companies and the people of Zambia to ensure that mining of copper will be conducted in a way that minimizes its adverse impact on the environment.

5. Environmental Impacts of Mining

An actual mine site is just one point in a long line of activity before and after the digging starts. It is also the center of a geographical web of transportation routes (roads, barges, air access routes), energy infrastructure (dams, power lines), tailings ponds, waste rock piles and processing plants. In the right place, with the right company, new technologies and some good planning, many of the potential adverse impacts of mining are avoidable. Good environmental performance is most likely when there is a combination of sound regulations, freedom of information, a responsible company and labour force, and an informed and effective public. When these factors are in place, there is accountability and transparency built in. At the same time, there is the simple truth that there are some

⁴³For KCM, every one-cent per pound is worth US\$5 million.

⁴⁴*Supra*, note 31.

places where mining, even of the most precious of metals, is completely inappropriate. The challenge we face as consumers of mineral products is to know, where, how and when it is possible to have environmentally sound mining operations.

Although it can be argued that minerals remain essential for human welfare, the negative effects of current mining practices threaten to outweigh the benefits. In areas where mining is regulated, it still causes substantial damage to the environment. Where regulated poorly or not at all, the environmental impacts of mining can be devastating.

The primary environmental damage from the mining industry happens during the extraction of the raw materials and each stage of the mining process has the potential for different impacts of various degrees. The impacts will depend on the sensitivity of the local terrain, the type of technology employed, the skill and knowledge of the company and the ability to monitor and enforce compliance with environmental regulations.

General stages of mine development, with summaries of activities and environmental issues are set out below.

Table 1.3: Potential Environmental Impacts of Mining

Development Phase	Potential Activities	Environmental Issue (subject to mitigation/prevention measures)
Exploration	Airborne and ground-based geochemical and geophysical surveys, prospecting, claim staking, line cutting, stripping, drilling and trenching, road/trail building and/or helicopter transport, bulk sampling	Land alienation from protection options, camp garbage, trail/road and trenching erosion, access-related over harvesting and fishing, habitat disruption, noise pollution, acid mine drainage
Mining and Milling	Environmental impact assessment, mine design and construction, stripping/storing of “overburden” of soil and vegetation, ore extraction, crushing/grinding of ore, floatation or chemical concentration of ore, mine and surface water treatment, storage of waste rock and tailings	Wildlife and fisheries habitat loss, changes in local water balance, sedimentation, containment of toxins in tailings ponds and/or leaching solutions, tailing ponds or leaching pads stability failure, potential acid generation from waste rock and pit walls, heavy metal leaching from acid mine drainage, cyanide solution containment at heap leach operations, wind borne dust
Smelting and Refining	Processing of mineral concentrate by heat or electro-chemical processes	Sulphur dioxide emissions contribute to acid rain, toxic chemical (e.g., ammonia, sulphuric acid) use for processing, high energy requirement
Mine Closure	Re-contouring of pit walls and waste dumps, covering or reactive tailings dumps, decommissioning of roads, dismantling of buildings, re-seeding/planting of disturbed areas, ongoing monitoring and possible water quality treatment	Seepage of toxic solutions into ground and surface water, contamination from acid mine drainage, wildlife and fisheries habitat loss, re-vegetation failure, wind borne dust, slope and tailings impoundment failure

Source: Environmental Mining Council of British Columbia, Environmental Impacts of Mining 1999.

(a) Environmental Impacts of Mining in Zambia

The most extreme environmental impacts of mining occur in and around mines, yet the impacts may be felt at great distances from the mine site, and may begin well ahead of any real production. In order to determine the specific environmental impacts of mining in Zambia, a study of four mines on the Copperbelt was undertaken.⁴⁵ Below are the findings at one mine site, Mufulira mine, and one waste disposal dam, the Muntimpa Tailings Dam.⁴⁶

(i) Mufulira Mine

The Mufulira mine has been in operation since 1933. It is situated immediately northwest of the town of Mufulira on the Zambian Copperbelt. The Mufulira mining license covers an area of 14 281 hectares, with the principle mining activities covering a total area of about 2 228 hectares.⁴⁷

The mine consists of underground mining operations, a concentrator which at the time of the report was treating about 8 000 tonnes of ore per day, a smelter and a refinery.⁴⁸ As at December 1996, Mufulira Division employed 6 504 persons in mining activities and associated support services in the Mufulira mining license area. The workforce is drawn mostly from four townships up to 5 km from the mine plant. Mufulira district has an

⁴⁵ Mufulira, Nchanga, Konkola and Nchanga mines.

⁴⁶ This study presents a fair picture of the extent of the mining practices and their environmental impacts on the Copperbelt. There are very minor variances between the mines.

⁴⁷ ZCCM Environmental Impact Statement (Mufulira Division) 1997.

⁴⁸ *Ibid.*

estimated population of about 152 664.⁴⁹ The “mining community” is estimated at 82 000 persons which accounts for approximately 54% of the Mufulira population.

ZCCM plays a substantial role in providing services to its workers and to the inhabitants of Mufulira. The services include housing, health care, water supply and sanitation, the supply of electrical power, schooling, and recreational facilities.

ZCCM employees from Mufulira division occupy low cost and high cost ZCCM owned houses in the townships of Butondo, Kankoyo, Kantanshi and Mufulira Central. These townships all lie within 5 km of the mine site.

Potable water supply for Mufulira Division is obtained from the Mufulira river (typically 13 000 m³/ day) and underground aquifers (15 000 m³/day).⁵⁰ The water is pumped to a water treatment plant which has a design capacity of about 37 000 m³/day.⁵¹

Approximately 50 000 m³/day is distributed to the ZCCM townships as well as to non-ZCCM communities.⁵² Frequently there are shortfalls in the availability of the water for the ZCCM community. The water treatment plant is now more than 40 years old and there is inadequate monitoring data to indicate the ability of the plant to achieve desired water quality standards.⁵³

⁴⁹*Supra*, note 16 at 11.

⁵⁰*Supra*, note 47 at 11.

⁵¹*Ibid.*

⁵²*Ibid.*

⁵³This is discussed in more detail in Chapter Four.

Sewage is reticulated to five treatment plants operated by Mufulira Division. The total design capacity is inadequate to meet the demands of the present population of Mufulira. The sewage reticulation system, which is over 30 years old, has not been properly maintained or upgraded. Significant rehabilitation is required to ensure consistent compliance with effluent standards.

Environmental Impacts

According to the Zambian environmental laws,⁵⁴ the environmental impacts of mining activities are assessed primarily from monitoring water and air quality. In 1994, ZCCM updated their water environmental monitoring programs as part of the Environmental Management Plan activities. There are a total of 34 water sampling stations at Mufulira mining license area, and 9 licenses, issued by the Environmental Council of Zambia (ECZ) to discharge into the environment.

The principle findings from the water-monitoring program are:

- The mine adds up to 90 000 m³/day to the surface water system, much of which enters the Kafue River;
- The processing operation and peripheral structure use between 128 000 to 132 000m³/day;

⁵⁴The relevant laws and regulations are discussed more extensively in Chapter Four.

- Mufulira mine area is drained by the Mufulira River and its tributaries the Butondo and Kansuswa Streams. Some of the mine effluent entering these streams is occasionally out of compliance in terms of total dissolved or suspended solids, but the Mufulira River itself is generally within acceptable limits.; and
- There is inadequate monitoring of the potable water quality and sewerage effluents.⁵⁵

Effective 23 November 1997, the ECZ requires all mines to obtain licenses to emit air pollution.⁵⁶ The main sources of air pollutants at Mufulira are emissions from the smelter and to a lesser extent, dust off the tailings dumps. There are no studies that document conclusively the quantity and distribution of the dust and sulphur dioxide emissions in Mufulira however, the following general statements can be made:

- The residents of Kankoyo township are most affected by emissions, particularly during the dry season; and
- The amount of sulphur emissions indicates that during the rainy season, from November to April, there is a possibility of acid rain.

In 1994 ZCCM installed a meteorological monitoring station at Mufulira. Regular monitoring of air emissions will be part of ongoing environmental management activities.

⁵⁵It is important to note that the mine operators and not the ECZ do the testing and sampling from the water-monitoring program. At the time of collecting this data, ECZ did not have the necessary resources to carry out the sampling.

⁵⁶The Environmental Protection and Pollution Control (Air Pollution Control) Regulations, 1996.

(ii) Muntimpa Tailings Dam

Muntimpa Tailings Dam was commissioned in 1978 as an impoundment for tailings arising from the Nchanga Concentrator and the Tailings Leach Plant.⁵⁷ This is a valley dam designed to contain 600 million tonnes of tailing material at the end of its active life span.

Environmental Impacts

Over the years, many problems have been experienced which have contributed generally to discharges of suspended solids and heavy metals into the natural streams namely the Muntimpa and Mwambashi streams. Most notably, the inconsistent lime supply resulting in the incomplete neutralization of tailings at the leach plant has affected the construction of the dam periphery walls.⁵⁸ This in turn has contributed to the reduced holding capacity of the dam. Occasional low pH discharges have been experienced and affected the fauna and flora in the two streams. The pollution problems of the Muntimpa dam on the receiving streams have also affected the people residing along the two river systems who are dependent on them for their livelihood.

⁵⁷Both facilities fall under the Nchanga Mine License Area.

⁵⁸Lime is used to neutralize the tailings at the leaching plant. This lime is available locally from the Ndola Lime Company, a company based on the Copperbelt and created almost exclusively to supply lime to the mines. When further queries were made regarding the problem of the supply of lime to Muntimpa, it was discovered that the lime was available but that there was a problem of truck availability to transport the lime to the leaching plant.

The Mwambashi river valley supports an important farming area.⁵⁹ There are a number of commercial farms that operate either on a mixed basis or that are totally devoted to horticultural or cattle farming. In addition to these commercial farmers, there are other small-scale farms and subsistence farming communities supported by the rivers. Farmers extract water for irrigation and drinking purposes from the Mwambashi River, while livestock is watered either directly from the river or via troughs.

As far back as 1981, the Nchanga Consolidated Copper Mines (NCCM) Veterinary Surgeon who was at the time based in Kitwe reported cases of abnormal high levels of mortality, sickness and abortions amongst livestock on the farms bordering the Mwambashi River.⁶⁰ These reports indicated that all investigations on viral, bacterial and tick-borne diseases were negative. Postmortem inspection of some of the animals revealed indications that some of the causes of death might have been copper poisoning. Extensive investigations were conducted to establish the full extent of the problem and the origin of the heavy metals in the sediments of the river. Available information dating back to 1980 showed that there had been considerable discharge of suspended solids into the Muntimpa River from the Muntimpa Dam.⁶¹ These suspended solids containing high levels of heavy metals (especially copper) have over the years accumulated on the riverbed as sediment.

⁵⁹The area along the Mwambashi River has been used for farming since about 1956.

⁶⁰ZCCM Muntimpa Tailings Dam Group Environmental Services Position Paper. August 1998.

⁶¹*Ibid.*

In 1981, a group of farmers from the Mwambashi valley sued ZCCM.⁶² The farmers argued that their high levels of loss of cattle were as a result of copper pollution of the Mwambashi River. The case was decided in favor of the farmers who were awarded K168, 074.00 plus costs.⁶³

Despite the previously mentioned reports and court case, these pollution problems continued to exist. Between October 1994 and June 1998, approximately 134 671 tonnes of suspended solids were discharged into the Muntimpa stream.⁶⁴ This discharge contained about 1 614 tonnes of total copper and 150 tonnes of total cobalt.⁶⁵ The pollution was compounded in December 1997 when management decided, following persistent problems of poor neutralization from the leaching plant, to discharge tailings directly into the Muntimpa stream. These tailings eventually spilled into the Mwambashi River.⁶⁶ The spillway, which was spilling directly into the stream, was finally closed on August 4 1998. However, the heavy rains of the 1997/98 rainy season caused an

⁶²*Farmers v. ZCCM* (1981)(Subordinate Court of the First Class).

⁶³ There have been two other documented pollution occurrences, which gave rise to animal losses: 1956/57 and 1967. It is not clear what happened in the earlier case, but the 1967 case was settled out of court by the mining industry. Details of the settlement were not available.

⁶⁴*Supra*, note 60.

⁶⁵*Ibid*.

⁶⁶*Ibid*.

accumulation of water in the dam. This threatened the stability of the dam necessitating the opening of the gates to allow a higher discharge of water from the dam.⁶⁷

In light of the above, on December 22 1997, the management at Nchanga applied for exemption from meeting statutory discharge requirements. The Director- Mine Safety at the Ministry of Mines and Mineral Development granted the exemption which was to last till March 31 1998.⁶⁸ Acid supply constraints disrupted the changing over procedures from the then spillage in use to a new one, and yet another exemption was applied for and granted for the period April 7 to May 15 1998.⁶⁹

6. The Need for Change

The above studies showing serious air and water pollution can be added to the growing number of cases of mining activities that have been undertaken with little concern for the environment. Mining by its nature consumes, diverts and can seriously pollute the surrounding environment. Changes in laws, technologies and attitudes have begun to address some of the most immediate threats to the environment posed by mineral development, but there are still many areas of mining practices and regulations that need to be addressed. In the case of water pollution for example, according to the 1993 BC State of the Environment Report, mine drainage is still “one of the main sources of

⁶⁷At the time the case study was conducted in 1999, the tailings material had covered the entire Muntimpa stream and part of the Mwambashi River extending up to the confluence with Chati stream, approximately 40 km downstream from the tailings dam.

⁶⁸*Supra*, note 60 at 10.

⁶⁹*Ibid.*

chemical threats to groundwater quality” in the province.⁷⁰ Groundwater supplies the drinking water of more than half the people living outside of Greater Victoria and Greater Vancouver.⁷¹

For the sake of current and future generations, the purity of both air and water needs to be safeguarded against irresponsible mineral development. There is an urgent need to ensure that the best pollution prevention strategies are employed in cases where the risk can be managed. But we also need to recognize that in some places mining should not be allowed to proceed because the identified risks to other resources are too great.

While there have been improvements in mining practices in recent years, significant environmental risks remain. Negative impacts can vary from the sedimentation caused by poorly built roads during exploration through to the sediment and disturbance of water during mine construction. Water pollution from mine waste rock and tailing’s may need to be managed for decades, after mine closure. With mining having become more mechanized and therefore able to handle more rock and or material, mine waste has multiplied enormously. As mine technologies are developed to make it more profitable to mine low-grade ore, even more waste will be generated in the future. This trend requires the mining industry to adopt and consequently apply practices that are efficient and minimize the environmental impacts of the waste production.

⁷⁰BC State of the Environment Report 1993, at 29-31.

⁷¹*Ibid.*

A Mineral Efficient Future

If we are serious about developing responsible mining practices, it is important that we adopt a mineral policy that promotes increased mineral efficiency. A mineral efficiency policy would reduce the environmental impacts associated with mining by:

- Reducing demand for virgin minerals and promoting the reuse of metals already in circulation, and
- Improving mining technologies to reduce the amount of minerals “lost” as pollution.

As stated previously in the Chapter, the use of minerals is heavily concentrated in rich nations, and the disparities in use are most dramatic for metals. It is estimated that residents of the industrialized world comprise only about 20% of the global population, yet consume 86% of the world’s aluminum and 81% of its iron.⁷²

The primary objective in increasing mineral efficiency is to reduce the amount of new materials from the earth. To achieve this goal, we will have to optimize our use of the minerals presently circulating in the global economy. There are some technical possibilities for increasing mineral efficiency:

- Reduce personal consumption of mineral bearing-goods.
- Substitute non-metals for metals.

⁷²Oliver Bomsel *et al.*, *Mining and Metallurgy Investment in the Third World: The End of Large Projects?* (Paris: Organization for Economic Co-operation and Development, 1990).

- Reuse and recycle metals.

Reduce

The simplest method, on a personal level, is to reform form purchasing non-essential or luxury items, such as jewelry, (extra) cars and appliances.

Mineral efficiency can also be improved at the product design and manufacturing stages. For example, in the late 1980's there was a significant rise in titanium dioxide prices. Consequently, companies where able to devise ways of manufacturing their products using fewer inputs of titanium dioxide while still maintaining product quality.⁷³ In Germany for instance, proposed legislation would require that manufacturers of products such as cars and personal computers take them back when consumers are finished with them. This type of legislation would encourage manufacturers to design products that are more durable, thereby reducing the need to replace items as frequently.⁷⁴

Substitute

Manufactures could be required to substitute benign and /or renewable resources for non-renewable minerals. An example of a more benign substance is the use of glass fiber optic cables in place of copper wires for communication.

⁷³*Ibid.*

⁷⁴Environmental Mining Council of British Columbia (EMCBC), *Mining and the Environment* (1999) online: EMCBC Homepage <<http://www.miningwatch.org/emcbc/>> (date accessed: 4 March 1999).

Reuse/Recycle

An additional and essential facet of a mineral efficiency policy would involve ensuring that materials are recovered and recycled whenever possible. Metals are ideal for recycling, as they do not lose their mechanical and metallurgical properties when recycled, and therefore can be recycled an infinite number of times.⁷⁵ Furthermore, the economic value of metals remains the same regardless of whether or not they have been recycled.

A policy that encourages the use of recycled metals would; reduce the quantity of virgin minerals that must be mined and processed; reduce the environmental impacts associated with new mines; and reduce per capita energy and water. For example, new steel from recycled scrap metal results in;

- 90% reduction in costs compared to steel from virgin materials
- 86% reduction in air pollution
- 40% reduction in water use
- 76% reduction in water pollution
- 97% reduction in mining wastes

⁷⁵Copper is the most thoroughly recycled engineering metal in use today. See Innovations in Copper, *Newly Mined Copper: Why do we need It?* online: Innovations in Copper <<http://innovations.copper.org/1998/10/virgincopper.html>> (date accessed: 10 June 2002).

- 105% reduction in consumer wastes⁷⁶

A policy aimed at increasing efficiency in mineral production would address a number of factors, including the efficiency use of energy and water (at all stages of production).

Furthermore, efficient mineral production would aim to reduce the output of wastes (e.g. metals lost as effluent or airborne emissions; as well as the amount of waste rock, tailings, etc.). This in turn would lead us to a global mining culture that would hopefully be sustainable.

⁷⁶*Supra.* note 74 at 46.

CHAPTER TWO: SUSTAINABLE DEVELOPMENT

It took Britain half the resources of the planet to achieve its prosperity: how many planets will a country like India require?

Mahatma Ghandi⁷⁷

With global mining, the issue is no longer one of the need of minerals per se. As discussed in the last chapter global demand for minerals is likely to continue for as long as nations require those minerals for their development. The issue then becomes one of nations conducting their mining operations in ways that minimize negative impacts on the environment and in turn on human and other life forms. In other words, mining in a way that is efficient, responsible and sustainable.

Although various groupings - governments, politicians, interest groups, academicians, etc.- have embraced the concept of sustainability in the last two decades, global consensus is yet to be reached regarding what sustainability actually means, whether it can be implemented, and if it can, under what circumstances. In this Chapter, I contend that in spite of what appears to be the generality and vagueness of the concept of sustainability, it has an underlying message that is relevant to all nations, collectively and individually, and is therefore capable of specific application in varying contexts including mining.

⁷⁷ Mahatma Ghandi, when asked if after independence, India would attain British standards of living.

1. The World Today

National boundaries are now so very permeable that traditional national and international issues have become blurred. Policies formerly considered as being matters of national concern now have an impact on the ecological basis of other nations' development and survival.⁷⁸ With the advent of globalization, most topical issues today are discussed in the global context, and with growing concern of environmental degradation, most of the current discussion surrounding this issue is focused on the development of humanity and how this has impacted the environment.

In April 1968, a group of thirty individuals from different countries- scientists, educators, economists, humanists, industrialists, and national and international civil servants - gathered in Rome to discuss the present and future predicament of man. Out of this meeting grew The Club of Rome: an informal organization whose purposes are to foster understanding of the varied but interdependent components - economic, political, natural and social - that make up the global system. The group foresaw the collapse of per capita food and industrial output as the result of the exhaustion of non-renewable resources. Through its investigation of the global impacts of human activity, the Club identified five major trends of global concern: accelerating industrialization, rapid population growth, widespread malnutrition, depletion of nonrenewable resources, and a deteriorating

⁷⁸It has also been argued that the converse is true, i.e. policies of certain nations are increasingly reaching into the sovereign territory of other nations and thereby limiting those nations' options in devising national solutions to their own problems. See H.E. Judge Nagendra Singh, President, International Court of Justice (1987), in R.D. Munro & J.G. Lammers *Legal Principles and Recommendations adopted by the Experts Group on Environmental Law of the World Commission on Environment and Development* (London: Graham & Trotman 1987).

environment.⁷⁹ Taking the view that these trends are all interconnected and that their development is measured in decades or centuries, rather than in months or years, the following conclusions were reached.

Firstly, if the present growth trends in world population, industrialization, pollution, food production, and resource depletion continue unchanged, the limits to growth on this planet will be reached sometime within the next one hundred years. The most probable result will be a rather sudden and uncontrollable decline in both population and industrial capacity.

Secondly it is possible to alter these growth trends and to establish a condition of ecological and economic stability that is sustainable far into the future. The state of global equilibrium could be designed so that the basic material needs of each person on earth are satisfied and each person has an equal opportunity to realize his individual human potential.

Thirdly, if the world's people decide to strive for this second outcome rather than the first, the sooner they begin working to attain it, the greater will be their chances of success.⁸⁰

Although this was not the first time that people had looked at the world with a global, long-term perspective and reached the above conclusions, a vast majority of policy

⁷⁹The findings of the Club of Rome were published in *The Limits to Growth*, D.H. Meadows et al (New York: Universe Books, 1972).

⁸⁰*Ibid.*, at 21-24.

makers seemed to be actively pursuing goals inconsistent with the results. The Club therefore hoped to bring these concerns and conclusions, once again, to the attention of policy-makers and the public worldwide and to promote new global policy initiatives and action.

This idea of global remedies for global concerns was taken up, expanded upon and discussed at a different level, the international level. In 1983 the World Commission on Environment and Development (WCED) was created as a consequence of General Assembly resolution 38/161 adopted at the 38th Session of the United Nations (UN).

Established at a time of unprecedented growth in pressures on the global environment, with grave predictions about the human future becoming commonplace, the WCED was mandated to re-examine the critical issues of environment and development and to formulate innovative, concrete and realistic action proposals to deal with them.⁸¹ Tied to this was the need to strengthen international co-operation on environment and development and to assess and propose new forms of co-operation that could break out of existing patterns and influence policies and events in the direction of needed change. Effectively, the WCED was being asked by the UN General Assembly to formulate a global agenda for change and to raise the level of understanding and commitment to action on the part of individuals, voluntary organizations, businesses, institutions and governments.

⁸¹The Commission's Mandate was officially adopted at its Inaugural Meeting in Geneva on 1-3 October 1984.

What the General Assembly was asking for can be said to have been too ambitious and unrealistic. It may have been, however, a demonstration of a widespread feeling of frustration and inadequacy in the international community about the world's inability to address the vital global issues and deal with them effectively. The basic message of the WCED is that it is urgent that the world undertakes extensive social changes needed to correct the course of development. If this is not done, the world runs the risk of undermining its children's fundamental right to a healthy, life-enhancing environment.⁸² The most urgent task of the WCED, therefore, was to persuade nations of the need to return to multilateralism, to begin a renewed search for multilateral solutions and to adopt a restructured international economic system of co-operation. Nations had to be convinced of the need for a sustainable course of development,⁸³ development that ensures that the needs of the present are met without compromising the ability of future generations to meet their own needs.⁸⁴

⁸²It is worth noting that the WCED report focuses on humans and not on the environment. Other disciplines have taken the environment as their focal point in dealing with the issue of sustainability. For example, see the discussion on ecosystem or biophysical and economic approaches to sustainable development later on in the Chapter.

⁸³When the terms of reference of the WCED were originally discussed in 1982, there was the feeling among some member states of the General Assembly that the WCED only consider environmental issues. This idea was not accepted due to the general consensus within the General Assembly that the environment does not exist as a sphere separate from human actions, ambitions and needs. There was also the tendency to limit development to 'what poor nations should do to become richer.' In an attempt to effectively deal with the issues raised, the WCED took the view that '... environment is where we all live and development is what we all do in attempting to improve our lot in that abode.' As a result links between poverty, inequality and environmental degradation formed a major theme in the WCED's analysis and recommendations.

⁸⁴World Commission on Environment and Development. *Our Common Future* (London: Oxford University Press, 1987) [hereinafter *Our Common Future*].

2. Sustainable Development and International Law

Following the WCED report the first global attempt to come to some consensus in dealing with environmental and developmental issues was at the United Nations Conference on Environment and Development (UNCED) at Rio de Janeiro, Brazil, June 3-14, 1992 (Rio Conference). The aims of the Rio Conference were, *inter alia*, to explore the root causes of environmental degradation and environmentally unsustainable developments; prevent environmental degradation; and ensure the equitable sharing of resources on a global basis for humankind. In other words, the main task of the Rio Conference was to place the environment issue at the heart of economic policy and decision-making. At this conference, a Framework Convention on Climate Change was opened for signature.⁸⁵ The objective of the signatories was the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. A Biodiversity Treaty was also opened for signature, with the objective of protecting endangered species and ensuring the equitable sharing of the benefits flowing from the earth's biological diversity.⁸⁶

Three important soft-law agreements were also concluded: the Rio Declaration on Environment and Development;⁸⁷ the Statement of Forest Principles;⁸⁸

⁸⁵31 *ILM* 851 (1992).

⁸⁶31 *ILM* 822 (1992).

⁸⁷31 *ILM* 876 (1992).

⁸⁸Non- Legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of all Types of Forests, 31 *ILM* 882 (1992).

and Agenda 21.⁸⁹

None of these is legally binding, but they do reflect the consensus views of states that this and future generations have the right to equitably satisfy their developmental and environmental needs. Not only do they serve now as guidelines for national, regional and international action, but they also provide a basis for establishing the international legal framework to achieve sustainable development.

The legal instruments that emerged at the Rio Conference represent a mixed bag in terms of normative specificity. Some instruments are long and lofty on general principles and objectives, but short on specific normative details, while others are detailed.⁹⁰ This should not come as a surprise given the nature of the UNCED as a truly global diplomatic process and the sensitivity of the matter dealt with. Besides, any first concerted effort at laying the international normative foundations of sustainable development- a concept that is not only to redirect government policies, but in the end to operate also at the level of individual and corporate conduct- should rightly have been expected to result in both general rules and specific obligations.

Clearly, the world recognized that remedial policy responses to national and global concerns were local, partial and inadequate. Most policy discussions and the resulting

⁸⁹IUCN, "Agenda 21: A Programme of Action for Sustainable Development" reprinted in N. Robinson (ed.), *Agenda 21: Earth's Action Plan - IUCN, Environmental Policy and Law Paper No. 27* (Gland: Occana Publications, 1993).

⁹⁰Compare, for example, Articles 3 (Principles) and 4 (Commitments) of the Framework Convention on Climate Change.

responses tended to focus on symptoms of environmental damage rather than basic causes, and policy instruments tended to be ad hoc rather than designed for efficiency, fairness, and sustainability.⁹¹ As a result of these early perceptions of environmental damage, however, much was learned about policies and instruments for attacking pollution and insights into these policies were used to help in dealing with the more fundamental and intractable environmental issues identified above. This has led to attempts to apply the concept of sustainability to specific disciplines.⁹² The concept of sustainability can, to some extent, be expressed objectively by way of a system of indicators. Nevertheless it is essentially a normative concept rooted in three value judgements.

3. Ecosystem or Biophysical Approaches to Sustainability

First, sustainability postulates the right of people alive in the future to the resources of our earth, making inter-generational equity a guiding principle for political action. This ruling may be intuitively reasonable but it is not compelling for everyone. So why would future generations be accorded the same claims to the earth's resources as the people of today? Of the arguments that can be put forward in favor of inter-generational equity, the principle of reciprocity between generations is the most important. Awareness that a

⁹¹For example, in the 1970's emphasis centered on end-of-pipe pollution control, which, while a serious problem, was actually a symptom of expanding populations, and inefficient technologies that fueled exponential growth of material and energy use. See *Our Common Future* at 37-38.

⁹²One such area is the corporate world. Corporate and organizational approaches to sustainability will not be discussed in this thesis as they are beyond its scope. For some discussion in this area, see C. Frankel, *A Short History of Corporate Environmentalism in Earth's Company: Business, Environment and the Challenge of Sustainability* (Gabriola Island, BC: New Society Publishers, 1998). See also S. Hart, "Beyond Greening: Strategies for a Sustainable World" (1997). Harvard Business Review. 199.

generation should not use up what it inherited – as the principle of reciprocity demands – is also accompanied by enlightened self-interest, making this rule seem plausible when thinking of one's own children and grandchildren. How then can present generations utilize and still leave behind adequate resources for future generations? The ecosystem argument offers some ideas.

The ecosystem or biophysical approach to sustainability is based on a scientific perspective employed by conservation biologists. The starting point for this approach is that the current pattern of environmental degradation found around the world has evolved because humans see nature narrowly and have not yet learned to develop an ecological perspective to acknowledge landscape patterns, and to fit in with nature as members and citizens.⁹³ Although there is considerable variation in detail, there is remarkable consistency in the history of resource exploitation: resources are inevitably overexploited, often to the point of collapse and extinction. It is suggested that such consistency is due to the following common features: (i) Wealth or the prospect of wealth generates political and social power that is used to promote unlimited exploitation of resources. (ii) Scientific understanding and consensus is hampered by the lack of controls and replicates, so that each new problem involves learning about a new system. (iii) The complexity of the underlying biological and physical systems precludes a reductionist approach to management. Optimum levels of exploitation must be determined by trial

⁹³R. E. Grumbine, "The biology of thinking like a mountain." in *Ghost bears: Exploring the Biodiversity Crisis* (Washington DC: Island Press, 1992).

and error. (iv) Large levels of natural variability mask the effects of over exploitation. Initial over exploitation is not detectable until it is severe and often irreversible.⁹⁴

It may be difficult to foretell the effects of this potential destruction, but it is clear that extinction does matter, and for at least two reasons. As the primary agents of species loss, humans have the power to stop most extinction from occurring. The second reason may be more immediately compelling: people are utterly dependent on biological diversity. Food, water, and all the necessities of life are derived ultimately from functioning ecosystems. Lose enough species from any system and it is likely to become dysfunctional in unpredictable ways. To the conservation biologists therefore, what we are now experiencing is the biodiversity crisis: inadequate nature reserves, human overpopulation and non-sustainable resource consumption, species extinction, endangered ecosystems, impending rapid climate change, and imperfect laws. In order to deal with this crisis and to prevent any future recurrence, environmental management and conservation efforts should be based upon concern for the whole ecosystem (biodiversity) and not just the plants and animals that inhabit them.⁹⁵

⁹⁴D. Ludwig, *et al.*, "Uncertainty, Resource Exploitation, and Conservation: Lessons from History" (1993) 260 Science. 171.

⁹⁵Biodiversity, according to the U.S. Office of Technology Assessment, is "the variety and viability among living organisms and the ecological complexes in which they occur." There is, however, more to biodiversity than the number of species and kind of ecosystems. Ecosystems have three primary attributes that are interdependent: composition, structure and function.

Ecosystem *components* are the inhabiting species in all their variety and richness. Many different species, gene-pool abundance, and unique populations are what most people think of when they hear the term "biodiversity". But there is more to consider.

Ecosystem *structure* refers to the physical patterns of life forms within the ecosystem. For example, an ecosystem dominated by old, tall trees has a different structure than one comprised of short trees.

Environmental management and conservation that is sustainable would therefore, have to be based on the following presumptions. Firstly, materials from the earth's crust cannot systematically accumulate in the biosphere without adversely affecting it. Secondly, human made products should not be allowed to accumulate in the biosphere. Thirdly, the ecological capacity of any ecosystem should not be systematically deteriorated. And fourthly, there should be an efficient and fair distribution of resources.⁹⁶

The major problem that faces conservation biologists in their approach to sustainability is that nature is fundamentally erratic, discontinuous and unpredictable. It is almost impossible to predict these changes and therefore very difficult to determine that an ecosystem has deteriorated. In order to address this problem, conservation biologists advocate the use of the "precautionary principle".⁹⁷

The precautionary principle, a presumption of environmental risk, is an expression of environmental sanctity, which requires prevention, and reduction of environmental

Ecosystem functions are hard to see in action, but "without the part of the carbon cycle where small invertebrates, fungi, and micro-organisms work to break down wood fiber, the downed logs in an ancient forest would never decay." To achieve sustainability in environmental management or conservation, all the above attributes of biodiversity have to be taken into account. Conservation biologists argue that conservation efforts would be structured differently from the way they are today if humans proclaim preserves based on how they work ecologically and not on how they look aesthetically as is the current practice. See J.K James & E. Schneider, "Embracing Complexity: The Challenge of the Ecosystem Approach"(1994) 20:3 Alternatives 32 at 36.

⁹⁶D. Bodansky, "Scientific Uncertainty and the Precautionary Principle" (1991) 33 Environment 4 at 24.

⁹⁷The principle has been adopted in several declarations including the Rio Declaration on Environment and Development, Principle 15, UN Doc. A/CONF.151/5/Rev. 1 (June 13, 1992), reprinted in 31 *ILM* 874 (1992): "In order to protect the environment, the precautionary approach shall be widely applied by States 'according to their capabilities'. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost effective measures to prevent environmental degradation."

impacts even in the absence of scientific or legal proof of adverse effect or risk of harm.⁹⁸ It places the onus of establishing the lack of environmental risk upon those who advocate development. In cases where scientific uncertainty exists, as to whether an activity or substance could have an adverse effect, the principle requires that it should be considered to be as hazardous as it could possibly be.⁹⁹ The principle of “precautionary action” requires the prevention of acts that cumulatively threaten to overwhelm the capacity of ecosystems, even in the absence of damage or risk caused by the particular activity.¹⁰⁰

The principle departs from the traditional concepts of legal and scientific proof. It conflicts with the fundamental principle in common law systems that one may act without limitation unless there is a law that restricts the activity.¹⁰¹ If applied to past actions, it would have the effect of reversing the burden of proof upon defendants to show that their activities did not contribute to environmental harm. Because of these characteristics, it is a difficult principle to incorporate into law, particularly domestic civil or regulatory law.¹⁰² The principle would be most appropriately applied in the context of

⁹⁸B. Pardy, *Environmental Law: A guide to Concepts* (Toronto: Butterworths, 1996).

⁹⁹J. Camron and J. Abouchar, “The Precautionary Principle: A Fundamental Principle of Law and Policy for the Protection of the Global Environment”, (1991) 14 Boston Col. Int’l & Comp L. Rev. 1.

¹⁰⁰*Ibid.* “Precautionary action requires reduction and prevention of environmental impacts irrespective of the existence of risks. This, however, must not be understood in the sense that aspects of risks are not relevant; the crucial point is that environmental impacts are reduced or prevented even before the threshold of risks is reached. This means that precautionary action must be taken to ensure that the loading capacity of the environment is not exhausted...” L. Gundling, “The Status in International Law of the Principle of Precautionary Action”(1990) 5 Int’l J. Of Estuarine and Coastal Law. 23 at 26.

¹⁰¹*Supra*, note 96 at 20.

¹⁰²*Ibid.*

setting regulatory standards¹⁰³ and in the environmental assessment process.¹⁰⁴ It would have the effect of establishing a lower threshold for restricting activity.¹⁰⁵

4. Economic Approaches to Sustainable Development

Second, another question can be derived from the sustainability debate: What environment do human beings want? Two arguments, both influenced by economics, are put forward in this discussion. The first assumes the sustainability of nature and can be called weak sustainability. Adherents of that position argue that future generations will receive what amounts to an affluence package, consisting of a constant or increasing sum of material and natural capital.¹⁰⁶ If the natural foundations of life were harmed – diminishing natural capital - sustainability would be achieved through increased production of material assets. According to this way of seeing things, even irreversible damage such as the destruction of primal forests or rare species of animals would be sustainable so long as the capital thus produced created corresponding affluence. In the extreme case, a world without nature would come into being where climate, the water cycle, and important raw materials were produced artificially. This view of economic resources is narrow and cannot be maintained.

There is now an increasing number of economists who recognize that there are only very limited possibilities of replacing nature's contributions to well being by material capital,

¹⁰³*Ibid.*

¹⁰⁴*Ibid.*

¹⁰⁵*Ibid.*

¹⁰⁶H. Daly, *Beyond Growth: The Economics of Sustainable Development* (Boston: Beacon Press, 1996) [hereinafter *Beyond Growth*].

so that at least irreversible damage to the environment must be avoided. Adherents of this second position talk of constant natural capital for future generations, no matter how great the manufactured components of affluence. They argue that the entire concept of economic growth (defined as increasing material consumption) must be rethought, especially as a solution to the growing host of interrelated social, economic, and environmental problems. What is needed is real economic and social development¹⁰⁷ and an explicit recognition of the inter-relatedness and interdependence of all aspects of life on the planet. This entails a move from an economics that ignores this interdependence to one that acknowledges and builds upon it. To this group of economists, sustainability calls for the integration of economics and the other sciences and an economics that is fundamentally ecological in its basic view of the problems facing humanity.

Ecology and economics have been pursued as separate disciplines through most of the 20th century and each has addressed separate issues, utilized different assumptions to reach answers, and supported different interests in the policy process.¹⁰⁸ Ecological economics arose during the 1980s among a group of scholars who realized that improvements in environmental policy and management and protecting the well-being of

¹⁰⁷This has been defined as 'qualitative improvement without growth in resource throughput'. See R. Constanza *et al.*, *An Introduction to Ecological Economics* (Baco Raton, Florida: St. Lucie Press, 1997) [hereinafter *Ecological Economics*].

¹⁰⁸This despite the fact that each has certainly borrowed theoretical concepts from the other and shared patterns of thinking from physics and other sciences. Individual scholars kept trying to introduce the issues addressed by natural science into economics, but economists as a group systematically rejected them. In their popular manifestations as environmentalism and economism, these disciplines became juxtaposed secular religions preventing the collective interpretation and resolution of the numerous problems at the intersection of human and natural systems. See *Ecological Economics* *supra* note 107.

future generations were dependent on bringing these domains of thought together.¹⁰⁹

Ecological economics is not a single new paradigm based in shared assumptions and theory. Rather, "...it is essentially a rethinking of the relationship between the world and humans' role in it, and a working out of the implications of a new way of thinking for how we manage our lives and our planet."¹¹⁰

According to ecological economists, the basic global problems for which we need innovative policies and management instruments include unsustainably large and growing human populations that exceed the carrying capacity of the earth. This leads to highly entropy-increasing technologies that deplete the earth of its resources and whose un-assimilated wastes poison the air, water, and land conversion that destroys habitat, increases soil erosion, and accelerates loss of species diversity.¹¹¹ More specifically, the three basic problems are allocation, distribution and, scale.

¹⁰⁹Numerous experiments with joint meetings between economists and ecologists were held, particularly in Sweden and the United States, to explore the possibilities of working together (Jansson 1984; Constanza and Daly 1987). Meanwhile, there was also growing discontent with the deficiencies in the system of national accounts that generates measures of economic activity such as gross domestic product, while ignoring the depletion of natural capital through the mining of resources such as petroleum and through environmental degradation (Huetting 1980). Economists and ecologists joined to encourage the major international agencies to develop accounting systems that included the environment (Ahmad, El Serafy, and Lutz 1989). Buoyed by such initial efforts, the International Society for Ecological Economics (ISEE) was formed during a workshop of ecologists and economists held in Barcelona in late 1987, and the journal, *Ecological Economics*, was initiated in 1989.

¹¹⁰*Supra*, note 107 at 49.

¹¹¹Entropy is defined as the 'used-up-ness' of matter or energy. Therefore if something has low entropy, it has available or still useful matter or energy. High entropy refers to unavailable or used up matter or energy. For a more detailed discussion on this see *Beyond Growth*, *supra*, note 106.

Allocation refers to the relative division of the resource flow among alternative product uses, e.g. how much goes to production of cars, to shoes, clothes, and so on. A good allocation is one that is efficient, i.e. that allocates resources among product end-uses in conformity with individual preferences as weighted by the ability of the individual to pay. The policy instrument that brings about an efficient allocation is relative prices determined by supply and demand in competitive markets.¹¹²

Distribution refers to the relative division of the resource flow, as embodied in final goods and services, among alternative people. How much goes to A, to B, to others and to future generations? A good distribution is one that is just or fair, or at least one in which the degree of inequality is limited within some acceptable range. The policy instrument for bringing about a more just distribution is transfers, such as taxes and welfare payments.¹¹³

Scale refers to the physical volume of the throughput, the flow of matter or energy from the environment as low-entropy raw materials and back to the environment as high-entropy wastes. It may be thought of as the product of population times per capita resource use. It is measured in absolute physical units, but its significance is relative to the natural capacities of the ecosystem to regenerate the inputs and absorb the waste outputs on a sustainable basis.¹¹⁴

¹¹²*Supra.* note 106 at 65.

¹¹³*Ibid.*

¹¹⁴*Ibid.*

Neoclassical economics deals extensively with allocation, secondarily with distribution and not at all with scale.¹¹⁵ Ecological economics deals with all of these, and accepts much of neoclassical theory regarding allocation. Its emphasis on the scale question is made necessary by the neglect of it in standard economics making it the biggest difference between ecological economics and neoclassical economics.

According to ecological economists, the most useful indicator of the magnitude of our environmental predicament is population times per capita resource consumption. This is the scale of the human economic subsystem with respect to that of the global ecosystem on which it depends, and of which it is a part.¹¹⁶ The global ecosystem is the source of all material inputs feeding the economic subsystem, and is the sink for all its wastes.

Population times per capita resource consumption is the total flow -throughput- of resources from the ecosystem to the economic subsystem then back to the ecosystem as waste.¹¹⁷ There was once a time when the economic subsystem was small relative to the size of the global ecosystem. Today, the economic subsystem is very large relative to the global ecosystem. The global ecosystem's source and sink functions have large but limited capacity to support the economic subsystem. The imperative therefore is to maintain the size of the global economy to within the capacity of the ecosystem to sustain it.

¹¹⁵*Beyond Growth, supra*, note 106 at 80.

¹¹⁶*Ecological Economics, supra*, note 107 at 6.

¹¹⁷*Ibid.*

Seen from this viewpoint, it seems unlikely that the world can sustain a doubling of the material economy,¹¹⁸ let alone the WCED's called for "five-to ten-fold increase."¹¹⁹ Since the global ecosystem, which is the source of all the resources needed for the economic subsystem, is finite and has limited regenerative capacities, throughput growth is not the way to reach sustainability. For the ecological economists, the path to sustainable future gains in the human condition will be through qualitative improvement rather than quantitative increases in throughput.¹²⁰

Improvement in human welfare can come about by pushing more matter or energy through the economy or by squeezing more human want satisfaction out of each unit of matter or energy that passes through: throughput increase is growth and efficiency increase is development.¹²¹ Growth is destructive of natural capital while development or qualitative improvement is not at the expense of natural capital. When explained in these terms, it is evident why sustainability has had a hard time breaking into economic theory.¹²² Sustainable development necessarily means a radical shift from a growth

¹¹⁸It is expected that the world's population will double in this century and with this doubling is the expected corresponding increase in material consumption. See *Our Common Future* at 50.

¹¹⁹*Our Common Future* at 51.

¹²⁰*Supra*, note 107 at 7.

¹²¹*Supra*, note 106 at 102.

¹²²The economics of the past fifty years has been overwhelmingly devoted to economic growth. The term "economic growth" has in practice meant growth in gross national product (GNP). All problems are to be solved or at least ameliorated, by an ever-growing GNP. It is the only magnitude in all of economics that is expected to grow forever, never to reach an economic limit at which the marginal costs of further growth become greater than the marginal benefits. In microeconomics every enterprise has an optimal scale beyond which it should not grow. But when we aggregate all microeconomic units into the macro economy, the notion of an optimal scale, beyond which further growth becomes anti-economic, disappears completely. See *Beyond Growth*.

economy and all it entails to a steady-state economy, certainly in the North and eventually in the South as well.¹²³ As stated earlier, growth as used here refers to an increase in the physical scale of the matter or energy throughput that sustains the economic activities of production and consumption of commodities. In a steady-state economy, the aggregate throughput is constant, though its allocation among competing uses is free to vary in response to the market. Since there is of course no production and consumption of matter or energy itself in the physical sense,¹²⁴ the throughput is really a process in which low- entropy raw materials are transformed into commodities and then eventually into high-entropy wastes.¹²⁵ Therefore, throughput begins with depletion and ends with pollution. Growth is quantitative increase in the physical scale of throughput. Qualitative improvement in the use made of a given scale of throughput, resulting either from improved technical knowledge or from a deeper understanding of purpose is called “development”.¹²⁶ A steady-state economy therefore can develop, but cannot grow, just as the planet earth of which it is a subsystem, can develop without growing.

5. International Equity

Third, the concept of sustainability contains another necessary dimension alongside the ecological one: the dimension of international justice. Laying claim to equal rights to unimpaired nature should not be restricted to future generations. Global equality of

¹²³*Beyond Growth*, *supra* note 106 at 27.

¹²⁴The theory of thermodynamics states that matter cannot be created or destroyed. It can only be transformed.

¹²⁵*Supra*, note 106 at 31.

¹²⁶*Ibid.*

opportunity should also be viewed as crucial for each generation. Every human being has the same right to an intact environment. Also everyone has an equivalent right to globally accessible resources so long as the environment is not over-exploited. This dimension – international equity – lays the foundation for achieving a balance of interests between developed and the developing countries.

The major objective of development can be said to be the satisfaction of human needs and aspirations. In spite of the tremendous economic growth in the last century, this objective is not being met in a large population of developing countries. On the one hand most of the socio-economic benefits have been limited to the developed or industrial countries resulting in the affluent 20 per cent among the world's population consuming about 80 per cent of the planet's resources.¹²⁷

On the other hand, developing countries, with about three-quarters of the world's population, are living in underdevelopment and poverty. Poverty and environmental degradation are linked in an intimate and complex way. The poor live in and suffer from degraded environments, they create environmental degradation from increased resource consumption because their poverty directs them in the interests of their immediate needs to over-use and destroy resources on which their future depends. The deteriorated environment in turn intensifies their consumption needs and condition of poverty and underdevelopment.

¹²⁷*Supra*, note 72.

The United Nations Commission on Trade and Development (UNCTAD) category of the world's poorest countries –Least Developed Countries (LDCs) –amounts to 47 states. In 1981 there were 31.¹²⁸ These countries with a total population of about 500 million in 1992 only contributed 0.4% to world trade. If the next category is added, a total of 130 states account for just 3.6% of world exports.¹²⁹ That means that two-thirds of all the countries in the world are of virtually no significance for the global market. They exert almost no influence on what happens there, but are highly dependent on that market for their imports and exports. Many of the poorest countries have little more to offer than raw materials and agricultural produce, and foreign exchange earnings are often dependent on exporting one, two or three products.

A marginal position in the world economy and high indebtedness go hand in hand. According to the World Bank, in 1995, 33 of the 60 low-income countries had high debts.¹³⁰ All of them belong in the category of those countries that have no influence on the movements of the world market. The financial stability of the poor countries is further threatened by new trends in the global market. International trade in goods is losing out to markets for capital and electronic services. Financially weak countries have two problems to deal with. Firstly, they are hard hit by foreign exchange fluctuations due to speculation on the derivatives market. Secondly, their economies lack the capital for participation in

¹²⁸UNCTAD List of Least Developed Countries 1994.

¹²⁹In 1992, total world exports amounted to US\$3,662 billion. These 130 countries only accounted for US\$133 billion. Almost the whole of world trade thus takes place between the industrial nations and 20 or so threshold countries and the oil states.

¹³⁰They are also termed severely indebted low-income countries (SILICs). See World Bank: World Development Indicators 2002, online: World Bank Homepage <<http://www.worldbank.org/prospects/gdf2001/vol1-pdf/s/c>> (date accessed: 6 January 2002).

the symbolic economy of communications networks and data banks with investments of billions.

In their efforts to overcome poverty and dependence the poor countries are faced with conflicting objectives. For what should they strive? Standard economic thinking views the greatest possible integration in the world market as the best, even the only way for a country which wants to develop economically and socially. But that is questionable. Is the volume of world trade unlimited? Is there room for everyone struggling to enter a sustainable market? What happens if globalization of flows of raw materials and transportation declines because such flows are not compatible with protection of the global commons?

The WCED too has a suggestion. It calls for further economic expansion by the factor of 5 to 10 in order to improve the lot of the poor without having to appeal too much to the politically impossible alternatives of serious population control and the redistribution of wealth. Again the question is asked: is this viable? Can the world's resources support such economic expansion when the scale of the human economy is already unsustainable in the sense that it requires the consumption of natural capital? How much of this called for expansion can come from development and how much must come from growth? This question is not addressed by the WCED,¹³¹ but statements from the organization, indicate

¹³¹This has been one the criticisms of the WCED. See for example W. Fancis, *Sustainable Development and EIA in Alberta* (LL.M Thesis University of Calgary 1994)[unpublished].

that the WCED expects the lion's share of that factor of 5 to 10 to come from development, not growth.¹³²

The WCED may be too optimistic, a factor of 5 to 10 increase cannot come from development alone, and if it comes mainly from growth it will be devastatingly unsustainable. Therefore the welfare of the developing as well as the developed nations, depends much more on population control, consumption control and redistribution than on the technical fix of a 5-to 10-fold increase in total factor productivity.¹³³ There appears to be vast uncertainty on this critical issue of the scope for economic development from increasing efficiency. It has been argued that poor countries cannot cut per capita resource use; indeed they must increase it to reach a sufficiency, so their focus must be mainly on population control.¹³⁴ The general consensus appears to be that developed countries can cut both, and for those that have already reached demographic equilibrium the focus would be more on limiting per capita consumption to make resources available for transfer to help bring the developing countries up to sufficiency. Investments in the areas of population control and redistribution therefore increase in priority for development.¹³⁵

¹³²According to the Secretary of WCED, the link between growth and its impact on the environment has also been severed and the maxim for sustainable development is not limits to growth; it is the growth of limits.

¹³³Some authors have gone further and advocated for a decrease by the factor of 10 of consumption in developing countries. See W. Sachs et al., *Greening the North: A post-industrial blueprint for ecology and equity* (London: Zed Books: 1998).

¹³⁴See *Ecological Economics*, *supra* note 107.

¹³⁵Some have argued further that for certain countries, sustainable development will not be a realistic objective at all if sustainability is to mean drawing on the income rather than the capital of the natural resource base, and provided that development carries with it, -as it should -the

6. Summary

Never before has the degree of human influence on natural systems been so great, and never before have the risks associated with these actions been so severe. The decisions made now will have a significant impact on the environmental and economic health of current and future generations. Sustainable development is an important part of long-term strategic planning that attempts to make the economy and environment connection in an equitable manner.

Sustainable development has been criticized for appearing to mean anything to anybody. The term is said to have so many definitions that it has no meaning at all. This criticism is partially valid. There are numerous interpretations of sustainable development, but every major concept that encompasses human ideals, such as liberty or democracy, is subject to diverse interpretation. These broad interpretations do not undermine the importance or usefulness of these terms. Indeed, the definitions and interpretations of sustainable development reflect its extensive scope.

justified expectation of reaching and maintaining a certain minimum standard of social welfare commensurate with the notion of human dignity. Such views seem to be centered around the idea of 'a right to develop'. However, this 'right' does have certain limitations inasmuch as it cannot be asserted at the expense of the community or even at the expense of neighbouring States whose prospects may be jeopardized. For example, a State should not be allowed, in the name of development, to proceed to applications of nuclear energy in such a way as to harm the environment and imperil human life. In the process of advocating sustainable development one has to examine the rights and responsibilities of States, both bilaterally and in relation to the international community as a whole. See G. Handl, "Sustainable Development: General rules versus Specific Obligations" in Lang, W., ed., *Sustainable Development and International Law* (London: Boston: Graham & Trotman/M. Nijhoff, 1995).

Sustainable development or sustainability serves as a comprehensive framework for the formation of policies that integrate environmental, economic, and social issues. It offers an alternative to traditional decision-making policies and values, recognizing that the natural systems of our environment are not only critical to basic economic needs, but also to quality of life. It is a term that has distinct meaning but is flexible enough to apply to the broad base of sectors that it encompasses.

Sustainable development is positive socioeconomic change that does not undermine the ecological social systems upon which communities and societies are dependent. Its successful implementation requires integrated policy, planning and social learning processes; its political viability depends on the full support of the people it affects through their governments, their social institutions and private activity. The sustainable society is one that lives within the self-perpetuating limits of its environment. That society is not a “no growth” society... It is rather, a society that recognizes the limits of growth and looks for alternative ways of growing.¹³⁶

¹³⁶James Coomer. “Quest for a Sustainable Society” (Oxford: Pergammon Press, 1979) 75.

CHAPTER THREE: SUSTAINABILITY CRITERIA

As discussed in Chapter Two, development and the environment are not necessarily conflicting terms. Problems arise when the linkage between the two is managed unsustainably. Economic growth cannot be sustained if it continually undermines the healthy functioning of the Earth's natural systems or exhausts planetary natural resources. By the same token, only healthy economies can generate the resources necessary for investment in environmental protection. The recognition of the critical link of the economy to the environment and social well being is the cornerstone of sustainable development.

While sustainability may be generally accepted as an effective policy for bringing about and maintaining some kind of harmony between human development and nature, its implementation imposes significant legal challenges. The WCED, being well aware of these difficulties and in an attempt to help bring about the necessary changes, appointed the Experts Group on Environmental Law to develop legal principles for environmental protection and sustainable development.

The general principles concerning natural resources and environmental interferences recommended by the WCED Legal Experts Group (Principles 1-8) have in common that they are applicable to all instances of the use of a natural resource or of an environmental interference in any part of the world. It follows that these general principles do not merely apply in areas beyond the limits of national jurisdiction or in the transboundary context, but also in the entirely domestic, an area which according to traditional

international law, is subject to the exclusive jurisdiction of States. It is from these Principles that criteria for assessing sustainability will be developed in this chapter.¹³⁷

1. Fundamental human right

The first principle stipulates the fundamental right of every individual human being to an environment adequate for his or her health and well being. Although the environment to which the fundamental right relates clearly compromises the environment in which human beings live, it also is intended to compromise those parts of the earth and the surrounding sphere which hold important natural resources for man (e.g. marine waters) or which, when disturbed or degraded, may eventually detrimentally affect areas normally inhabited by man (e.g. rain forests or the ozone layer).

The requirement that the environment must be adequate for (human) health and well being is extremely vague. In any case both physical and mental health and well being are to be protected and promoted. The adjective “adequate” makes clear that there are limits to the protection of the environment for the purpose of promoting the health and well being of human beings. Indeed, those limits may to some extent even be dictated by the need to promote the health or well being of human beings (e.g. by food production or housing). Apart from that, the determination of the adequacy of the environment for the health and well being of human beings will depend to a considerable extent on many regional or local factors such as the nature of the environment concerned, the kind of use

¹³⁷The full text of the Legal Principles is attached as an appendix to this thesis.

made of it, the means at the disposal of the public authorities and the population, and the expectation of the human beings themselves.

The fundamental human right to an adequate environment implies at least the existence of an obligation on the part of states, to adequately protect the environment for the benefit of individual human beings (substantive human right). Also implied is the obligation to grant to such individual human beings the procedural legal means necessary to protect their interests in an adequate environment (procedural human right) against infringements by the state or by other persons or entities such as private companies.

In an attempt to translate the principle of a fundamental human right as formulated in Principle 1 into national or domestic legislation, countries have to be aware, firstly, that the direct and immediate object of this principle is the maintenance and or restoration of an adequate environment.¹³⁸ Secondly, the formulated fundamental right refers to the more concrete notion of health as an interest to be protected.

¹³⁸This can be contrasted with Principle 1 of the 1972 UN Declaration on the Human Environment which provides:

“Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well being....”

This principle can be said to have as its direct and immediate object “freedom, equality and adequate conditions of life”, putting the requirement of an adequate environment merely in second place.

2. Conservation for present and future generations

Under the second principle, the environment and natural resources are to serve the needs of both present and future generations.¹³⁹ The principle obliges states to manage the environment and natural resources for the benefit of present generations in such a way that they are held in trust for future generations.¹⁴⁰ This implies, in the first place, a basic obligation for nations to conserve options for future generations by maintaining, to the maximum extent possible, the diversity of the natural resource base. It requires a management of natural resources or the environment in such a manner that they may yield the greatest sustainable benefit to present generations while maintaining their potential to meet the needs and aspirations of future generations.

Conservation of the diversity of the natural resource base for the benefit of future generations is warranted as the possibilities to develop substitute products or to improve production and or extraction technologies are not unlimited. Future generations may otherwise only be able to obtain the same benefits at considerably higher costs.

The second basic obligation for nations following from the duty to hold the natural heritage of mankind in trust for future generations concerns the prevention or abatement of pollution. This includes forms of degradation of natural resources or the environment,

¹³⁹This principle purports to give effect to the statement in the Preamble of the 1972 UN Declaration on the Human Environment that: "To defend and improve the human environment for present and future generations has become an imperative goal for mankind..."

¹⁴⁰The word "trust" here is used in reference to the ethical and moral obligations to use resources in such a way that future generations do not inherit depleted stocks and a deteriorated environment. It does not refer to the legal trust.

which would reduce their range of uses or which could leave future generations with enormous financial burdens to clean up the environment.

Although this principle places special emphasis on the obligation to conserve natural resources and the environment for the benefit of future generations, it is important to keep in mind that such an obligation also exists for the benefit of present generations.¹⁴¹

3. Ecosystems, related ecological processes, biological diversity, and sustainability

Principle 3 places three obligations on states with regard to ecosystem management.

Firstly, countries are obliged to maintain ecosystems, i.e. systems of plants, animals and micro-organisms together with the non-living components of their environment, and related ecological processes essential for the functioning of the biosphere in all its diversity. In particular those that are important for food production, health and other

¹⁴¹Numerous references to the need to conserve the natural heritage of mankind for the benefit of present and future generations also are to be found (usually in the preamble) in many international agreements concluded after the adoption of the 1972 UN Declaration on the Human Environment, e.g. in:

- 1972 Paris Convention concerning the Protection of World Cultural and National Heritage;
- 1973 Washington Convention on International Trade in Endangered Species of Wild Fauna and Flora;
- 1976 Barcelona Convention for the Mediterranean Sea;
- 1976 Apia Convention on the Conservation of Nature in the South Pacific;
- 1977 Geneva Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques;
- 1978 Kuwait Regional Convention.

aspects of human survival and sustainable development. In the 1980 World Conservation Strategy (WCS)¹⁴² the main ecosystems involved are referred to as life-support systems.

The most important of those life-support systems are agricultural systems, forests and coastal and fresh water systems.¹⁴³ Agricultural systems or land suitable for agricultural purposes is a relatively scarce natural resource that is of crucial importance for the world's production of food. Forests are of vital importance for people because they supply timber and other products, and because they regulate local regional climates and retain soil cover on site and protect areas downstream from excessive floods and other harmful fluctuations in stream-flow. Coastal wetlands and shallows provide nutrients and nurseries for most of the world's fisheries. Coral reefs also provide habitats for fish. Similarly, many fresh water wetlands and flood plains support important inland fisheries, while flood plain agriculture has long relied on the regular supply of nutrients by floodwaters.

The life-support systems just mentioned might be adversely affected in many ways. Agricultural areas may be lost by being built on or by the erosion of the soil as a result of poorly managed human activities. Such degradation of the land may also involve the destruction of habitats of beneficial insects and other animals, such as crop pollinators and the predators and parasites of pests. Deforestation and over grazing may lead to loss of soil, silting up of rivers, hydroelectric facilities or irrigation systems or may give rise

¹⁴²IUCN, *World Conservation Strategy* (Gland Switzerland: Mitchell Beazley/IUCN/UNEP/WWF, 1984). online: IUCN Homepage <<http://www.iucn.org>> (date accessed: 5 February 2002).

¹⁴³*Ibid.*

to excessive flooding. Habitat destruction or pollution may adversely affect coastal or fresh water systems.

It follows from the foregoing that protection of the life-support systems and the related essential ecological processes requires rational planning and allocation of uses and high quality management of those uses designed to prevent, inter alia, degradation of soil and habitats, uncontrolled deforestation and pollution.

Secondly, the article contains a special obligation for countries to maintain maximum genetic diversity. As postulated in the WCS, preservation of genetic or biological diversity is not only imperative on ethical grounds, but also as:

“[A] matter of insurance and investment- necessary to sustain and improve agricultural, forestry and fisheries production, to keep open future options, as a buffer against harmful environmental change, and as the raw material for much scientific and industrial innovation.”

Indeed the preservation of the genetic material contained in both domesticated or wild plants and animals is essential for breeding programs designed to improve yields, nutritional quality, flavor, durability, pest and disease resistance or responsiveness to different soils and climates. Preservation of genetic diversity is essential for the supply of food, as well as for the production of medicines or other pharmaceutical products. Many species, moreover, are useful for scientific research, whether as experimental material or as providers of clues to technical innovations.

In order to preserve maximum biological diversity measures must be taken against destruction of habitats, over-exploitation of living resources and adverse effects on native species caused by the introduction of exotic species. Apart from these measures of on-site preservation, measures of off-site preservation must be taken in the form of timely collection of genetic material and its protection in banks, or plantations, zoos, botanic gardens and aquaria.

The third obligation that Principle 3 places on countries is that in the exploitation of living natural resources and ecosystems the principle of optimum sustainable yield must be observed. This means that a living natural resource or ecosystem must only be utilized in such a manner and to such an extent that benefits from the resource will be provided indefinitely. If this Principle is not obeyed the resource will diminish or will even be extinguished.

Thus in the case of aquatic animals, over-fishing must be prevented. Over-exploitation of wild plants and animals of the land or of such ecosystems as grazing lands (through overstocking or uncontrolled grazing) or forests and woodlands (through uncontrolled deforestation) must also be avoided. In order to arrive at a sustainable level of an exploited living natural resource or ecosystem it will, therefore, be necessary to determine the productive capacity of the living natural resource or ecosystem concerned. It should then also be borne in mind that, in the case of a species, the productive capacity will not only depend on the biology of the species but also on the quality of the ecosystems that support it.

It should be noted that the concept of optimum sustainable yield instead of maximum sustainable yield has been used as a yardstick to achieve and maintain sustainable utilization of a living natural resource or ecosystem. Regulatory measures to achieve or maintain exploitation of a species below the optimum sustainable yield level may include restrictions of the total take, the number of persons, vessels or other units allowed to participate in the exploitation and of the times (closed season) and places (protected areas). They also may include prohibitions or restrictions of the use of certain methods and equipment. Another important means to control the exploitation of certain plants or animals or parts or derivatives thereof may consist in trade and marketing restrictions.

4. Environmental standards and monitoring

Principle 4 stipulates that states shall establish specific environmental standards, i.e. concrete numerical or technical standards aimed at preventing or abating detrimental interferences with natural resources or the environment. These specific environmental standards are an important tool for the conservation of natural resources and the environment as they provide concrete yardsticks for both users and preservers of natural resources and or the environment. These standards may take various forms depending on local, regional and sometimes even global conditions as well as preferred functions of the natural resources or environment concerned.

Environmental quality standards are standards which prescribe the minimum or maximum permissible level of a certain substance or physical effect in a given part of the environment (such as the soil, water or space) which at any given moment must be met, or as the case may be, must not be exceeded.

Emission or discharge standards prescribe the maximum permissible release of a certain pollutant from a given source (e.g. a dwelling, a certain type of industry, a means of transport or a municipal purification plant) to a certain part of the environment under specified conditions.

Technological standards lay down prescriptions for technologies or operations (e.g. production, storage or transport equipment, facilities and or operations) which may involve the release of pollutants.

Product standards specify technical conditions regarding the composition of certain products that may otherwise unduly affect the quality of certain natural resources and or the environment.

In principle, all types of standards ought to be set in such a way that environmental quality standards are attained or maintained.

Under Principle 4, states shall also establish systems for the collection and dissemination of data and regular observation of natural resources and the environment. This is intended to permit adequate planning of the use of natural resources and the environment, to allow for the early detection of interferences with natural resources or the environment and ensure timely intervention. Reliable systems for the collection and dissemination of data will also facilitate the evaluation of conservation policies and methods.

5. Assessment of planned activities

The duty provided for in the principle of assessment of planned activities is of vital importance in order to prevent significant interferences with natural resources or the environment. It requires states, before commitments or irrevocable decisions are made, to assess or require the assessment of the nature and extent of effects of planned activities on natural resources or the environment.

Principle 5 merely lays down an obligation in principle for states to assess or require the assessment of the potential detrimental effects of planned activities on the use of natural resources or on the environment. It does not give any information on how the assessment is to take place in practice. On this point guidance is provided by certain conclusions relating to environmental impact assessments contained in Chapter C of the 1981 United Nations Environment Programme (UNEP) Conclusions of the Study on the Legal Aspects concerning the Environment related to Offshore Mining and Drilling within the Limits of National Jurisdiction.¹⁴⁴ According to Conclusion No. 8:

“The [environmental impact] assessment should cover the effects of operations on the environment, wherever such effects may occur. It should when deemed appropriate contain the following:

¹⁴⁴These conclusions were reached by the UNEP Working Group of Experts on Environmental Law and were subsequently endorsed by the UN General Assembly in its Resolution No. 37/27 of March 24 1983 on the International Co-operation in the Field of the Environment.

- a description of the geological boundaries of the areas within which the operations are to be carried out;
- a description of the initial ecological state of the area;
- an indication of the nature, aims and scope of the proposed operations;
- a description of the methods, installations and other means to be used;
- a description of the foreseeable direct and indirect long-term and short-term effects of the operations on the environment, including fauna, flora and the ecological balance;
- a statement setting out the measures proposed to reduce to the minimum the risk of damage to the environment from carrying out the operations and, in addition, possible alternatives to such measures;
- an indication of the measures to be taken for the protection of the environment from pollution and other adverse effects during and at the end of the proposed operations; and
- a brief summary of the assessment that may be easily understood by a layman.”

In addition to the above requirements, an environmental impact assessment should also specify the types of project, which are in principle subject, or eligible to become subject, to the assessment requirement, as well as any exceptions that exist.

6. Timely information, access and due process

Principle 6 is explicitly concerned with the position of natural or legal persons¹⁴⁵ and provides for two main duties. One duty is to inform all persons by appropriate means in time of planned or, as the case may be, already initiated activities, which may significantly “affect their use” of a natural resource or their environment. The other duty consists in granting the persons concerned a right of access to and due process in administrative hearings concerning the granting of licenses for proposed activities. Such persons are then enabled to raise objections and to influence the conditions under which the administrative authorities may grant permission for the proposed activities. They should also be given the possibility to appeal to administrative courts in order to challenge the granting of a license by the administrative authorities. States must also see to it that the persons concerned may have resort to a court in order to obtain an injunction and or compensation when activities in fact significantly affect their use of a natural resource or their environment.

¹⁴⁵This does not necessarily imply that the persons concerned must be deemed to have acquired international legal personality, i.e. have become the bearers of a right under international law to demand compliance with the duty of states contained in the principle. Indeed, that principle may also be deemed to reflect a duty of the state vis-à-vis other states merely for the benefit of persons in order to protect them against infringements upon their use of a natural resource or their environment.

7. Planning and implementation of development activities

Principle 7 sets out to state as a general principle applicable to all nations, regardless of their stage of development, that the conservation of natural resources and the environment must be treated as an integral part of the planning and implementation of development activities. This principle is of fundamental importance from the viewpoint of preventing sometimes-irreparable impairment of natural resources or the environment.

The Principle stipulates further that particular attention shall be paid to environmental problems arising in developing countries. As stated in previous chapters, the very condition of underdevelopment is likely to involve, in its own way, a great danger to the proper conservation of natural resources and the environment. In their efforts to close or at least narrow the development gap between the rich and poor countries in addition to providing for the developmental needs of their people, the developing countries may well be inclined to give secondary consideration to environmental concerns. Irrational use of natural resources or environmental degradation will, moreover, not only be caused by a lack of capital making it difficult to finance the facilities or personnel required to cope with environmental problems, but also by a lack of relevant scientific and technological know-how. Poverty and underdevelopment may, thus, together with certain natural phenomena such as poor soil, drought and harmful insects lead to such well-known problems as desertification, urbanization, deforestation and soil degradation.

Also found in this Principle is that states have the obligation to assist other states, especially developing countries, in their efforts to attain environmental protection and

sustainable development.¹⁴⁶ Such assistance could include scientific and technical information and expertise, results of research programs, training opportunities and specialized equipment and facilities.

8. General obligation to co-operate

This Principle obliges states to not merely act individually, but, where appropriate, also co-operate with other states or through competent international organizations to implement the provisions of the preceding articles.¹⁴⁷ The obligation to co-operate in principle pertains to all elements of the obligations laid down in the preceding principles. No particular form of co-operation is recommended.¹⁴⁸ It is therefore left to the States to determine the proper form of co-operation after careful consideration of a great number of factors such as the subject-matter of the co-operation, the geographical area to be

¹⁴⁶Similar provisions are found in the 1980 Declaration of Environmental Policies and Procedures relating to Economic Development adopted by the African Development Bank, the Arab Bank for Economic Development in Africa, the Asian Development Bank, the World Bank, the Commission of the European Community, the OAS, UNDP and UNEP.

¹⁴⁷The call for States to co-operate with one another or through competent international organizations is not a new one. Principle 24 of the 1972 UN Declaration on the Human Environment provides: "International matters concerning the protection and improvement of the environment should be handled in a co-operative spirit by all countries, big or small, on an equal footing. Co-operation through multilateral or bilateral arrangements or other appropriate means is essential to effectively control, prevent, reduce and eliminate adverse environmental effects resulting from activities conducted in all spheres, in such a way that due account is taken of the sovereignty and interests of all States."

¹⁴⁸Co-operation may be based on a bilateral agreement such as the 1972 Agreement concluded between the United States and the then USSR on Co-operation in the Field of Environmental Protection, or the 1974 Agreement concluded between the United States and the Federal Republic of Germany on Co-operation in Environmental Affairs. Co-operation may also take the form of a multilateral agreement such as the 1968 African Convention on the Conservation of Nature and Natural Resources or the 1985 ASEAN Agreement on the Conservation of Nature and Natural Resources.

covered, the need for short- or long-term or for incidental or institutionalized co-operation.

9. Summary

The above Principles imply that profound changes in institutions and decision-making process will be required of any country trying to implement them. Accomplishing this poses the greatest social and legal challenges. Additionally, although law may have an internal morality centering on notions of procedural fairness, its contribution to solving social problems usually awaits political agreement on ethical, political and economic policy. Law is largely a goal implementing, not a goal deriving set of techniques, even if one of its strengths is the ability to provide structures for decisions on goals. Being embedded in the *status quo*, law supports it.¹⁴⁹

Law has other important functions, such as providing stability of expectations. It allows people to plan ahead and undertake binding future commitments, while providing a modest degree of flexibility to respond to new situations. It is important to remember, however, that without political will, the legal system is virtually helpless to deal with the environmental crisis that present institutions have allowed to arise. For the purposes of this thesis, the focus on areas where the law offers expertise will be:

- (a) designing authoritative decision-making mechanisms (for example, through the use of international, constitutional, municipal and administrative law);

¹⁴⁹I. Jenkins, *Social Order and the Limits of Law* (Princeton: Princeton University Press, 1980) at ix.

- (b) providing framework institutions for a society's economic system (such as contract, property, corporate and labour law);
- (c) proscribing action (for example, through the use of criminal sanctions);
- (d) giving legislative form to political attempts to influence behaviour in other ways, often through the use command-penalty or economic incentive schemes;
- (e) modify the legal rights of private citizens; and
- (f) dispute settlement.¹⁵⁰

Sustainability Criteria

The foregoing Principles are very general in nature, and rightly so. This allows for countries to extrapolate this generality and legislate laws that are specific to their circumstance. Not all principles will carry the same weight or importance to all countries. The form that the law takes, as well as its content, will be determined by such factors as the nature of the environment to be protected, the level of development, the finances available to ensure that the laws are implemented, and the political will of legislating governments to protect the environment.

However these laws are formulated, they must be based on the Principles discussed above if they are to contribute to sustainability. The following criteria, derived from the above

¹⁵⁰For a more detailed discussion on these areas where law offers expertise see, P.S. Elder, "Sustainability" (1991) 36 McGill Law Journal 832 at 839.

discussion, will be used as a broad framework for the analysis of the relevant *Zambian* legislation in the next chapter.

- Protection of human health and well being
- Conservation of resources
- Maintenance of ecosystem integrity
- Preservation of biological diversity
- Provision of clear and effective environmental standards
- Requirement of environmental assessments
- Effective data collection and dissemination
- Access and due process in administrative and judicial proceedings
- Integrated planning and decision-making

CHAPTER FOUR: MINING REGULATION AND ENVIRONMENTAL PROTECTION IN ZAMBIA

As has been stated in Chapter One, Zambia is exceptionally endowed with rich and abundant natural resources, which have not been fully exploited. Mining, by far the greatest part of the Zambian economy, will continue to play a leading role in the economic development of the country. The government therefore embarked on a national development program to realize the great resources potential into material benefits for the people. In 1992 the appropriate economic policy measures were introduced; market based exchange and interest rates, market based prices, simplified government procedures all anchored in a congenial government-private sector relationship, and liberalized open market trade and investment conditions.

Recognizing the special investment requirements for the mining sector, the government took specific measures to address the needs of investors who wished to participate in the country's mineral resource development. These measures were not only aimed at promoting private investment in the mining sector, but were also intended to turn the state's role to that of a facilitator from that of an investor.

In an attempt to make the mining sector more favorable for private investment, government through the Ministry of Mines and Minerals Development put in place an attractive legal and fiscal framework. These included duty and value added tax (VAT) exemptions, concessionary terms that could be agreed upon between the state and the investor through the Mining Development Agreement (thus guaranteeing a stable and rewarding investment environment), and amendments to the relevant legislation.

1. The Mines and Minerals Act¹⁵¹

Zambia's principle mining legislation is the Mines and Minerals Act (MMA). Enacted in 1995,¹⁵² the MMA regulates prospecting for and mining minerals with sections ranging from the acquisition of mining rights to investment incentives. The MMA greatly simplifies licensing procedures, places minimum reasonable constraints on prospecting and mining activities, and creates a very favorable investment environment.

(a) Mining Rights

Rights of prospecting for, mining and disposing of minerals are acquired and held in accordance with Part II of the MMA. Under these provisions, prospecting for minerals or carrying on mining operations can only be done under the authority of a mining right, which is in the form of a license and is issued by the Minister.¹⁵³

(i) Licensing System

Three types of licenses are available to the large-scale operator:

- **Prospecting License:** this confers the right to prospect for any mineral over a given area for a period of two years and is renewable.¹⁵⁴
- **Retention License:** the right to retain an area, subject to the Minister's agreement, over which feasibility studies have been completed but market conditions are

¹⁵¹Chapter 213 of the Laws of Zambia.

¹⁵²This repealed the earlier legislation of 1972.

¹⁵³*Supra*, note 151, s.5.

¹⁵⁴*Supra*, note 151, s.12.

unfavorable to development of a deposit at that time. The size of the area may be that covered by a prospecting license or smaller area as redefined by the license holder.

The duration of the license would be three years renewable for another single period of three years.¹⁵⁵

- Large Scale Mining License: this confers exclusive rights to carry out mining operations and other acts reasonably incidental thereto in the area for a maximum of 25 years. The area to be held should not exceed the area reasonably required to carry out the proposed mining operations. Applications need to be accompanied by environmental protection plans and by proposals for the employment and training of citizens of Zambia.¹⁵⁶

Similar rights are available to smaller operators, but on a reduced scale.

- Prospecting Permits: relate to areas of 10 km² and have a duration of 2 years non-renewable.¹⁵⁷
- Small Scale Mining Licenses: relate to areas not exceeding 400 hectares and have a duration of 10 years renewable.¹⁵⁸

¹⁵⁵*Supra*, note 151, s.18.

¹⁵⁶*Supra*, note 151, s.23.

¹⁵⁷*Supra*, note 151, s.29.

¹⁵⁸*Supra*, note 151, s.34.

- Gemstone Licenses: holders may carry out mining operations over an area not exceeding 400 hectares for a period of not more than 10 years.¹⁵⁹
- Artisans Mining Rights: give the right to local people to mine on an artisan basis an area not exceeding 5 hectares for a period of 2 years non-renewable.¹⁶⁰

(b) Environment Framework

Part IX of the MMA deals specifically with environmental protection. In deciding whether or not to grant any mining right, the Minister is obliged to take into account the need to conserve and protect the environment.¹⁶¹ This includes the air, water and soil, flora, fauna, fish, fisheries and scenic attractions and the features of cultural, architectural, archeological, historical or geological interests in or on the land over which the right is sought. To assist in making such decisions, the Minister has the power to cause to be carried out, such environmental impact studies and other studies as are considered necessary.¹⁶² The mining right, if granted or renewed, will then be subject to any conditions that the Minister deems appropriate. Although no specific standards are given, the MMA does provide that any such condition shall conform to specifications and practices established by national standards for the management of the environment as it is

¹⁵⁹*Supra*, note 151, s.40.

¹⁶⁰*Supra*, note 151, s.62.

¹⁶¹*Supra*, note 151, s.75.

¹⁶²This power is to be exercised at the discretion of the Minister.

affected by mining operations.¹⁶³ These national standards are established under the Environmental Protection and Pollution Control Act.¹⁶⁴

2. The Environmental Protection and Pollution Control Act¹⁶⁵

As a way of integrating conservation with development issues, the government engaged in a process of consultations with various stakeholders, out of which a wide range of policy actions were proposed. One such proposal was for a national conservation policy that could be applied by all government agencies, to ensure that environmental issues were taken into account when considering developmental projects. As a result, in 1985 the Zambian government adopted the National Conservation Strategy as a principle document for conservation and better management of natural resources. The objectives of the strategy were:

- To ensure the sustainable use of Zambia's renewable natural resources;
- To maintain Zambia's biological diversity; and
- To maintain essential ecological processes and life-support systems (soil regeneration and protection, nutrient recycling, protection and cleansing of water, etc.)

The National Conservation Strategy recognized that the powers of enforcement in the exiting legislation were weak and thus recommended the enactment of a comprehensive

¹⁶³*Supra*, note 151, s. 76(2).

¹⁶⁴Zambia presently has about 28 pieces of legislation that relate to the environment. Only the ones with a direct bearing on mining operations are considered in this thesis.

¹⁶⁵Act No. 12 of 1990.

environmental law and an independent body. This led to the enactment of the Environmental Protection and Pollution Control Act (EPPCA) in 1990.¹⁶⁶

The EPPCA establishes the Environmental Council, a body corporate whose functions include the protection of the environment and the control of pollution. In order to provide for the health and welfare of persons, animals, plants and the environment, the Council regulates water and air quality, disposal of wastes, pesticides and toxic substances, noise, and ionizing radiation. The EPPCA also gives to the Council certain responsibilities regarding natural resources conservation. The provisions most relevant to the environmental impacts of mining on the Zambian Copperbelt are looked at in detail below.

(a) Water

Under Part IV of the EPPCA, the Council is responsible for establishing water quality and pollution control standards. The Council determines conditions for the discharge of effluents into the aquatic environment and formulates rules for the preservation of fishing areas, aquatic areas, and drinking water sources and reservoirs. Any person intending to engage in an undertaking that is likely to discharge effluent is required to inform the council of that intention at an early planning stage.¹⁶⁷ The Council may then require such person to apply for a license to discharge. Such license may or may not be granted following the Council's consideration of the following:

¹⁶⁶*Ibid.*

¹⁶⁷Effluent is defined in the EPPCA as "waste water or other fluid of domestic, agricultural, trade or industrial origin treated or untreated, and discharged directly or indirectly into the aquatic environment."

- The possible effects on the quality of an affected water course or other source;
- Any existing licenses affecting the same water course or other source; and
- The water requirements of riparian residents, human settlements and agricultural schemes that depend on the water course.

Once the Council has established water quality standards, no person is allowed to discharge any pollutant into the aquatic environment in contravention of those standards.¹⁶⁸ The Council is empowered to collect and interpret data on water quality which is relevant to its work and shall order or carry out investigations in cases of actual or suspected pollution.

(b) Air

As in the case of water quality, the Council establishes ambient air quality and emission standards. These emission standards are prescribed within controlled areas and relate to emissions from industrial or business activities, from burning liquids, or solid fuels.¹⁶⁹ When establishing or prescribing emission standards, the Council is to consider the rate of emission, as well as the concentration and nature of the pollutants emitted. The best practicable technology available in controlling pollutants during the emission process is also taken into consideration.¹⁷⁰ The ambient air emissions prescribed by the Council are

¹⁶⁸*Supra*, note 165, s. 24.

¹⁶⁹The Council may, with the approval of the Minister responsible for the environment, declare by statutory instrument any area to be a controlled area for the purposes of the Act. See EPPCA s.37.

¹⁷⁰*Supra*, note 165, s. 38.

to be published in the government Gazette at least ninety days before the date upon which they come into effect. Once in effect, no person may emit any pollutants that cause air pollution in contravention of the prescribed standards.¹⁷¹ In instances where the Council either suspects or is aware of air pollution, it is obliged to order or carry out investigations and collect the necessary data.¹⁷²

Any person intending to erect or install an industrial plant or develop a new industrial process likely to cause air pollution has to apply to the Council for a license.¹⁷³ In granting a license, the Council is to consider the following:

- The possible effects on the quality of ambient air of the area;
- The existing licenses affecting the same air resource;
- The requirements of residents, human settlements and other industrial or commercial activities; and
- Comments from the local authority and other concerned organizations.¹⁷⁴

¹⁷¹*Supra*, note 165, s 39.

¹⁷²*Supra*, note 165, s.36.

¹⁷³Any operations that were releasing emissions likely to cause air pollution before the commencement of the EPPCA had to be licensed within twelve months after the commencement of the Act.

¹⁷⁴*Supra*, note 165 s. 45.

(c) Natural Resources Conservation

Under Part X of the EPPCA, the Council has specific responsibilities regarding land use practices.¹⁷⁵ This includes the responsibility to;

- Conduct or sponsor research on land use practices and their impact on natural resources;
- Establish and review land use guidelines;
- With the approval of the Minister, make regulations for the conservation and protection of natural resources;
- Monitor dereliction of land and where derelict land exists, assess the nature of rehabilitation work required;
- Monitor land contamination and where such contamination exists, assess the nature of rehabilitation work required;
- Carry out campaigns to increase public awareness about natural resources conservation; and
- Take stock of the nation's natural resources and their utilization in liaison with other relevant agencies and experts dealing with natural resources conservation.

¹⁷⁵Land use is defined as including an activity that has an impact on land, water, soil, air, fauna and flora. see EPPCA s. 75.

The Council also has the power to direct any person responsible for land dereliction or contamination to carry out rehabilitation works. This has to be done within a reasonable specified time and to the satisfaction of the Council. In instances that warrant immediate correction, the Council may carry out rehabilitation works and charge all or part of the costs of the works to the person responsible for causing the contamination.¹⁷⁶ Any person failing to comply with a directive to rehabilitate land is guilty of an offence. The Council also has the power to carry out surveys and interviews that will assist in the proper management and conservation of natural resources, inspect land uses to determine their impact on the quality and quantity of natural resources and publicize land use guidelines and natural resources conservation regulations.¹⁷⁷

(i) Environmental Impact Assessment Regulations¹⁷⁸

The administration of the EIA process in Zambia involves three primary stakeholder parties. These are the developer, the sectoral agencies or planning authorities and the Council. Other parties may be involved directly or indirectly either because they are interested or affected in one way or another. This group is referred to as the interested and affected parties and includes the general public. Each of these parties is responsible for specific administrative aspects of the EIA process.

¹⁷⁶*Supra*, note 165, s. 77.

¹⁷⁷*Supra*, note 165, s 79.

¹⁷⁸The Environmental Protection and Pollution Control (Environmental Impact Assessment) Regulations, 1997.

The Developer

The administration of the EIA process starts with the developer or project proponent conceptualizing a development project. The primary object of the developer is to bring about development by providing either goods or services. The developer may include government ministries and departments, investors, the private sector and the local community.

The responsibilities of the developer include the preparation of project documents, completing the EIA, meeting management requirements resulting from EIA recommendations, and meeting the expectations of the public. In this regard the developer provides information regarding the nature and scope of the project, the expected impacts, management and mitigation measures, monitoring programs and the rehabilitation programs. The developer also needs to inform the public on areas needing their involvement and ensure that they are agreeable to the type of project being embarked on.¹⁷⁹

Sectoral Agencies and Planning Authorities

Sectoral or authorizing agencies refer to any government ministry or department, public corporation, local authority or public officer in which or whom any law, regulation or by-law vests powers and functions to authorize, control or manage any aspect of a proposed or existing project. These agencies work on behalf of the public to ensure that ecological,

¹⁷⁹*Ibid.*, Regulations 3-6.

cultural, social and economic issues are addressed in line with existing government policy and legislation. Their main responsibility is to ensure that the proposed projects meet all the sectoral requirements for which the agency is mandated.

- **The Environmental Council**

The Environmental Council is a lead agency empowered to identify projects, plans and policies for which environmental impact assessments are necessary and to ensure that the same is done in line with provisions of the EIA regulations. Its responsibilities include managing the EIA process, establishing the terms of reference for project assessments (in consultation with the developer and the public), and assisting the developer establish a public consultation process.¹⁸⁰

The Public

Growing public concern for the environment spells out the need for involving the public in decision-making. This allows the developer to inform the public about the project and afford them the opportunity to express their concerns so as to include the same in management plans. Apart from it being a legislative requirement, public involvement helps reduce problems such as increased costs, project delays arising from public opposition to the project, bad publicity and litigation.

The responsibilities of the public in the EIA process include the provision of information about the local environment, and community goals and aspirations in relation to the

¹⁸⁰*Supra*, note 165, s.6.

proposed development. Other input includes contributing to the social, cultural and economic evaluation of the project and assisting in the decision-making and management process.

(d) Administration of the EIA Process

The administration of the EIA process is made up of three basic stages:

- The project screening stage where a proposed project is screened to determine whether it qualifies for the EIA process or not. The main focus here is the Project Brief.
- EIA preparation and review, which focuses on the Environmental Impact Statement.
- Project implementation, which deals with the management of mitigation measures as well as post assessment environmental monitoring and auditing.

(i) Project Brief

The developer prepares a Project Brief which gives a description of the project in line with the provisions of the Regulations, and submits the same to the Council.¹⁸¹ Upon receipt of the Project Brief, the Council sends copies to relevant authorizing agencies for their comments. This is done within seven days of receiving the brief and the authorizing

¹⁸¹*Supra.* note 178. Regulation 3.

agency has thirty days in which to give feed back to the Council.¹⁸² The Council proceeds to make a decision based on its own assessment, that of the authorizing agency and that of other relevant institutions. The decision is made to either approve the project without conditions or to compel the project to a full EIA study. The Council makes this decision within forty days of receiving the Project Brief.

(ii) Environmental Impact Statement

Once a project has been recommended for a full EIA study, the developer proceeds to conduct one in line with provisions of the regulations.¹⁸³ The developer begins with a scoping exercise and proceeds to prepare the Terms of Reference (TORs) for the study.¹⁸⁴ This is done within forty days of receiving communication from the Council. The Council considers and rejects or accepts the TORs within five days of receipt. If the TORs are accepted, the developer proceeds to identify a team to carry out the EIA study and submits the names and qualifications of the team members to the Council. The Council considers and either rejects or accepts the study team. Once the team has been accepted, it proceeds to conduct the EIA study in accordance with the TORs provided and with adequate public consultation.¹⁸⁵

Upon completion of the study, the developer presents the impact statement to the Council. The Council then circulates it to the relevant agencies for comments and at the

¹⁸²*Supra*, note 178. Regulation 5.

¹⁸³*Supra*, note 178. Regulation 7.

¹⁸⁴*Supra*, note 178. Regulation 8.

¹⁸⁵*Supra*, note 178. Regulation 10.

same time proceeds to invite public views and comments. The Council proceeds to consider the statement paying particular attention to the need for mitigation measures. The Council then makes a decision accepting the project with or without conditions, or rejecting it altogether. Once a decision has been communicated, any aggrieved parties are free to appeal to the Minister against the decision within ten days of its communication by the Council.¹⁸⁶

Having provided a brief description of the legislation that regulates mining and its environmental impacts in Zambia, I will now assess that legislation against the sustainability criteria developed in Chapter Three.¹⁸⁷ The operations of KCM, which owns the largest package of former ZCCM mines (KCM owns three mines, Konkola, Nchanga and Nampundwe as well as manages the operations at the Nkana smelter), will be used to assist in the analysis of the relevant legislation.

3. The Mines and Minerals Act and Sustainability

It would appear from the detailed provisions relating to environmental protection that the MMA adequately deals with the need to conserve and protect the environment in mining operations. These provisions, however, do not apply to the major contributors, in Zambia, of environmental damage from mining. While all mining rights, and the rights conferred by them, are subject to the provisions of the MMA and any regulations made under it and

¹⁸⁶*Supra*, note 178. Regulation 24.

¹⁸⁷For the analysis, some of the criteria are looked at together. This is because of the way that the legislation addresses them. For instance, the integrated planning and decision-making is dealt with under the requirement of environmental assessments in the EIA Regulations.

to the conditions attached to it at the time it was granted,¹⁸⁸ the large-scale licence is treated differently. With respect to the large-scale mining licence, the provisions and regulations of the MMA have effect subject to section 9, which reads:

“(1) For the purpose of encouraging and protecting large-scale investments in the mining sector in Zambia, the Minister may, on behalf of the Republic, enter into an agreement relating to the grant of a large-scale mining license.

(2) An agreement referred to in subsection (1) shall be known as a Development Agreement, and may contain provisions binding on the Republic in relation to:

- mining operations under a large-scale mining license, or the financing of any mining operations under such a license;
- the circumstances or the manner in which the Minister or the director shall exercise any power or discretion conferred on them by this Act in respect to the license;¹⁸⁹ and
- the settlement of disputes arising out of or relating to the agreement, the administration of this Act, or the terms or conditions of a large-scale mining license, including provisions relating to the settlement of any such dispute by international arbitration.”

This provision was included in the MMA to encourage foreign investment in the mining sector, and in all privatized mining operations, development agreements were entered

¹⁸⁸*Supra*. note 151. s.8.

¹⁸⁹The director referred to here is the Director of Mines who generally supervises and regulates the proper and effectual carrying out of the provisions of the MMA. See s. 83.

into. The agreements contain, *inter alia*, provisions relating to environmental issues. Under these provisions, a mine developer submits to the Director of Mines, an Environmental Plan. The Environmental Plan is concluded in consultation with the relevant government agencies and contains information describing the current state of the environment in which the mining activity is to be conducted as well as the impact of the proposed mining activity on the environment and any mitigation measures. This includes environmental clean-up obligations and any relevant time-scales.

Stability Period

Under the Development Agreements for mine privatization, GRZ has granted a 15- year stability period for all privatized mines, with the exception of KCM, which has been granted a 20-year stability period. This means that during the stability period the new owners are only required to conduct their operations in accordance with the agreed pollution and emission targets set out in the Environmental Plans. In other words, breaches of Zambia's existing environmental standards will be tolerated. For the duration of the stability period GRZ has limited authority to enforce environmental laws: it will not impose fines or penalties (unless emissions exceed the licensed higher levels) nor will it make changes to Zambian mining-environmental legislation. GRZ must refrain from imposing requirements that are more onerous than those specified in the Environmental Plans.

For instance, section 12.3 of the Development Agreement between Roan Antelope Mining Corporation and the Government of the Republic of Zambia reads:

“Subject to compliance by Roan Antelope with the Environmental Plan and the Environmental Clean Up Obligations...GRZ hereby confirms that it will not for a period of fifteen years from the Effective Date take any action (and will procure no action is taken by any of its Ministries, departments or agencies over which it has operational control acting on its behalf) under, or in enforcing, any applicable Environmental Laws or any New Environmental Laws or regulations passed after the date hereof (including any laws or regulations which impact, directly or indirectly on environmental matters) (New Environmental Obligations) with the intent of securing Roan Antelope’s earlier compliance with Environmental Laws or the New Environmental Obligations or earlier implementation of the Environmental Clean Up Obligations than that envisaged by the timetable and conditions set out in the Environmental Plan.”

The Development Agreement also allows for either party to propose, to the other, variations to the Environmental Plan and any disputes arising from the Agreement are to be referred to international arbitration for settlement, taking dispute resolution out of the jurisdiction of the Zambian courts.

The existence of Development Agreements makes it practically impossible for any relevant body to effectively regulate the environment in the mining sector. All environmental standards and obligations are negotiated and implemented in “good faith” between the government and the new mine operators. Public participation in the process is virtually non-existent with even recourse to litigation having been removed. The Development Agreements appear to give a green light to pollution, a situation

inconsistent with the corporate social responsibility professed by the new mine owners. KCM 's mission statement, for instance, provides:

We will uphold the values of good corporate citizenship and seek to contribute to the wider economic, social and environmental well being of Zambia.

In addition to this, KCM, whose major shareholders are Anglo- American, the International Finance Corporation (IFC) and the Commonwealth Development Corporation (CDC) should also be seen to comply with the more broadly framed OECD Guidelines for Multinational Enterprises. These advise companies 'to raise the level of environmental performance in all parts of their operations even where this may not be formally required'.¹⁹⁰ Companies are expected 'to take due account of the need to protect the environment, public health and safety, and generally to conduct their activities in a manner contributing to the wider goal of sustainable development'.¹⁹¹

4. The Environmental Protection and Pollution Control Act and Sustainability

(a) Protection of Human Health and Well Being

Although the Zambian Constitution¹⁹² contains an extensive Bill of Rights, the express right to environmental quality does not exist under Zambian law.¹⁹³ While the EPPCA

¹⁹⁰Paragraph 40. Commentary on the Environment, The OECD Guidelines for Multinational Enterprises (MNEs). Revision 2000.

¹⁹¹Preamble to Chapter V. Environment, the OECD Guidelines for MNEs.

¹⁹²Act No. 18 of 1996

contains detailed provisions that place obligations on government officials and individuals to protect environmental quality, these provisions do not amount to recognition of the right to environmental quality in Zambian law.¹⁹⁴

The right to a healthy environment can be implemented in a number of ways, either through recognition in the constitution that environmental quality is a basic human right whose enjoyment is essential to the enjoyment of all other rights, or through enactment of legislation that provides substantive protections.

(i) The Constitutional Approach

The recognition of a human right to a healthy environment in the constitution has advantages as well as disadvantages. One implication of such an approach is that those holding the right have a powerful claim to guide the actions of those holding the correlative duty to protect environmental quality. In addition, protected rights are universally recognized as taking priority over other social goals and providing a standard against which to measure public actions. Holding the right empowers individuals to

¹⁹³However such an interpretation may eventually result from judicial scrutiny of section 11 which provides "It is recognized and declared that every person in Zambia has been and shall continue to be entitled to the fundamental rights and freedoms of the individual... namely (a) life, liberty, security of the person and the protection of the law... subject to such limitations as are contained in this Part..." It is worth noting that the Zambian courts have not yet offered such interpretation in the few environmental cases to come before them to date. Several important decisions on this section might have an impact on whether the right to life will eventually encompass a right to be free from threats to health or environmental quality.

¹⁹⁴Provisions on government obligations include s.75 of the MMA and s.6 of the EPPCA dealing, respectively, with Ministerial and Council obligations to conserve and protect the environment. Obligations of individuals include s.86 of the EPPCA regarding the obligation to report acts of pollution to relevant authorities.

protect themselves against actions and inactions that would undermine environmental quality.

There are also disadvantages to a wholly rights-based approach. The actual content of the right must be largely left to judicial determination on a case-by-case basis. Defining the right in a way that specifies positive actions that must be taken may therefore be initially difficult. It is also important to recognize that environmental rights, by their nature cannot be totally anthropocentric. In other words, they must be based upon the need to protect essential biological processes for their own sake. Incorporating these non-human values would be a unique challenge for a human rights approach.

(ii) The Legislated Approach

A right to environmental quality may also be expressly recognized in particular statutes.¹⁹⁵ The advantage of this approach is that specific responsibilities are defined in detail so that there is less ambiguity about what actions must be taken by those responsible.

Lack of Protection of Human Health and Well Being: Air Pollution

The problems of air pollution from smelting activities at Nkana (currently managed by KCM), Mufulira and Chambishi still continue. It is increasingly accepted that corporate social responsibility is a key requirement for creating a prosperous and ecologically and socially sustainable world. KCM is not living up to its own definition of good corporate

¹⁹⁵See for instance the Preamble and Section 6 of the Yukon Environment Act, 1991.

citizenship. Its operations, in many respects, are not in line with international standards: for example, the World Bank guidelines on pollution abatement and World Health Organization (WHO) Air Quality Guidelines. World Bank experts have identified atmospheric emissions from the KCM run Nkana smelter and First Quantum's Mufulira smelter as 'a priority impact', with ore concentrators, smelters and acid recovery plants cited as major polluters within the Copperbelt.¹⁹⁶ The Environmental Management Plan (EMP) focusing on Environmental Assessment on the Copperbelt notes that the areas that have been most adversely affected by air pollution from Nkana smelter are the residential areas to the north, south and east of the complex, such as Nkana West, Wusakile and Chamboli. Attempts by people living in these areas to grow vegetables in garden plots have been 'largely unsuccessful'. The EMP also admits that the high ambient ground level concentrations on site also present serious risks for the health of the workforce.¹⁹⁷

Atmospheric emissions from smelting activities at Nkana smelter, Mufulira and Chambishi are a priority issue. Emissions of sulphur dioxide range from between 300,000 and 700,000 tons per year. Toxicological data collected worldwide suggest that human fatalities can arise from short-term exposure to atmospheric sulphur dioxide levels in excess of 1000 µg/m³.¹⁹⁸ KCM rejected the idea of installing a state-of-the-art, Flash

¹⁹⁶Final Environmental Management Plan: Strategies and Recommendations, Komex International. Environmental Assessment Copperbelt Environment Project, May 2001.

¹⁹⁷*Ibid.*

¹⁹⁸Komex International. Environmental Assessment Copperbelt Environment Project prepared for ZCCM Investments Holdings Plc., May 2001. See also World Bank's Sulphur Oxides Pollution, Prevention and Control Guidelines. The KCM Environmental Assessment Vol. 5.1, 6.7.11 states: '... it was predicted that the emissions after Year 10 will still exceed the relevant air quality guidelines. The number of days in a given year in which the emissions will be in excess of the

Furnace at Nkana smelter on the grounds of cost. This option is the only way of bringing emissions down to safe levels. KCM is committed to meeting GRZ and IFC/World Bank policies and guidelines for Nkana smelter's operational facilities within three years of the commencement of the contract but only where 'technologically and commercially feasible'.¹⁹⁹ Despite some refurbishment, paid for out of the British aid program, emissions from the Nkana smelter - even after 10 years - 'will' as KCM concedes 'still exceed the relevant air quality guidelines'.²⁰⁰

Danger to Health

Exposure to sulphur dioxide in the ambient air has been associated with reduced lung functions, increased incidence of respiratory symptoms and diseases, irritation of the eyes, nose and throat and premature mortality. Children, the elderly and those already suffering from respiratory ailments, such as asthmatics, are especially at risk. Health impacts appear to be linked especially to brief exposures to ambient concentrations above 1,000 µg/m³ (acute exposures measured over 10 minutes). Some epidemiological studies however have shown an association between relatively low annual mean levels and excess mortality.²⁰¹

guidelines at a 1 km distance from the plant range from 50 days in Year 4 to 160 days in Year 10.

¹⁹⁹KCM Environmental Assessment, 4.2.1. Vol. 5., 4.2.1.

²⁰⁰KCM EMP Vol. 5.1. Part A. 6.7.11.1.

²⁰¹World Bank, Pollution Prevention and Abatement Handbook, Effective July 1998.

Under its Pollution Prevention and Abatement Handbook (1998), the World Bank notes that

‘good practice in airshed management should encompass the establishment of an emergency response plan which can be put into effect when levels of air pollution exceed one or more of the emergency trigger values’.

According to the guideline the recommended emergency trigger value for sulphur dioxide is 150 µg/m³ for the 24-hour average concentrations. Given that the Nkana smelter regularly exceeds this threshold it is imperative that KCM put emergency procedures in place to mitigate the negative impact on people’s health.

(b) Access and due process in administrative and judicial proceedings

While the exercise of legal rights in the courts is an important component of the public role in protection of the environment, most of the fundamental decisions concerning the quality of the Zambian environment are undertaken in an administrative context. Many public environmental approvals and regulations affecting the environment are developed without the benefit of formal public input by way of an adjudicatory process. Where public consultation is used, it is severely affected by the differential in resources between the government, industry and the public, by the timing of the consultation and by the information made available.

Formalized provisions for public input are justified on a number of grounds.²⁰² First, public intervention in the environmental decision-making process will ensure that the decisions rendered will be more informed and accepted. Through participation, people gain an understanding of the different perspectives and interests at stake and are thereby more willing to accept the ultimate decision. Interested groups and individuals can challenge the data upon which the proposed regulations are based, test the regulatory assumptions employed and provide a new or different perspective as to the approaches undertaken.

Second, public participation brings about a fairer, more legitimate process. It is reasonable that when decision-makers define acceptable or safe environmental quality levels, together with the regulators and the regulated industry, the public, those who must bear the risk of the decisions, should have input into the process.

Third, administrative decisions are made in the public interest. How better for decision-makers to gain an understanding of what is in the public interest than by hearing representations by the public.

Public participation in the Zambian environmental decision-making process is required by law. Under section 8(1) of the EIA regulations,²⁰³ in order to help determine the scope of the work to be done in the conduct of the environmental impact assessment and in the

²⁰²See: P.S. Elder (ed.), *Environmental Management and Public Participation* (Toronto: Canadian Environmental Law Research Foundation, 1975); P. Muldoon, *The Fight for an Environmental Bill of Right: Legislating Public Involvement in Environmental Decision-Making* (Toronto: Butterworths, 1988).

²⁰³*Supra*, note 178.

preparation of the environmental impact statement, a developer is obliged to include the views of the public.²⁰⁴ Government obligations in this regard arise in the review process of the EIA. Once the developer has completed the EIA process and prepared and submitted the EIA statement to the Council, the Council then distributes copies of the statement to relevant government ministries and agencies, non-governmental and community-based organizations, interested and affected parties. The Council also has to place copies of the statement in public buildings in the vicinity of the site of the proposed project. Notification in at least two national newspapers three times per week for two consecutive weeks and a broadcast on national radio, detailing the place and times where copies of an environmental impact statement are available for inspection and the procedure for submitting comments is also required.²⁰⁵ In addition to this, the Council may organize or cause to be organized, public meetings in the locality of the proposed project.

The legislation not only mandates public consultation, it also provides general guidelines for the consultation process outlining where notice of a public hearing is to be placed, how long the notice period should be, and when and where the public hearing will take place.²⁰⁶ The Council is further obliged to make available for public inspection all documents from the end of the public review period to the end of the public hearing. The Council is also required to take the comments received from the public consultation

²⁰⁴See also Regulation 10.

²⁰⁵*Supra*, note 178, Regulation 16(1).

²⁰⁶*Supra*, note 178, Regulation 18.

process into account when making its final decision and make its decision known to all concerned parties.

Although the legislative provisions for integrated planning and decision-making public participation process in Zambia are quite substantive, public input in environmental decision-making is minimal. In cases where groups or individuals participate in consultation processes, most do not have the resources to participate in the process on a long-term sustained basis. Also, sufficient background information is not always given and resources are usually insufficient to undertake independent studies to test and challenge the assumptions and information being put forward by the developer.

In addition, while any person can submit, to the Council, written comments on any copy of an environmental impact statement,²⁰⁷ only the Council can make the decision to hold a public hearing.²⁰⁸ This decision is discretionary and is to be exercised if, in the opinion of the Council, a public hearing will enable it to make a fair and just decision or if the Council considers it necessary for the protection of the environment.²⁰⁹ New operators' licenses and emission permits were issued with respect to the owners of the twelve privatized mining operations in Zambia. In each case, the Council required an environmental impact statement from the developers, but the decision to hold a public hearing was never reached.

²⁰⁷*Supra*, note 178, Regulation 16. (3).

²⁰⁸*Supra*, note 178, Regulation 17. (2).

²⁰⁹*Ibid*.

Another key aspect of implementing public participation in environmental quality is the ability to bring environmental cases under administrative or judicial review. This is impeded by apparent resistance of both judges and legislators to broad participation in environmental cases before the ordinary courts. This resistance is usually justified by unsubstantiated fears of a flood of litigation. Ordinary courts of civil jurisdiction have traditionally had, as their core function, the settlement of property or pecuniary disputes between directly interested private individuals or corporations. Protection of environmental quality by its very nature raises issues that are polycentric and which may directly or indirectly affect the health, lives and interests of many citizens and the self-defined interest of environmental groups. Thus when attempts are made to use the courts to remedy environmental wrongs, citizens and environmental groups are faced with rules respecting standing.

The problem of standing is illustrated by the rules respecting the rights to sue for nuisance, i.e., injury to property or unreasonable interference with the use and enjoyment of land. When the nuisance is relatively localized and is characterized as a private nuisance, a person with what is judged to be a sufficient interest in the land affected can obtain an injunction or damages.²¹⁰

When the nuisance affects a wide class of landowners or a public or a public resource such as a fishery, the nuisance is said to be public. Traditionally, the right to bring an action in public nuisance lies solely with the Attorney General, except where an

²¹⁰A. Roman, *Locus Standi: A cure in Search of a Disease?* In Swaigen, ed., *Environmental Rights in Canada* (Toronto: Butterworths, 1981).

individual can demonstrate that some particularly direct or serious damage has been suffered over and above that incurred by other members of the public.

The result of these rules is that only people who have suffered direct damage in localized environmental problems, such as the ones discussed in Chapter One, have standing to obtain the appropriate remedies. This excludes, from the judicial process, environmental groups having suffered no direct damage, but who have the available resources to sue. The EPPCA deals with this issue under EIA Regulation 24, where only persons or entities who have been party to the decision-making process can appeal to the Minister against a decision of the Council and to the High Court against a decision of the Minister.

According to the EMP, as the Nkana smelter project is not on a 'greenfields' site but is 'a continuation of existing operations' a full public consultation and disclosure process is not required by Zambian regulations. People living in the vicinity of the smelter may not be fully aware of the risks to their health. Sulphur dioxide is not the only hazard: chronic exposure to particulates can lead to premature death by exacerbating respiratory illness, pulmonary disease and cardiovascular disease. Acute exposure can increase the chance that a person in a weakened state or an especially susceptible person will die.²¹¹

²¹¹*Supra*, note 201.

(c) Conservation of Resources, Maintenance of Ecosystem Integrity, Preservation of Biological Diversity and the Requirement of Environmental Assessments

Although Zambia has specific legislation dealing with conservation, maintenance of ecosystem integrity and preservation of biological integrity,²¹² it is the EIA process provided for under the EPPCA that is used to implement the provisions. For instance, the Wildlife Act²¹³ contains elaborate conservation and preservation of biological diversity provisions, at the same time allowing for mining operations to be conducted in national parks and game management areas. Section 25 reads:

“Mining rights may be granted in a national park provided an environmental impact assessment is conducted in accordance with procedures specified by the Environmental Council under the Environmental Protection and Pollution Control Act...”

The relevant conservation and protective measures, therefore, are only effective if the EIA process itself is effective.

The objectives of an environmental assessment process should be to:

- promote environmentally sound decision-making;
- establish a system of accountability for the environmental performance of all actors;

²¹²See for instance the Natural Resources Conservation Act, the Wildlife Act, the Fisheries Act, and the Forests Act of Zambia.

²¹³Act No. 12 of 1998.

- ensure that the environmental consequences of every proposed initiative are fully considered before the initiative is implemented (subject to appropriate exemptions for genuine emergencies);
- provide clear environmental criteria for the assessment and approval of initiatives;
- provide a fair and credible mechanism for conducting environmental assessments;
- provide an effective system of monitoring the environmental impacts of initiatives; and
- provide for public participation.

To this end, application of the process should be universal. New and existing projects should be subject to environmental assessment as a precondition of approval. In the *Zambian EIA Regulations*, this is provided for as follows:

7 (2) The requirement for an environmental impact statement shall apply to:

a developer of any project specified in the Second Schedule regardless of whether they are part of a previously approved larger project;

any alterations or extensions of any existing project which is specified in the Second Schedule; or

any project which is not specified in the Second Schedule but for which the Council determines an environmental impact statement should be prepared.

In instances where the Council determines that the project is likely to have a significant impact on the environment it requires that the developer prepare an environmental impact statement.²¹⁴ The statement is to be prepared in accordance with terms of reference arrived at in consultation with the Council. The terms of reference may include issues such as ecological considerations, sustainable use, social, economic and cultural considerations, effects on the landscape, the general land use in the area, and effects on water and air quality.²¹⁵ In order to help determine the scope of the work to be done in the conduct of the environmental impact assessment and in the preparation of the environmental impact statement, the views of the public are to be taken into account in the preparation of the terms of reference. To this end, the developer is expected to organize a public consultation process, involving government agencies, local authorities, non-governmental and community-based organizations and interested and affected parties.²¹⁶ Once the terms of reference have been approved by the council, the developer then goes ahead and conducts the environmental impact assessment (EIA) in accordance with the following guidelines:²¹⁷

(i) Preliminary Actions

The first steps in conducting the assessment are mainly administrative and involve the appointment of the experts that will comprise the team that will undertake the study. The

²¹⁴*Supra*, note 178. Regulation.7(1)

²¹⁵EIA Regulations, *supra*, note 178, Third Schedule.

²¹⁶*Supra*, note 178. Regulation 8(2)

²¹⁷The guidelines are provided in detail in the Fourth Schedule of the Regulations.

team then reviews and determines the applicable laws, regulations and standards as well as identifies the various alternatives for the development of the project.

(ii) Identification of Potential Impacts

At this stage, all the possible environmental impacts of the project are identified. The assessment team, the Council and the potentially affected and interested parties determine which of the impacts shall be the subject of the study. Factors such as the magnitude, extent, significance and special sensitivity of the project play an important role in the choice of the impacts.²¹⁸

(iii) Baseline Study

The team undertakes a detailed description of the existing environment including the social and economic activities of the population resident in the potentially affected area.

(iv) Impact Evaluation

Once the team has evaluated the various predicted impacts, they are ranked in order of importance based on the following:

- Quantitative change where change can be quantified.
- Qualitative change where change cannot be quantified. In this instance, the impact of project depends on the social acceptability of the project.

²¹⁸ Magnitude deals with the extent to which environmental resources will be affected. Extent looks at how much area will adversely or positively be affected by the project. Significance looks at the value in terms of costs and benefits that the society places on the resources and the different impacts affecting the resources. Special sensitivity helps identify which impacts are significant in the special local economic, social and ecological setting.

(v) Public Participation

The team solicits the views of the community likely to be affected by the project. These views are considered in the development of mitigation measures.²¹⁹

(vii) Identification of Mitigation Measures

At this stage, measures for the elimination (where possible), or reduction of environmental impacts for various alternatives identified in the study. These alternatives could include technological measures and management measures. The cost of the mitigation measures is to be included in the impact evaluation.

(vii) Assessment or Comparison of Alternatives

The team is expected to compare all the alternatives on the basis of economic, socio-cultural and environmental gains and costs, and rank and recommend them to the developer. The developer then chooses one alternative, and having given reasons for the rejection of the others, submits the report to the Council.

(viii) The Council Decision

Upon consideration of the project, the Council either approves or rejects the project. If approved, the developer may implement the project and once implemented, the assessment team has to carry out a post assessment environmental audit between 12-36 months of the commencement of the project.²²⁰

²¹⁹Regulation 10.

²²⁰*Supra*, note 151. Regulation 28.

The Regulations also specify in great detail, guidelines for the choice of persons that shall conduct the assessment,²²¹ the consultation with the public and other relevant entities before a decision is taken, and the obligation of the developer, within a specified time, to undertake an audit of the project that has been subject to the EIA process. The Regulations do not, however, provide for intervenor funding to groups or individuals wishing to participate in public hearings nor do they make specific mention of the Councils ability to monitor and review the implementation of its approvals.

(d) Provision of clear and effective environmental standards and effective data collection and dissemination

A condition precedent to achieving environmental protection is the imposition of standards for the management and control of development activity. Compliance is then measured against these standards. Environmental standards may be made binding in law through conditions to an operating license, administrative direction or order, compliance agreement, regulation or statute. Whatever the selected mechanism, the standard is rendered enforceable.

Under the EPPCA, any person wishing to discharge effluent has to apply for a permit from the Council. The Council may issue such permit or license once satisfied that the application has adequate and appropriate facilities and equipment for pre-treatment and that the affluent will not cause significant damage to the environment.²²² Any license to

²²¹*Supra*, note. 178. Regulation 9.

²²²Regulation 5 of the Effluent and Waste Water Regulations.

discharge effluent into the aquatic environment has to conform to the conditions and standards already determined by the Council.

The Council has established very clear and detailed standards for discharges into the ambient air and aquatic environments. For example, under the Water Pollution Control (Effluent and Waste Water) Regulations,²²³ detailed and measurable limits for chemical and physical parameters for effluent and waste- water are set out in the Third Schedule. This helps to increase effective and efficient monitoring of compliance.

Any choices made regarding the approach to be selected to promote compliance must be based on the objectives of encouraging environmentally positive behaviour and deterring environmentally harmful activity. Options for rewarding compliance include tax incentives, direct subsidies for pollution control technologies for more environmentally benign alternatives; and formalized compliance waivers for undertakings to employ improved control measures.²²⁴ In addition to criminal sanctions to deter environmentally harmful activity, administrative sanctions should also be included. These could be the power to revoke or suspend a license, effluent charges, user charges, product charges, administration charges or fees and taxation.²²⁵

Sanctions for non-compliance with environmental standards are provided for under the EPPCA. Under Regulation 11 of the Effluent and Waste Water Regulations, if the

²²³Statutory Instrument 72 of 1993, and 177 of 1993.

²²⁴For a listing and critique of useful options see John A. Patterson, *Charge the Producer, Tax the consumer: A strategy for Environmental Protection*, (December 1989 unpublished).

²²⁵Economic Instruments for Environmental Protection, (Paris, OECD 1989).

Council has reasonable cause to believe that any person is contravening or is likely to contravene any of the provisions of the Regulations or any conditions of a license, the Council shall serve an enforcement notice on that person. An enforcement notice specifies the contravention, steps that have to be taken to remedy or avoid the contravention as well as the time limit within which the steps are to be taken.²²⁶

The Regulations also provide for the revocation of a license as well as imprisonment of any person who continues to contravene the Regulations or conditions of a license after an enforcement notice has been issued.²²⁷ While these provisions appear to provide for adequate powers to enable criminal prosecution of environmental offenders, adequately trained personnel and equipment to exercise the function are lacking. To date no suits have been successfully brought against any environmental offenders by the Council. Lack of effective monitoring and data collection procedures were cited by the Council as the main reasons.

Also important in any enforcement and compliance program is the ability to detect violations. An effective program should be founded on early warning systems to enable a determination of compliance and prompt remedial or mitigative action. This calls for effective surveillance and data collection that can be documented as evidence for enforcement action. Although the EPPCA provides for the duty to keep records of the

²²⁶*Supra*, note 223, Regulation 11 (2).

²²⁷*Supra*, note 223, Regulation 12.

licensed activities, this duty is restricted to the license holder.²²⁸ The records are submitted to the Council every six months and the license holder has to report to the Council any abnormal discharge of effluent.²²⁹ The Council does have the power to enter any premises on which a licensed activity is being conducted and take samples for examination and analyses. As noted above, the lack of relevant resources impede the exercise of this power. In one case where samples were taken to determine the extent of damage caused to crops by sulphur dioxide emissions from the Mufulira smelter, they could not be analyzed, as the Council did not have a laboratory. The only proof that the Council had that the crops were damaged was visual proof.²³⁰

Emission Targets

As has already been stated, the ECZ is responsible for granting the Nkana smelter and other mines a licence to emit air pollutants. ECZ is allowed to prescribe intermediate limits that are higher than long-term emission limits but these should not only be negotiated with KCM, the wider community affected by the mine operations has a right to be involved in a decision of this importance.

The EMP makes clear that the Nkana smelter, is "an integral part" of KCM's operation in Zambia". Even though it has not yet purchased the smelter, KCM has been obliged to

²²⁸*Supra*, note 22, Regulation 7.

²²⁹*Ibid*.

²³⁰*Nelly Banda v. General Manger: Zambia Consolidated Copper Mines Ltd. Mufulira Division and Zambia Consolidated Copper Mines Ltd. Mufulira Division (Zambia Subordinate Court of the First Class) 2000.*

include these facilities in its detailed EMP because they are essential for its Konkola and Nchanga mines. According to IFC requirements, KCM is obliged 'to provide meaningful information' and 'to ensure the accessibility of information'. IFC's Good Practice Manual 'Doing Better Business through Effective Public Consultation and Disclosure' sets out four management principles for disclosing project information: disclose early, use information disclosure to support consultation; provide meaningful information; ensure the accessibility of the information.

The way the information on emission levels and targets is presented in the EMP, however, is confusing and contradictory. This makes it hard to understand precisely which standards KCM is committed to achieving within the specified time frame. KCM acknowledges that when it took over operations at the Nkana smelter, the monitoring stations around the site recorded daily maxima for sulphur emissions in excess of 10,000 $\mu\text{g}/\text{m}^3$. Both Zambian air quality standards and the latest World Bank guidelines recommend that daily average ambient sulphur dioxide emissions should not exceed 125 $\mu\text{g}/\text{m}^3$.²³¹

The EMP offers reassurance by saying that KCM and the Nkana smelter are committed to meeting GRZ and World Bank requirements for their facilities within 3 years of vesting (i.e. by 31 March 2003). The only exceptions are achievement of the site-specific guideline value for sulphur dioxide ambient air quality and stack particulate concentrations at the Nkana smelter where full compliance will only be achieved by

²³¹KCM Plc., Environmental Assessment, Vol. 5.1- SmelterCo Smelter and Refinery Complex Part A- Environmental Assessment, at 45.

March 2006.²³² However, close scrutiny of the EMP reveals that the standard to be achieved by 2006 is an ambient air quality limit of 500 µg/m³ for a daily averaging period.²³³ The EMP states that this is in compliance with pre-1998 World Bank guidelines, but fails to mention that it is four times the current World Bank limits. In other words, even by 2006, the KCM managed operations at Nkana smelter will fall far short of domestic and World Bank limits on air quality.²³⁴

Responsibility for overseeing implementation of the Final Environmental Management Plans lies with ZCCM-IH. Enforcement and monitoring of compliance with obligatory actions assigned to both ZCCM-IH and private investors remains with GRZ's numerous regulatory agencies that include the ECZ and the Mines Safety Department (MSD). The World Bank Environmental Support Project will attempt to build up the capacity of ECZ not only to fulfill its own tasks but also to coordinate the activities of other regulatory bodies. The managerial and technical capacity in critical institutions such as ECZ is lacking and this institutional weakness cannot easily be corrected. This highlights the need to involve local communities and NGOs in monitoring.

But affected communities face a number of difficulties in monitoring KCM's compliance with these thresholds. Firstly, the levels to be attained are not clearly explained in the EMP. Secondly, there is a worrying lack of available data. Zambia does not at present

²³²KCM Plc. Environmental Assessment, Executive Summary, at 47.

²³³*Ibid.*, at 37.

²³⁴Oxfam and RAID, Submission to the UK National Contact Point on Anglo American's Adherence to the OECD Guidelines for MNEs in respect of its operations in Zambia, November 2001.

generate the appropriate data even to prove compliance with existing statutory thresholds (Statutory Instruments No 119 and No 141). In an appendix to the EMP, there is the admission that the Nkana smelter is unable to carry out in-stack emissions monitoring and that due to 'the limitations of monitoring equipment caused by high gas velocities', dust emissions from the oxyfuel reverberator cannot be measured.²³⁵ In Zambia, atmospheric monitoring focuses almost exclusively on sulphur dioxide: data on other harmful volatiles is not collected. While ground level sulphur dioxide emissions around the Nkana smelter plant are collected, no information is available to track the impacts on communities living along the 'plume path' at a distance of 50 – 100 kms, who are also exposed to potentially dangerous levels of emissions.²³⁶

5. Conclusion and Recommendations

People living on Zambia's Copperbelt are confronted with a barrage of toxic chemicals and other pollutants, all of which undermines their right to health and damages their livelihoods. Heavy metals such as arsenic and lead and other industrial chemicals have contaminated streams and the main Kafue River. Waste dumps that scar the landscape are prone to erosion and are highly unstable. The tailings dams which are polluted with potentially toxic waste, provide breeding ground for mosquitoes. Not surprisingly, malaria is one of the area's major health problems. A variety of air pollutants like sulphur dioxide are pumped into the atmosphere from smelters and acid plants killing vegetation. Systemic health surveys are a luxury that Zambia, a heavily indebted poor country,

²³⁵KCM EMP, appendix to Vol. 5.1. 6.7.3.

²³⁶Komex. Environmental Assessment. Copperbelt Environment Project, *supra* note 198 at 116-118.

cannot afford. But exposure to this kind of toxic cocktail is associated with birth defects, cancer, respiratory problems and a weakening of the human immune system.

“Children are much more susceptible to these hazards than adults. Exposure to toxic agents can occur before conception if the mother is exposed to pollutants such as lead and mercury that cross the placenta, and there are wide ranges of chemicals that can be transferred through breast milk. Many children work in fields that have been sprayed with pesticides, and their parents may carry home chemical residues on their clothing. Having higher metabolic rates than adults, children breathe air from closer to the ground, and ingest higher concentrations of pollutants; inhaling them more deeply into their lungs than do adults, they retain these pollutants and absorb them into their metabolisms more readily.²³⁷

Recommendations for Corporate Responsibility

The proposed limits for continuing emissions of sulphur dioxide and other pollutants from the Nkana smelter are unacceptably high given that they will grossly exceed legal levels permitted under Zambian law and World Bank standards for many years. These emissions pose a major threat to the health of people living nearby. In view of the unacceptable risks to health, KCM should endeavor to bring all of the Nkana smelter's harmful emissions into compliance with the relevant standards within three years. Steps should also be taken to ensure that reliable data for measuring sulphur dioxide, dust and

²³⁷ Blacksmith Institute, *The Hidden Tragedy, Pollution in the Developing World*, online: Blacksmith Institute Homepage <www.give2net.com/3rdworldpollution.htm> (date accessed: 29 May 2002).

other emissions is collected and publicly disseminated so that local NGOs can help monitor levels of pollution. Local communities should help ECZ determine acceptable intermediate levels for emissions and develop emergency plans to safeguard the health of those communities that are most likely to suffer the adverse impacts of air pollution. There should also be a screening of the exposed population and workforce for pulmonary illnesses such as Pneumoconiosis.

Recommendations for Legislative changes

Numerous and detailed provisions regarding protection of the environment and pollution control in the EPPCA have the potential to make it a very effective tool in environmental regulation of the mining industry. Coupled with the accompanying regulations dealing with air and water pollution control, waste management and environmental impact assessments, the EPPCA if effectively administered could assist in halting current adverse impacts on both the natural environment and on human health on the Copperbelt.

In order for the legislative framework, within which mining activities operate in Zambia, to contribute to sustainability:

- The legislation should become immediately applicable to the large-scale mining operations;
- The government should adopt a long-term strategy to entrench the right to a healthy environment in the Zambian Bill of Rights;

- The EIA Regulations should provide that within the public consultation process, members of the public should be given the opportunity to request a public hearing. Criteria for refusing a hearing should be established and where the request for a hearing is denied, written reasons for the denial should be issued. In addition, the government should make available funding for public interest intervenors or participants;
- The legislation should provide for citizen suits to facilitate citizen enforcement of the legislation. This should be in addition to provisions in the legislation providing for the right of citizens to obtain injunctions to prevent ongoing and further violations of the legislation.
- Funding should be provided under the direction of the Council to groups or individuals who wish to participate in public hearings and who have demonstrated a sufficient interest in and the ability to make a contribution to the EIA process.
- The Council should have the ability to monitor and review the implementation of its approvals. Where necessary, it should be able to require a developer to show cause why the approval should not be revoked. For this purpose the Council should have sufficient funding to staff an effective monitoring and implementation review branch.
- A clear commitment of government resources is necessary to establish an effective investigative force to enable the criminal prosecution of environmental offenders. Priority must also be given within the Director of Public Prosecutions for the appointment of specialized prosecutors.

CHAPTER FIVE: CONCLUSION

A broad, overlapping consensus is forming around the goal of sustainability, including its ecological, social and economic aspects as described in the previous Chapters. However movement toward this goal is being impeded not so much by lack of knowledge, or even lack of political will, but rather by a lack of a coherent, relatively detailed shared understanding of a sustainable and desirable society. Developing this shared vision is an essential prerequisite to generating any movement toward a society that can provide permanent prosperity within the biophysical constraints of the real world in a way that is fair and equitable to all of humanity, to other species and to future generations. Although this understanding may not fully exist, the seeds exist and now is the time to take these seeds and nurture them into a way of life that all of humanity can embrace and promote.

Clearly, not everyone sees the topic of sustainable development with the same sense of urgency. But there are a growing number of people who believe the set of problems which are referred to under the heading of 'sustainability' are not just important, but may well pose a very real and quite serious threat to human security, to human well being, and to the quality of life of this and future generations. Continued, unlimited growth in material consumption is inherently unsustainable, but we cannot break away from this pattern until a credible and desirable alternative is available.

Starting to solve those problems, and embarking on a more sustainable course, could be a real opportunity for this generation. It could help reorganize our societies in ways which

give communities more control over our destinies, make us as individuals and as groups more secure and better off, and give us all a chance to improve the quality of our existence.

We are operating within very real, if poorly understood limits. These are imposed by the mounting demands of a growing world economy and population, by the capacity of the Earth's physical and biological processes to provide us with our necessities, or by our capacity to organize ourselves in open and transparent ways that encourage cooperative approaches to problems. Since these processes and limits, social and physical, are not well understood, there is no guarantee that the change the world is undergoing will always be gradual, reversible, proportional, or produce results to our liking. If we believe that the sustainability issue is real and serious, the choice is not whether or not there will be a transition. There will be. We hope it will be a planned transition rather than a hard landing. The choice may simply be whether we consciously lead and try to shape that transition or just react as best as we can as it happens.

The apparent simplicity of the concept of sustainable development in no way facilitates its implementation and in order to meet the challenges of achieving sustainability, it is necessary to modify or upgrade existing instruments, as well as to develop new ones. The barriers to acceptance of sustainable development will be well-entrenched consumer materialism in developed societies and the understandable aspirations of the developing world to meet their basic needs for survival and well-being. Success in meeting and overcoming these barriers will require learning from the historical record, avoiding the

mistakes of the past, and creating innovative solutions for the future.²³⁸ Clearly, the momentous adjustments required for moving onto a path of sustainable development will require a global commitment by all nations.

Reviving growth

Growth must be revived in developing countries because of the links between economic growth, the alleviation of poverty and environmental conditions that operate most directly in these countries. However, since developing countries are part of an interdependent world economy, their prospects also depend on the levels and patterns of growth in industrialized nations. Thus a reorientation of international economic relations between countries will be necessary for sustainable development.

Changing the quality of growth

Sustainable development requires a change in the content of growth to make it less material and energy intensive and more equitable in its impacts. These changes are required in all countries as part of a package of measures to maintain the stock of ecological capital, to improve the distribution of income and to reduce the degree of vulnerability to economic crisis.

²³⁸Daly argues that one mistake of the past to be avoided is that of letting appetites for material consumption blur our sensitivity to the conditions essential for sustainable development. Another lesson we must learn with respect to population growth is that a positive exponential growth rate, no matter how limited, of any variable (such as population) in a closed system (such as the earth) will eventually overpower the system and cannot be sustained.

Meeting essential needs for jobs, food, energy, water and sanitation

The principal development challenge is to meet the needs and aspirations of an expanding world population.

Ensuring a sustainable level of population

The sustainability of development is intimately linked to the dynamics of population growth. The issue however is not just one of global population size. A child born in a country where levels of material and energy use are high places a greater burden on the earth's resources than a child born in a poorer country.²³⁹ A similar argument applies within countries. Nonetheless, sustainable development can be pursued more easily when population size is stabilized at a level consistent with the productive capacity of the ecosystems supporting it.

Conserving and enhancing the resource base

Pressure on resources increases when people lack alternatives. Development policies must widen people's options for earning a sustainable livelihood, particularly in areas under ecological stress. If needs are to be met on a sustainable basis the earth's natural resource base must be conserved and enhanced.

²³⁹ J. Goldberg *et al.* *Energy for a Sustainable World*, 2nd ed. (New Delhi, India: Wiley Eastern Ltd. 1990) at 33-34.

Reorienting technology and managing risk

The capacity for technological innovation needs to be greatly enhanced in developing countries so that they can respond more effectively to the challenges of sustainable development. In addition, the orientation of technology development must be changed to pay greater attention to environmental factors.

Merging environment and economics in decision making

Many of the environment and development problems that confront the world have their roots in the sectoral fragmentation of responsibility. Sustainability requires that such fragmentation be overcome and requires further that there is an enforcement of wider responsibilities for the impacts of decisions. This in turn requires changes in the legal and institutional frameworks that will enforce the common interest.

Zambia and Sustainability

The privatization of ZCCM, which was actively encouraged by the donor community as a means of reducing corruption, inefficiency and waste, was supposed to bring new investment to the Copperbelt, reinvigorating the local economy and restoring its severely degraded and contaminated environment. Improved managerial and technological applications were to result in increased copper production and sales, which would in turn assist in revamping the national economy. This has not happened. Low world copper prices have affected mining operations in Zambia to the extent that some of the major

mines now face the threat of closure.²⁴⁰ Closure of the mines would not only put more than 11,000 people out of a job, it would also make it extremely difficult for the Copperbelt to sustain economic activity and could result in devastating social and economic consequences for the country as a whole. Zambia is therefore faced with the urgent need to try and get the mining industry back on track, but even more important, to develop and implement measures that, in the future, would ensure that major setbacks in one sector of the economy do not bring the economic activity of the whole country to a virtual standstill.

Zambia needs to revise how growth is measured and valued to make it equitable and long-term. This entails some changes in national decision-making including the integration of the environment and the economy in all levels of decision-making, and the utilization of economic appraisals that fully value the cost of goods and services (including environment and social impacts). In addition, coordinated efforts that link agencies, departments, and central government with local government as well as incorporate project appraisal techniques that include environmental and social costs and benefits and involve citizens in decision-making would be required. The principles of sustainability can assist in bringing about the necessary changes.

For Zambia, sustainable development has to take on the form of a process: a process that while providing for both growth and development is able to promote harmony among

²⁴⁰ The most notable are Roan Antelope Mining Corporation of Zambia Plc., which is currently under receivership; and Konkola Copper Mines where the major shareholder, Anglo American Plc. is considering withdrawing its funding to the mine. Huge losses due to poor world copper prices have been cited as a major factor in the threat of closure of the mines.

human beings and between humanity and nature. As this process evolves, it would create a political system that secures effective citizen participation in the choice and implementation of development projects as well as a social system that provides for solutions for the tensions arising from disharmonious development. It would also bring about a diverse economic system that is resilient and able to generate surpluses and technical knowledge on a self reliant and sustained basis, that is, a technological system that can search continuously for new solutions and an administrative system that is flexible and has the capacity for self-correction.²⁴¹ Sustainability for Zambia will mean coming to terms with the reality of limitations of resource and the carrying capacities of ecosystems, and pursuing development plans that do not lead to conflicts over such limited resources.

Sustainable development is not a strategy that can be incorporated into ten easy steps. It will require time and institutional, legal and behavioural changes to implement. However it has the ability to promote values and ethics that reflect the interdependence of the environment and the economy, the importance of fairness and equity for long-term prosperity, and the need for cooperation and community.

²⁴¹ This is dependent on the existence of an international system that fosters sustainable patterns of trade and finance.

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APPENDIX

LEGAL PRINCIPLES FOR ENVIRONMENTAL PROTECTION AND SUSTAINABLE DEVELOPMENT²⁴²

I. GENERAL PRINCIPLES, RIGHTS, AND RESPONSIBILITIES

Fundamental Human Right

1. All human beings have the fundamental right to an environment adequate for their health and well-being.

Inter-Generational Equity

2. States shall conserve and use the environment and natural resources for the benefit of present and future generations.

Conservation and Sustainable Use

3. States shall maintain ecosystems and ecological processes essential for the functioning of the biosphere, shall preserve biological diversity, and shall observe the principles of optimum sustainable yield in the use of living natural resources and ecosystems.

²⁴² Experts Group on Environmental Law. June 1986.

Environmental Standards and Monitoring

4. States shall establish adequate environmental protection standards and monitor changes in and publish relevant data on environmental quality and resource use.

Prior Environmental Assessments

5. States shall make or require prior environmental assessments of proposed activities which may significantly affect the environment or use of a natural resource.

Prior Notification, Access and Due Process

6. States shall inform in a timely manner all persons likely to be significantly affected by a planned activity and to grant them equal access and due process in administrative and judicial proceedings.

Sustainable Development and Assistance

7. States shall ensure that conservation is treated as an integral part of the planning and implementation of development activities and provide assistance to other States, especially to developing countries, in support of environmental protection and sustainable development.

General Obligation to Co-operate

8. States shall co-operate in good faith with other States in implementing the preceding rights and obligations.

II. PRINCIPLES, RIGHTS, AND OBLIGATIONS CONCERNING TRANSBOUNDARY NATURAL RESOURCES AND ENVIRONMENTAL INTERFERENCES

Reasonable and Equitable Use

9. States shall use transboundary natural resources in a reasonable and equitable manner.

Prevention and Abatement

10. States shall prevent or abate any transboundary environmental interference which could cause or causes significant harm (but subject to certain exceptions provided for in Articles 11 and 12 below).

Strict Liability

11. States shall take all reasonable precautionary measures to limit the risk when carrying out or permitting certain dangerous but beneficial activities and shall ensure that compensation is provided should substantial transboundary harm occur even when the activities were not known to be harmful at the time they were undertaken.

Prior Agreements When Prevention Costs Greatly Exceed Harm

12. States shall enter into negotiations with the affected State on the equitable conditions under which the activity could be carried out when planning to carry out or permit

activities causing transboundary harm which is substantial but far less than the cost of prevention. (If no agreement can be reached, see Article 22.)

Non-Discrimination

13. States shall apply as a minimum at least the same standards for environmental conduct and impacts regarding transboundary natural resources and environmental interferences as are applied domestically (i.e. do not do to others what you would not do to your own citizens).

General Obligation to Co-operate on Transboundary Environmental Problems

14. States shall co-operate in good faith with other States to achieve optimal use of transboundary natural resources and effective prevention or abatement of transboundary environmental interferences.

Exchange of Information

15. States of origin shall provide timely and relevant information to the other concerned States regarding transboundary natural resources or environmental interferences.

Prior Assessment and Notification

16. States shall provide prior and timely notification and relevant information to other concerned States and shall make or require an environmental assessment of planned activities which may have significant transboundary effects.

Prior Consultations

17. States of origin shall consult at an early stage and in good faith with other concerned States regarding existing or potential transboundary interferences with their use of a natural resource or the environment.

Co-operative Arrangements for Environmental Assessment and Protection

18. States shall co-operate with the concerned States in monitoring, scientific research and standard setting regarding transboundary natural resources and environmental interferences.

Emergency Situations

19. States shall develop contingency plans regarding emergency situations likely to cause transboundary environmental interferences and shall promptly warn, provide relevant information to and co-operate with concerned States when emergencies occur.

Equal Access and Treatment

20. States shall grant equal access, due process and equal treatment in administrative and judicial proceedings to all persons who are or may be affected by transboundary interferences with their use of a natural resource or the environment.

III. STATE RESPONSIBILITY

21. States shall cease activities that breach an international obligation regarding the environment and provide compensation for the harm caused.

IV. PEACEFUL SETTLEMENT OF DISPUTES

22. States shall settle environmental disputes by peaceful means. If mutual agreement on a solution or on other dispute settlement arrangements is not reached within 18 months, the dispute shall be submitted to conciliation and if unresolved, thereafter to arbitration or judicial settlement at the request of any of the concerned States.