

National wealth, natural capital and sustainable development in Namibia

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I would like to thank many people who assisted in providing data and valuable suggestions, in particular Jonathan I. Barnes, Kirk Hamilton, Ndamona Kali and Matthew Wright. The author is responsible for all opinions expressed in this report.

This work was supported in part through funding from the Swedish International Development Cooperation Agency and the United States Agency for International Development.

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Acronyms

EEZ	exclusive economic zone
GDP	gross domestic product
GNP	gross national product
PIM	perpetual inventory method
SEEA	System of Integrated Environmental and Economic Accounting

Abstract

A country's income and economic well-being depend on its wealth, where wealth is defined in the broadest sense to include produced, natural, human and social capital. Recognising this, international agencies have begun to shift their emphasis from economic development as gross national product growth to economic development as a process of 'portfolio management' that seeks to optimise the management of each asset and the distribution of wealth among different kinds of assets. In resource-rich economies, building national wealth requires that natural capital be transformed into other forms of capital. However, there has been growing concern that economic growth, especially in resource-rich developing countries, has been achieved by liquidation of natural capital without adequate provision for replacement of these assets for future generations.

Using the newly available accounts for Namibia's natural capital, national wealth accounts are constructed and used to assess its economic development. Some comparisons are made with Botswana to demonstrate the outcomes of contrasting development paths of these two countries, similar in some respects – size, population, geography and climate – but quite different with regard to management of natural resources. The government of Namibia has had no explicit policy to use natural capital to build national wealth. In 1980, per capita wealth in Namibia was 75 per cent greater than in Botswana, but Namibia followed a policy of liquidating its capital, even after Independence, and per capita gross domestic product growth has been slow. In contrast, Botswana developed an explicit policy to reinvest rents from its mineral wealth in other types of assets, resulting in a remarkable growth in per capita wealth and national income.

1. INTRODUCTION

A country's income and economic well-being depend on its wealth, where wealth is defined in the broadest sense to include produced, natural, human and social capital. Recognising this, international agencies have begun to shift their emphasis from economic development as gross national product (GNP) growth to economic development as a process of 'portfolio management' that seeks to optimise the management of each asset and the distribution of wealth among different kinds of assets. This new approach can be seen, for example, in the World Bank's latest *Development Report* in which the second chapter is entitled, 'Managing a Broader Portfolio of Assets' (World Bank, 2002).

A widely accepted concept of sustainable economic development requires that national wealth is non-decreasing over time.¹ Although natural capital is a large component of wealth, it has not yet been included in the national economic accounts of most countries. This is particularly important in the case of minerals, a non-renewable resource, where exploitation inevitably results in depletion of those assets. By omitting mineral depletion, the national accounts provide a distorted picture of a country's economic health: the accounts record mineral exploitation as a contribution to gross domestic product (GDP) and income, but do not record the simultaneous loss of wealth due to depletion. The same problems can apply to renewable resources like fisheries if they are not managed sustainably.

The danger of not fully accounting for natural capital can be seen by comparing the economic performance of resource-rich developing countries and resource-poor countries. One would think that resource-rich economies have an advantage over less-well endowed economies because natural resources – oil, minerals, forests, fisheries – could provide funds for rapid development and poverty reduction. However, Auty (1993) and Sachs and Warner (1995) found that as a group, resource-rich developing countries have performed worse economically than resource-poor developing countries over the past 30 years², a phenomenon known as the 'resource curse'. Table 1 shows that per capita GDP growth in resource-rich countries was well under two per cent between 1960 and 1990, while the growth of resource-poor developing countries averaged 2.5% or higher. Among the resource-rich countries, the ore-exporters have done the worst, averaging annual GDP growth of only 0.8%.

The reasons for the poor performance of resource-rich countries are complex. Part of the problem may result from the 'Dutch disease' where a surge in foreign exchange earnings from mineral exports leads to currency appreciation, which makes the domestically manufactured tradable goods uncompetitive in world markets, generally discouraging economic diversification and growth. This problem is exacerbated when the resource sector causing the economic boom does not have strong economic linkages with other sectors of the economy. Another aspect of the problem results from political pressure to use revenues from the exploitation of natural resources to fund current consumption without putting anything aside to compensate for the loss of natural capital. This is particularly the case in developing countries, where many basic needs remain unmet and rent-seeking behaviour may be especially difficult to resist. Clearly, the ability to monitor total wealth – including natural capital – and analyse changes in this indicator is central to economic development.

¹ Examples of theoretical work include Arrow et al., 2003; Dasgupta and Mäler, 2000; 2001; Hamilton, 2002; Hartwick, 1977; Heal and Kristrom 2001; Kunte et al. 1998. Pearce et al., 1989; Solow, 1974, 1986.

² While this may also be true in industrialised countries, the dependence of these economies on non-renewable resources is often much lower than in the developing countries under consideration, hence the management of this wealth is less critical.

Table 1 Resource endowments and economic growth in developing countries

	Number of countries	Annual per capita GDP growth 1960-1990
Resource-rich		
Large economies	10	1.6%
Small economies, of which	55	1.1%
Non-mineral exporter	31	1.1%
Ore-exporter	16	0.8%
Oil-exporter	8	1.7%
Resource-poor		
Large economies	7	3.5%
Small economies	13	2.5%
All countries	85	1.6%

Source: Based on Auty and Mikesell, 1998.

Beginning in the 1980s, the United Nations, European Union, OECD, World Bank and country statistical offices initiated a coordinated effort to address the omission of natural capital from the asset accounts. This effort has resulted in a standardised framework and methodologies for constructing environmental accounts, called the System of Integrated Environmental and Economic Accounts, or SEEA (United Nations, 2002). Environmental accounts estimate the economic value of natural resource stocks and the cost of depletion and improvements in these stocks. Using information about the value of natural capital, accounts for national wealth can be constructed, thus providing a more accurate assessment of economic performance and sustainable development.³

Namibia's economy is highly dependent on its natural resources: minerals, fisheries, and agricultural land, which together account for roughly 30 per cent of GDP, 85 per cent of exports and about 10 per cent of government revenues (CBS, 2001). In this paper, total wealth accounts are constructed and used to assess economic development in Namibia. Some comparisons are made with similar data for Botswana to demonstrate the outcomes of contrasting development paths of these two countries, similar in some respects – size, population, geography and climate – but quite different with regard to management of natural resources. The organisation of the paper is as follows. The next section discusses the methodology and data used for the estimation of total wealth. Section 3 presents the wealth accounts and analyses the trends Namibia's economic sustainability. These are compared to a similar analysis undertaken for Botswana. Concluding remarks are provided in the final section.

³ Human and social capital are still not included because there is no agreement about how to measure it.

2. METHODOLOGY AND DATA SOURCES

2.1 *Wealth and sustainability*

In an exhaustive, critical review, Pezzey (1992) identified the definition of sustainability that has come to be used most often by economists: economic development is sustainable if well-being per capita does not decline at any point over time. Solow (1974; 1986) and Hartwick (1977) derived the conditions necessary for economic sustainability in an economy dependent on a non-renewable resource, which came to be known as the Solow–Hartwick rule. The rule requires non-declining total wealth, which is achieved by reinvesting some portion of the rents from the non-renewable resource in other forms of capital (assuming, among other things, that resources are priced efficiently).

The relationship between sustainable well-being and non-declining wealth was further developed and formalised by, among others, Mäler (1991), Pearce and Atkinson (1993), Dasgupta (2001), Dasgupta and Mäler (2000, 2001), Hamilton (2002), and Hamilton and Clemmens (1999). The rule for sustainability can be expressed, adjusted for population growth, as:

$$(1) \quad \frac{K_{t+1}}{P_{t+1}} \geq \frac{K_t}{P_t}$$

where P is population and K is the value of total wealth, the sum of all different kinds of capital. In implementation of this indicator of sustainability for open economies such as Namibia, the concept of wealth must take into account not only domestic stocks of produced, natural, human and social capital, but also claims on foreign stocks of capital, which are represented by net holdings of foreign financial assets:

$$(2) \quad K = \sum (K_P + K_N + K_H + K_S + K_F)$$

2.2 *Measuring national wealth*

In using equations 1 and 2 to monitor sustainability over time, it is essential that all assets be included. Human and social capital are not readily measurable at this time; however, there are measures for the other three components of wealth in Namibia. Concepts and data sources for each component of national wealth are described below.

2.2.1 **Produced capital**

The stock of produced or manufactured capital includes structures and equipment and is calculated by most statistical offices around the world using the perpetual inventory method (PIM). PIM at any given time is simply cumulative gross investment in fixed capital minus depreciation of existing stock. Depreciation is based on an assessment of the lifetime of fixed capital in each industry and capital stock is revalued each year so that it represents replacement value rather than historical value. Namibia's Central Bureau of Statistics estimates manufactured capital stock based on the PIM; figures are published annually in the national accounts.

2.2.2 **Foreign financial capital**

Foreign financial assets represent claims by domestic agents – government agencies, enterprises and private individuals – on assets held in foreign countries. For small countries with relatively limited opportunities for profitable domestic investment, these assets can represent an important alternative investment. In most countries, the foreign assets of *government agencies* and *enterprises* are reported regularly to the central bank. Information about these assets was obtained for Namibia from (Bank of Namibia, 1995; 2001; IMF, 2001). It was only possible to construct accounts from

1989 onward because prior to Independence, Namibia's finances were largely intertwined with those of South Africa. For several years after Independence there were disputes with South Africa about Namibia's financial obligations, which were eventually settled by negotiation (World Bank 1995). The lack of data prior to 1989 is not a serious omission because, as we will see, the volume of Namibia's net foreign financial assets is quite small relative to other forms of wealth.

Holdings of foreign assets by *individuals* are not regularly reported in most countries and are often obtained only through special surveys. There is no published information for Namibia. Because of its colonial past and a relatively well-off minority population with ties to other countries, it is not unlikely that some of Namibia's private citizens have substantial holdings of foreign assets but there is no way to estimate these holdings.

2.2.3 Natural capital

Namibia's environmental accounts are based on the UN's SEEA framework (United Nations, 2002) and include minerals, fisheries, water, livestock, land and energy. Monetary asset accounts have been constructed only for minerals and fisheries. The methodology and data used to estimate the asset value of minerals and fisheries are described in Lange, 2003a; 2003b. Namibia's mineral accounts include diamonds, uranium and gold, which provide more than 95 per cent of mining GDP. Fisheries accounts include the three commercially most important fisheries: hake (*Merluccius capensis* and *Merluccius paradoxus*), horse mackerel (*Trachurus capensis*) and pilchard (*Sardinops ocellatus*), which account for more than 90 per cent of the value of fish production.

Although there was extensive fishing in Namibian waters for many decades, fish did not constitute part of Namibia's national wealth until after Independence in 1990. In order to be considered part of a country's wealth, a resource must be owned and actively managed for economic benefit. Prior to 1990, Namibia was administered by South Africa and its fisheries were exploited, largely by foreign operators, under virtually an open-access regime, a practice that was halted after 1990. Namibia was unable to exert control over its 200-mile Exclusive Economic Zone (EEZ), which contained the most lucrative fisheries, because no country would recognise South Africa's jurisdiction over the area. Only at Independence would other countries recognise Namibia's right to control the fish within its EEZ, and these stocks became party of Namibia's wealth.

While the methodology and data cannot be described in great detail in this report, a brief overview of the valuation methodology is provided. Asset valuation is ideally based on market prices, but for many natural resources, markets are very thin or missing entirely. Consequently, the SEEA recommends valuation of these assets as the estimated present discounted value of their future net income streams. The income, or resource rent, is the value of production minus the marginal exploitation costs. Data about marginal costs are not generally available, so, in implementation, average cost is commonly used, which may introduce an upward bias into the measure of rent. For each year, t , and each mineral, j , resource rent (R) is calculated as the value of production or total revenue (TR), minus the marginal exploitation costs, which include intermediate consumption (IC), compensation of employees (CE), consumption of fixed capital (CFC), and the opportunity cost of capital invested in mining, of 'normal profit' (NP), where normal profit is the product of produced capital (K) and its rate of return (i):

$$(3) \quad R_t^j = TR_t^j - IC_t^j - CE_t^j - CFC_t^j - NP_t^j$$

$$(4) \quad NP_t^j = iK_{P,t}^j$$

Having calculated the value of rent in a given year, the formula for calculating the value of mineral assets is (omitting superscript, j , for each mineral for easier reading):

$$(5) \quad K_{N,0} = \sum_{t=0}^T \frac{p_{N,t} Q_t}{(1+r)^t}$$

$$(6) \quad p_{N,t} = \frac{R_t}{Q_t}$$

$$(7) \quad T_t = \frac{S_{N,t}}{Q_t}$$

where T is the remaining lifespan of the resource, Q is the quantity extracted, p is the unit rent, r is the discount rate, and other variables are defined as above.

Asset valuation should be based on expected future extraction paths, production costs and market prices. However, in many instances this information is lacking so it is assumed that both the future volume of extraction and the per unit rent remain constant over time, a procedure recommended by the SEEA.

2.2.4 Missing natural capital

Due to a lack of data, the environmental accounts do not, at this time, include a measure of the value of three other important assets: land, water and wildlife. Fragmentary evidence suggests some depletion of water and wildlife, but the effects are expected to be small relative to changes in the other components of national wealth. The omission of land is more serious and requires some comment. Information from industrialised countries indicate that land is a major asset. In Australia, for example, land accounted for roughly 40 per cent of national wealth (Lange, 2002).

While physical accounts for land are relatively easy to construct, monetary accounts have not been constructed for Namibia because, among other reasons, no market prices exist for the very large portions of the land that are subject to traditional communal tenure regimes. In Namibia, 44 per cent of land is privately held; roughly 15 per cent is state owned and 41 per cent is held under communal tenure. Even private land has not been taxed, so there is no assessed value that can be used for constructing monetary land asset accounts.⁴

Land – used mainly for agriculture – does not change in extent, so the per capita volume of land has declined over time with population growth. There has been serious degradation of commercial grazing land, but agricultural productivity has also improved, at least partly compensating for degradation (Lange et al., 1998). The cessation of hostilities in northern Namibia after Independence allowed more productive use of land under communal tenure. Uncertainty over land reform may depress commercial land values. It is difficult to assess the net effect of these different forces. With unchanging land assets and a growing population, per capita land declines; hence, the omission of land results in an overestimate in the growth (or underestimate in the decline) of total per capita wealth.

⁴ A commercial land tax has been introduced and may provide information for land valuation in future accounts.

3. NATIONAL WEALTH IN NAMIBIA

This section reviews the level and composition of wealth in Namibia over the past 20 years to determine whether natural capital has been managed in a manner that promotes sustainability, i.e. whether per capita wealth is non-decreasing, and whether depletion of natural capital is compensated for by an increase in other forms of wealth. Discussion begins with a review of the physical and monetary accounts for natural capital. The trends in per capita wealth are compared to trends for Botswana.

3.1 *Monetary accounts for natural capital*

In current prices, natural capital has increased between 1980 and 2000 (from \$N2,352 million to \$N13,375 million) but when the asset values are adjusted for inflation, the depletion of natural capital becomes clear (Table 2). In constant 1995 prices, the value of Namibia's natural capital fell by 25 per cent from \$N11,330 million in 1980 to \$N8,476 million in 2000. The loss of asset value is almost entirely due to depletion of minerals. Fisheries, which only became part of Namibia's national wealth in 1990, have grown in value over the decade.

Depletion of all minerals compounded by declining real rents for diamonds and uranium caused mineral assets to lose 55 per cent of their asset value from 1980 to 2000. The decline in real rent is not surprising. The global market for uranium has not been good for some time, so that although the reserves have not yet been exhausted, there is not a strong market for uranium. Diamonds, the most valuable mineral, have been mined since the beginning of the 20th century. Initially, the reserves consisted of relatively high quality gem and near-gem stones, which could be mined relatively cheaply. But by the end of the 1980s, Namibia had largely exhausted its most profitable diamond reserves and moved to offshore diamond mining. The offshore reserves are more expensive to mine and are not as high quality. Recent discoveries increased diamond reserves and diamond assets increased in value from 1998.

Although fish provide a bright spot in the Namibian economy, the asset value has fluctuated rather wildly over the past decade due to unpredictable environmental events that affect fish stocks. Despite governments' goal to restore fisheries to high levels of stocks last seen in the 1960s, there has been little or no stock growth in the 12 years since Independence (Lange 2003b). At such a depleted level, Namibia's fisheries are less easy to manage and even more vulnerable to shocks and overexploitation. It seems unlikely that the fish stocks will recover to earlier levels. At the same time, there is increasing pressure from the fishing industry for higher levels of exploitation. Dependence on a volatile asset increases the vulnerability of the economy to external shocks. The trends for minerals and fisheries are discussed in greater detail in (Lange, 2003a and 2003b).

Table 2 Value of natural capital in Namibia, 1980–2000 (\$N million in current and constant 1995 prices)

	Current Prices			Constant 1995 Prices		
	Minerals	Fish	Total natural capital	Minerals	Fish	Total natural capital
1980	2,352	-	2,352	11,330	-	11,330
1981	1,778	-	1,778	8,481	-	8,481
1982	1,624	-	1,624	6,737	-	6,737
1983	1,534	-	1,534	5,793	-	5,793
1984	1,451	-	1,451	4,908	-	4,908
1985	1,923	-	1,923	5,181	-	5,181
1986	2,695	-	2,695	6,583	-	6,583
1987	3,036	-	3,036	6,806	-	6,806
1988	3,567	-	3,567	6,565	-	6,565
1989	3,883	-	3,883	6,188	-	6,188
1990	3,475	1,526	5,001	5,289	2,323	7,612
1991	3,212	1,250	4,463	4,670	1,818	6,487
1992	2,878	1,916	4,795	3,820	2,543	6,362
1993	2,136	2,699	4,835	2,611	3,300	5,911
1994	1,888	3,449	5,337	1,996	3,645	5,641
1995	1,709	3,181	4,889	1,709	3,181	4,889
1996	2,397	1,672	4,069	2,094	1,460	3,554
1997	3,060	2,407	5,467	2,496	1,963	4,459
1998	4,034	4,995	9,029	3,031	3,753	6,784
1999	4,575	4,440	9,015	3,226	3,131	6,357
2000	7,952	5,423	13,375	5,039	3,437	8,476

- indicates a zero value

Source: Based on Lange, 2003a; 2003b.

3.2 Total per capita national wealth

The previous section has shown that the value of Namibia's natural capital has decreased over the past two decades, largely the result of the depletion of mineral assets. An assessment of total wealth – produced capital, natural capital and foreign financial assets – will show that the depletion of natural capital has not contributed to building wealth.

In current prices it appears that Namibia's national wealth has increased enormously from 1980 to 2000 (Table 3). However, if the figures are adjusted for inflation, Namibia's real wealth has increased only about 20 per cent (in constant 1995 prices). In 1980, natural capital – at that time only minerals – accounted for nearly 25 per cent of total wealth. The share of natural capital fell from then, and now accounts for only 15 per cent of national wealth, even with the addition of fisheries wealth in 1990. Net foreign financial assets form an insignificant, and sometimes negative, share of national wealth. On a per capita basis, Namibia's real wealth has fallen sharply: there is nearly one-third less capital for each Namibian in 2000 than in 1980.

Table 3 National wealth of Namibia, 1980-2000**A. Current prices, millions of \$N**

	Produced Capital		Natural Capital	Net Foreign Financial Assets	Total
	Private	Public			
1980	3,183	2,574	2,352	NA	8,108
1981	3,679	3,106	1,778	NA	8,563
1982	4,304	3,731	1,624	NA	9,659
1983	4,916	4,403	1,534	NA	10,853
1984	5,188	4,839	1,451	NA	11,478
1985	5,875	5,612	1,923	NA	13,410
1986	6,916	6,683	2,695	NA	16,293
1987	7,687	7,704	3,036	NA	18,428
1988	8,831	9,043	3,567	NA	21,440
1989	10,419	10,543	3,883	-895	23,949
1990	11,910	12,080	5,001	-738	28,253
1991	13,228	13,620	4,463	-476	30,835
1992	14,660	14,974	4,795	-546	33,883
1993	16,121	15,999	4,835	379	37,334
1994	17,888	17,131	5,337	368	40,723
1995	20,344	18,691	4,889	8	43,932
1996	23,314	20,439	4,069	-259	47,563
1997	26,105	22,373	5,467	877	54,822
1998	29,362	23,789	9,029	944	63,124
1999	32,808	25,509	9,015	2,262	69,594
2000	35,287	27,022	13,375	2,609	78,293

B. Constant 1995 prices (\$N millions)

	Produced Capital		Natural Capital	Net Foreign Financial Assets	Total	Per capita wealth
	Private	Public				
1980	19,132	15,305	11,330	NA	45,766	45,616
1981	19,285	16,039	8,481	NA	43,805	42,398
1982	19,391	16,651	6,737	NA	42,778	40,159
1983	19,061	17,009	5,793	NA	41,863	38,118
1984	18,749	17,257	4,908	NA	40,914	36,134
1985	18,403	17,563	5,181	NA	41,146	35,246
1986	18,308	17,753	6,583	NA	42,643	35,430
1987	17,974	17,929	6,806	NA	42,709	34,418
1988	17,807	18,074	6,565	NA	42,446	33,177
1989	17,955	18,128	6,188	-1,426	40,845	30,966
1990	18,176	18,282	7,612	-1,124	42,946	31,578
1991	18,101	18,353	6,487	-692	42,249	29,966
1992	18,457	18,557	6,362	-725	42,652	29,478
1993	18,842	18,447	5,911	463	43,663	29,405
1994	19,508	18,538	5,641	389	44,076	28,924
1995	20,344	18,691	4,889	8	43,932	28,092
1996	21,604	18,793	3,554	-226	43,725	27,244
1997	22,389	18,941	4,459	715	46,504	28,235
1998	23,815	19,020	6,784	709	50,328	29,775
1999	25,161	19,149	6,357	1,595	52,263	30,129
2000	25,864	19,350	8,476	1,653	55,343	31,089

Source: Produced capital: CBS, 1996; 2001; 2002 and unpublished data in constant prices. Natural capital: Lange, 2003a; 2003b. Foreign financial assets: IMF, 2001 and Bank of Namibia, 2001.

Trends in the years after 1990 are particularly important because Independence provided an opportunity for new resource management and development policies. Real wealth in 1990 was \$N31,578 per person; wealth continued to decline until 1996, when it reached \$N27,244 per person, its lowest point in 20 years. But per capita wealth has since recovered to \$N31,089. The growth of the last few years is mostly due to private sector manufactured capital and natural capital. Natural capital, especially fish, is highly volatile. Although there is some scope for continued increases, as new mines are brought into production, it is unlikely that there will be major growth in wealth from natural capital, so the economy will depend on private sector investments for asset growth.

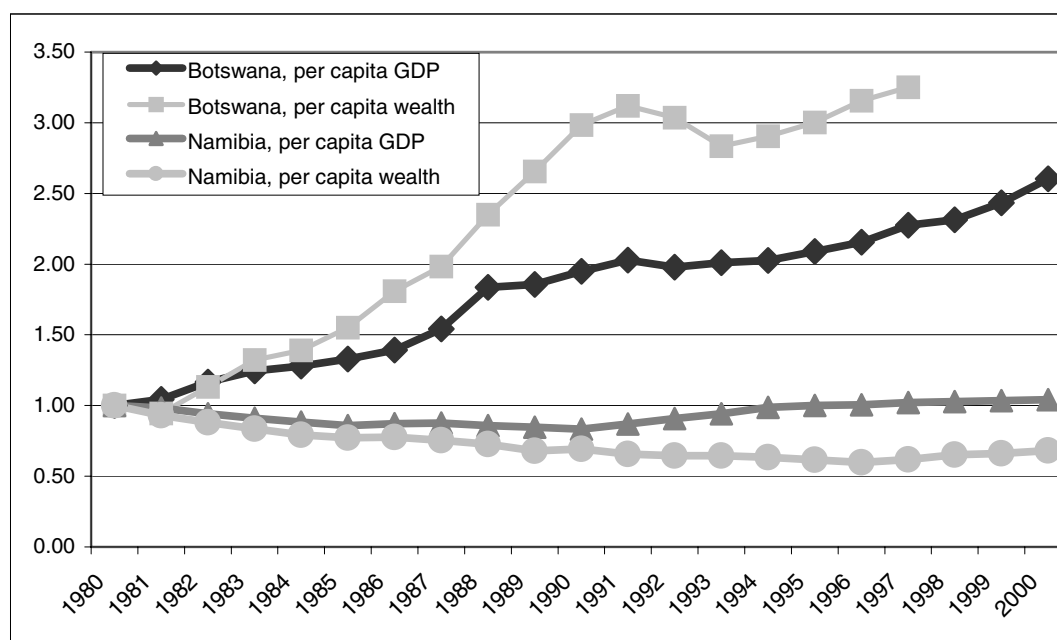
3.3 National wealth and well-being in Namibia and Botswana

Economic well-being depends on wealth. Therefore, one would expect trends in indicators of well-being to reflect trends in per capita wealth. National income, despite its widely acknowledged weaknesses, is the most commonly used indicator of well-being (Dasgupta, 2001; 2002). Figure 1 provides an index of growth of real per capita wealth and real per capita GDP for Namibia and Botswana from 1980 to 2000. See Lange and Wright, forthcoming; Lange et al., 2003; and Lange, 2003c, for a detailed discussion of Botswana's national wealth.

In 1980, national wealth in Namibia was 75 per cent greater than in Botswana (Lange, 2003c). Over the last two decades, Botswana used its natural capital to build national wealth, which brought about growth in income. Real per capita wealth more than doubled by 1997, while income increased 160 per cent by 2000. All forms of wealth increased in Botswana, but especially net foreign financial assets, which accounted for 18 per cent of national wealth by 1997. The growth of national wealth is consistent with Botswana's development policy, which explicitly aimed to reinvest all mineral revenues for national development, investments that included public infrastructure, human capital and foreign financial assets. In addition, by relying on rents from minerals as the major source of government revenue, Botswana was able to keep its corporate tax rate relatively low, encouraging private sector investment.

Botswana's growth in per capita wealth and GDP is not without weaknesses: although both public and private capital have grown faster than population, wealth creation has been dominated by the public sector. Furthermore, the economy is still dominated by mining and the declining share of private capital reflects slow progress in achieving government's objective of economic diversification.

Figure 1 Index of real per capita wealth and per capita GDP in Namibia and Botswana, 1980–2000 (1980=1.00)



Source: Namibia: Index of wealth calculated from Table 3; GDP from unpublished data from CBS. Botswana: based on Lange and Wright, forthcoming.

The Namibian case is somewhat more complex. From 1980 to 1990, both per capita GDP and per capita wealth declined, by 17 per cent and 31 per cent, respectively. This is not surprising since the decades prior to Independence were marked by civil conflict and extreme political uncertainty –

factors that increase transactions costs, discourage investment and drain resources from productive activities. There was clearly no policy of reinvestment of rents from non-renewable resources that were being depleted. The end of hostilities in 1990 brought about a reduction in these costs, but wealth continued to decline. It recovered later in the 1990s, but only slightly.

Per capita GDP increased from 1990 to 1995, returning the level of 1980. However, it has not changed much since that time. The initial increase in GDP may be attributable to the end of hostilities, which brought the return of some skilled workers who had gone into exile (increased human capital) and allowed more productive use of existing resources – fisheries is a good example (increased social capital). While government has invested heavily in human capital (education and healthcare), such investments are likely to yield substantial benefits only in the longer-term. Private sector investment has grown very slowly and investment in public infrastructure has not been sufficient to keep up with population growth.

Whatever the role of unmeasured increases in human and social capital, it is clear that Namibia is liquidating its capital and not investing fast enough to keep up with population growth. Produced capital is declining; some fisheries have recently been closed or severely restricted (pilchard and orange roughy); new mines may replace depleted mineral resources but these mines have a limited time horizon. This is reflected in slow or stagnant growth of per capita income.

4. CONCLUDING REMARKS

Sustainable development requires non-declining levels of per capita wealth. In resource-rich economies, this requires that natural capital be transformed into other forms of capital to build wealth. However, there has been growing concern that economic growth, especially in resource-rich developing countries, has been achieved by liquidation of natural capital without adequate provision for replacement of these assets for future generations. Although natural capital may be a large component of wealth, it has not yet been systematically included in the national economic accounts of most countries. Consequently, conventional measures of well being, such as GDP or net domestic product, are misleading indicators of sustainability.

Recognising the important role of wealth, economic development is increasingly viewed as a process of ‘portfolio management’ that optimises the management of each asset: produced, natural, human and social capital. The government of Namibia has had no explicit policy to use natural capital to build national wealth, either under the pre-Independence government based in South Africa or under the post-Independence government established in 1990. In 1980, Namibia’s per capita wealth was 75 per cent greater than Botswana’s, but Namibia followed a policy of liquidating its capital even after Independence, and per capita GDP growth has been slow. By contrast, Botswana developed an explicit policy to reinvest rents from its mineral wealth in other types of assets, resulting in a remarkable growth in per capita wealth and national income.

Wealth as an indicator of sustainable development requires that all forms of capital are included and that they are properly measured. The implications of some of these omissions were discussed in section 2. Certainly the most serious omission is human and social capital. Since Independence, Namibia has invested heavily in human capital, roughly 30 per cent or more of the government budget (Bank of Namibia, 2001). While the measure of total wealth presented here is an important step toward a comprehensive measure of wealth, human capital continues to present a major challenge, especially in countries like Namibia, which are struggling with the HIV/AIDS pandemic.

5. REFERENCES

- Arrow, K., P. Dasgupta, and K. Mäler. 2003. Evaluating projects and assessing sustainable development in imperfect economies. *Environmental and Resource Economics* (in press).
- Auty, R.M. 1993. *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. Routledge, London, UK.
- Auty, R.M. and R. Mikesell. 1998. *Sustainable Development in Mineral Economies*. Clarendon Press, Oxford.
- Bank of Namibia. 2001. *Annual Report 2000*. Bank of Namibia, Windhoek, Namibia.
- _____. 1995. *Annual Report 1994*. Bank of Namibia, Windhoek, Namibia.
- Central Bureau of Statistics. 2001. *National Accounts 2000*. National Planning Commission, Windhoek, Namibia.
- _____. 2002. *Population Census of Namibia*. National Planning Commission, Windhoek, Namibia.
- _____. 1996. *National Accounts 1995*. National Planning Commission, Windhoek, Namibia.
- Dasgupta, P. 2001. *Human Well-Being and the Natural Environment*. Oxford University Press, Oxford, UK.
- Dasgupta, P. 2002. Economic Development, Environmental Degradation and the Persistence of Deprivation in Poor Countries. Paper presented at the World Bank, May, 2002.
- Dasgupta, P. and K. Mäler. 2000. Net national product, wealth, and social well-being. *Environment and Development Economics* 5: 69-94.
- _____. 2001. Wealth as a criterion for sustainable development. Beijer Institute Discussion Paper Series No. 140.
- Hamilton, K. 2002. Sustainable per capita welfare with growing population: theory and measurement. Paper presented at the Second World Congress of Environmental and Resource Economists. Monterey, California, 23-27 June.
- Hamilton, K. and M. Clemmens. 1999. Genuine savings rates in developing countries. *World Bank Economic Review* 13 (2): 336-356.
- Hartwick, J. 1977. Intergenerational equity and the investing of rents from exhaustible resources. *American Economic Review* 67(5): 972-974.
- Heal, G. and B. Kristrom. Forthcoming. National income and the environment, in T. Tietenberg and H. Folmer, eds., *International Yearbook of Environmental and Resource Economics 2002/2003*. Edward Elgar, Cheltenham, UK.
- International Monetary Fund. 2001. *International Financial Statistics Yearbook*. IMF, Washington, D.C., USA.
- Kunte, A., K. Hamilton, J. Dixon, and M. Clemmens. 1998. Estimating national wealth: methodology and results. Environment Department Papers, Environmental Economics Series No. 57, Washington, D.C.: The World Bank.
- Lange, G.. 2001. The contribution of minerals to sustainable development in Botswana: natural resource accounts for minerals. Final Report to the Botswana Natural Resource Accounting Programme. Gaborone, Botswana.
- _____. 2002. Environmental accounts: uses and policy applications. World Bank Environment Department Paper No. 87. Washington, D.C.: World Bank.
- _____. 2003a. The contribution of minerals to sustainable economic development: mineral resource accounts in Namibia. *Research Discussion Paper No. 54*. Directorate of Environmental Affairs, Ministry of Environment and Tourism, Windhoek, Namibia.
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- _____.2003c. Wealth, natural capital, and sustainable development: the contrasting examples of Botswana and Namibia. Unpublished Paper, Institute for Economic Analysis, New York University, New York, USA..
- Lange, G., J.I. Barnes, and J. Motinga. 1998. Cattle numbers, herd productivity, and land degradation in Namibia. *Development Southern Africa* 15: (4): 555-572.
- Lange, G., R. Hassan, and K. Hamilton. 2003. *Environmental Accounting in Action: Case Studies from Southern Africa*. Cheltenham, UK: Edward Elgar Publishers. (in press).
- Lange, G. and M. Wright. forthcoming. Sustainable development in mineral economies: the example of Botswana. *Environment and Development Economics*.
- Mäler, K. 1991. National accounts and environmental resources. *Environmental and Resource Economics* 1 (1): 1-15.
- Pearce, D. and G. Atkinson. 1993. Capital theory and the measurement of sustainable development: an indicator of weak sustainability. *Ecological Economics* 8: 103-108.
- Pezzey, J. 1992. Sustainable development concepts: an economic analysis. World Bank Environment Paper No. 2.
- Sachs, J. and A. Warner. 1995. Natural resource abundance and economic growth. Discussion Paper No. 517a, Harvard Institute for International Development.
- Solow, R. 1974. Intergenerational equity and exhaustible resources. *Review of Economic Studies* 41: 29-45.
- _____. 1986. On the intergenerational allocation of natural resources. *Scandinavian Journal of Economics* 88: 141-149.
- United Nations. 2002. *Integrated Environmental and Economic Accounting*. Available on the UN website: www.un.org
- World Bank. 1995. *Namibia Public Expenditure Review*. The World Bank, Washington, D.C., USA.
- World Bank. 2002. *World Development Report 2002*. Washington, D.C.: World Bank

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