MINING AND SUSTAINABLE DEVELOPMENT: MEASURING PROGRESS

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DANIEL LIMPITLAW[1] and MARIE HOADLEY[1]

[1]School of Mining Engineering, University of the Witwatersrand
Private Bag 3, P.O. Wits, 2050
South Africa
limpitlaw@egoli.min.wits.ac.za

ABSTRACT

Mining has potentially large negative impacts on the biophysical environment and on the communities where mines operate. When mines are run efficiently, with effective environmental management programmes and in partnership with the affected communities, the wealth created may more than offset the cost associated with negative impacts. In such cases, the mining operations may be regarded as contributing to sustainable development (SD) through weak sustainability[1]. A critical variable in determining the net contribution of mining companies to SD is the degree of transparency with which the companies operate. In environments with high degrees of transparency, wealth creation and positive socio-environmental impacts are maximised. This paper assesses published reports of companies and their performance in contributing to SD by comparing changes in key SD indicators over time.

1 INTRODUCTION

The concept of sustainable development (SD) only has meaning within a stated development context and within a defined time period. Extractive industries, such as mining and mineral processing, eventually exhaust their ore bodies. If SD is to have meaning in that context, the financial and developmental benefits of mining must continue after the ore deposit has been exhausted.

Mining companies must be profitable if they are to stay in business. Profitability is the traditional measure for assessing a company's performance, but it is not a sufficient indicator of long-term viability. Economic efficiency does not necessarily result in sustainability and therefore, to assess whether a company promotes sustainability or not, the social and environmental impacts associated with its operations must also be analysed.

Recent initiatives in corporate governance[2] have resulted in an acceptance by leading companies that corporate reports have to reflect, accurately, transparently and verifiably, the company's efficiencies, health and safety in the workplace and interactions between communities and companies.

Only a small number of mining and metals companies have produced reports that can be used to assess their progress towards SD. These companies are the frontrunners, and are creating the

[1] Weak sustainability allows for the conversion of natural capital into economic goods and services.
[2] Such as the Global Mining Initiative (GMI) and the reporting guidelines developed by the Global Reporting Initiative (GRI).

benchmarks for SD reporting. This paper provides an assessment of the real costs and benefits of doing business for three of these companies. Anglo American, BHP Billiton and Rio Tinto are global, diversified companies whose principal interests are mining and metals. The data used in this assessment has been extracted from reports published by these companies.

1.1 Sustainable Development

The Southern African Development Community's vision for sustainable development (as presented by Hoadley *et al*., 2002) requires:

- acceleration of economic growth with greater equity and self-reliance;
- improvement of the health, income and living conditions of the poor majority; and
- equitable and sustainable use of the environment and natural resources for the benefit of present and future generations.

The real costs and benefits of wealth creation by large, multi-national companies should be assessed against this vision.

The three companies have been reviewed in terms of the reporting of their impacts on the economic, environmental, social and governance components of SD. Indicators used by the companies are presented here as measures of change in these impacts.

The largest datasets have been used when graphing each indicator. In most instances, indicator values predating 2001 are not available for BHP Billiton as the company was formed in that year through the merger of BHP Ltd and Billiton plc.

The three companies have different commodity profiles. They are affected differently by commodity cycles and their wastes and effluents production depends on the different natures of their activities. Their operations are not evenly distributed geographically and they are thus also differently affected by the development status of their host countries. These differences are not considered in this paper. All of the indicators presented below are considered in terms of net effect on SD.

2. INDICATORS OF PROGRESS IN SUSTAINABLE DEVELOPMENT

2.1 Economic component

Company turnover, shown in Figure 1, is an indicator of the level of participation by the company in the economy. Greater levels of participation may justify greater environmental costs while providing greater social development benefits. The level of participation must therefore be borne in mind when assessing indicators in other components of SD.

Profit is a measure of the economic efficiency with which a company operates. It reflects the wealth generated by the company. Companies that are not profitable cannot make a contribution to SD. The graph in Figure 2 shows that all three companies have an upward trend in profits over the period for which data are available. These companies are creating more wealth over time and are in a position to make positive contributions to SD.

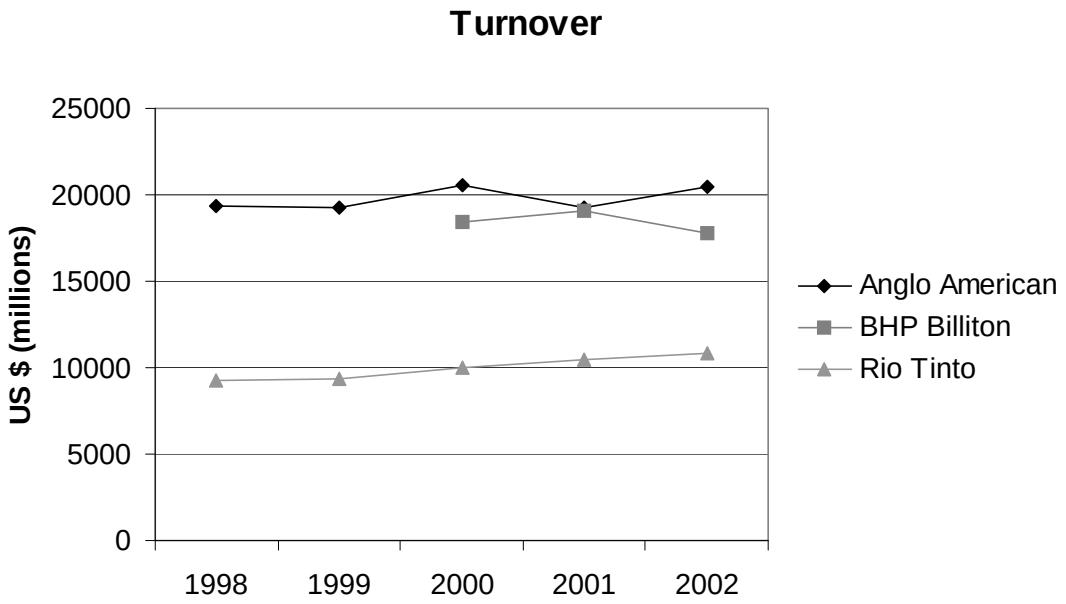

Figure 1. Company turnover (data: Anglo American, 2000a, 2001a, 2002a & 2003a; BHP Billiton 2001a & 2002a; Rio Tinto 2002a & 2003a).

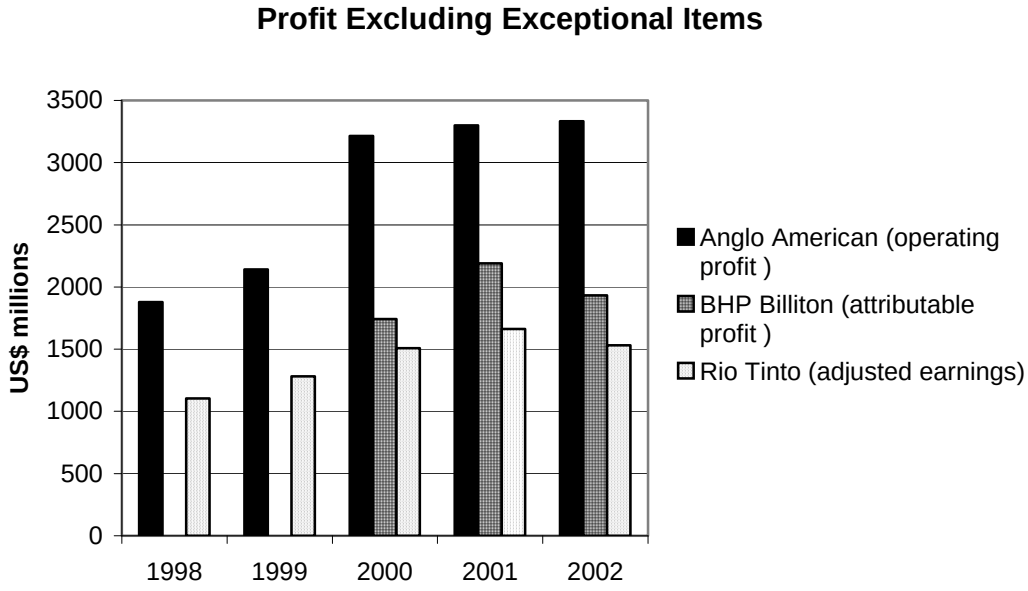

Figure 2. After tax profit (data: Anglo American, 2000a, 2001a, 2002a & 2003a; BHP Billiton 2001a & 2002a; Rio Tinto 2002a & 2003a).

Wages and salaries indicate the direct financial contribution made by companies to individuals in return for their labour. This is one of the ways in which wealth is distributed. Companies increase productivity by employing fewer people. These people function at higher levels of productivity and are consequently paid more. This increases the economic benefit to the employees remaining with the company, but direct contributions to livelihoods in the broader society are reduced as jobs are lost. This is particularly important in developing countries where each wage earner may support more than six dependants. The data presented in Figures 3 and 4 under-represent the direct economic benefit derived by society, as contractors are not included. In many instances, these make up a significant proportion of the total workforce.

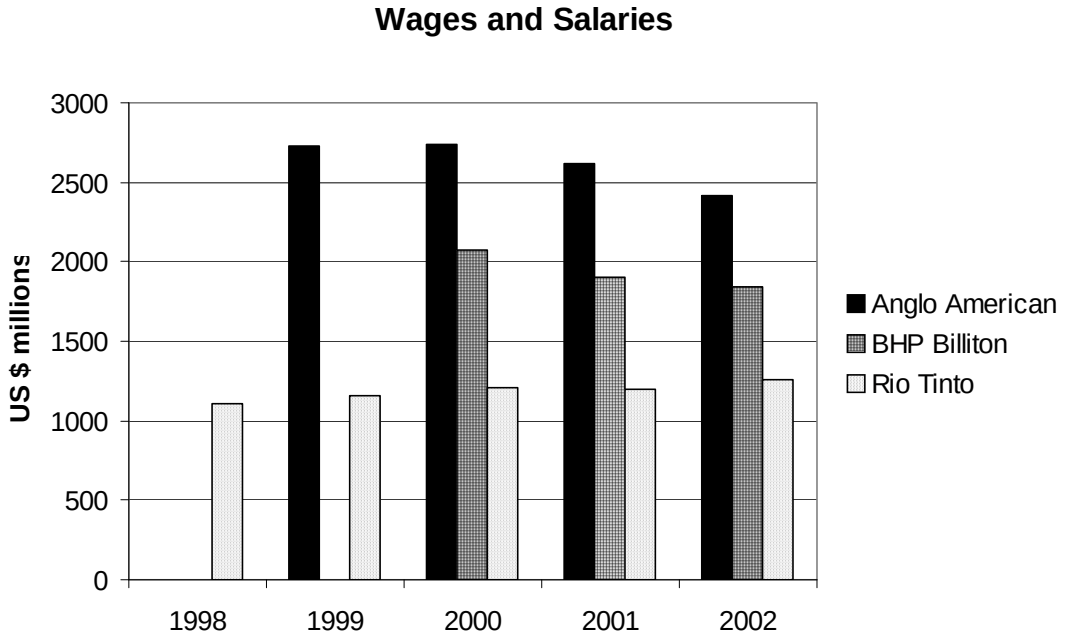

Figure 3. Employee remuneration (data: Anglo American 2001a, 2002a & 2003a; BHP Billiton 2002a, Rio Tinto 2000a, 2001a & 2003a).

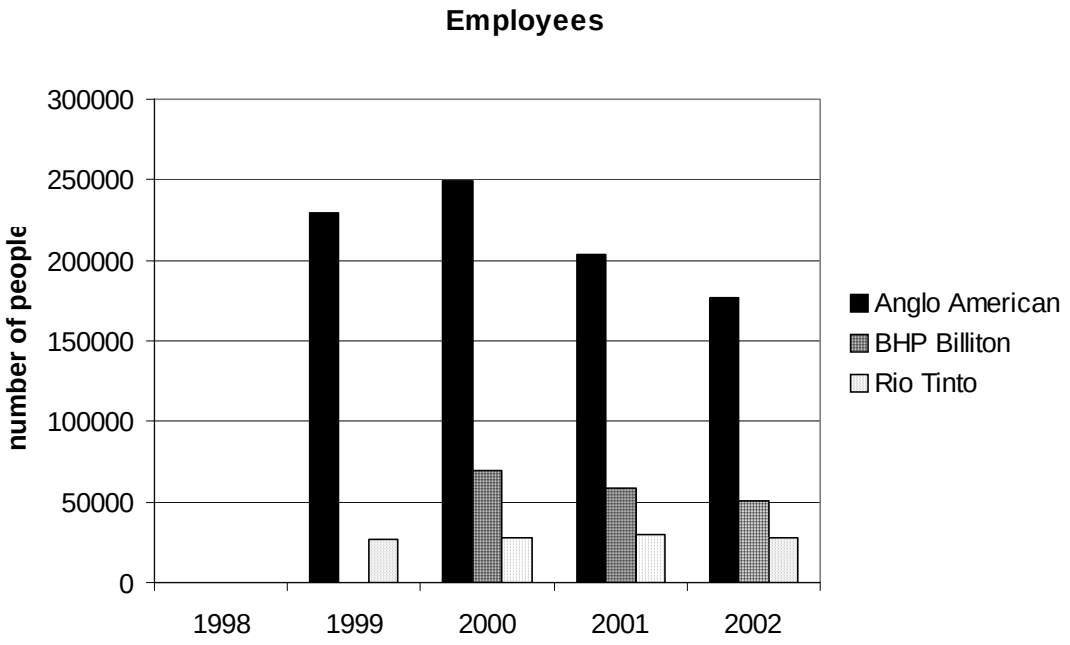

Figure 4. Employees (excluding contractors and employees of joint-ventures and associates and contractors) (data: Anglo American 2001a, 2002a & 2003a; BHP Billiton 2002a; Rio Tinto 2003a).

Company reports provide information on the number of employees and on the amount paid to these employees. This facilitates the calculation of average per capita remuneration – a complex indicator which provides information on the average direct economic benefit derived by employees through wages and salaries. The indicator also measures the level at which people are employed by the company, the currency in which they are paid and the cost of living of the country in which they work. The indicator does not provide a measure of the standard of living enjoyed by the employees. This makes comparison between companies difficult and further work is required before this indicator can be used in detailed analysis.

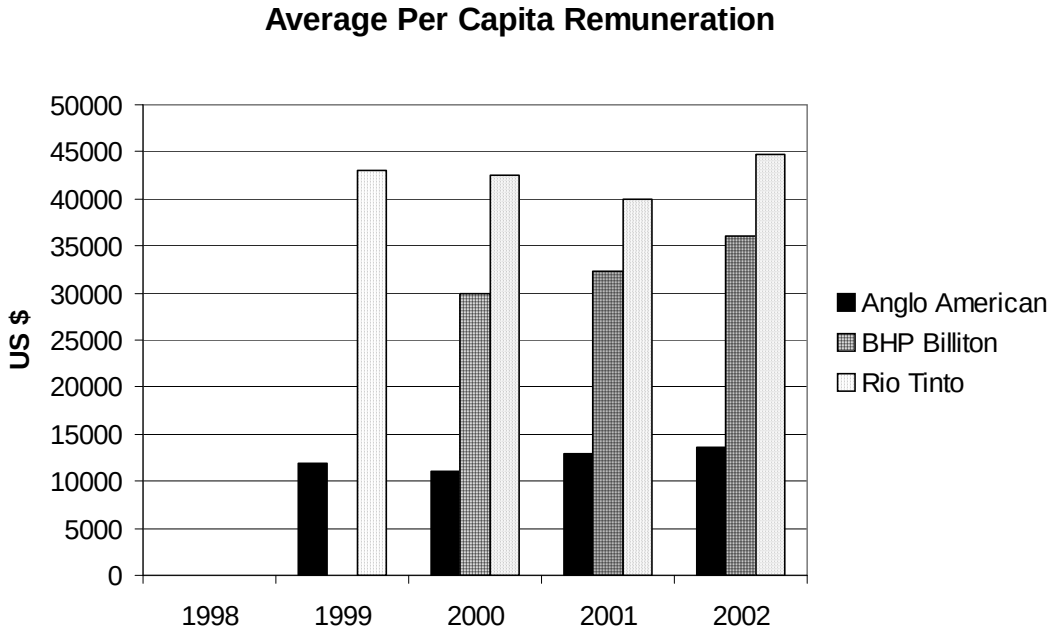

Figure 5. Average direct economic benefit derived by employees through wages and salaries (data: Anglo American 2001a & 2003a; BHP Billiton 2002a; Rio Tinto 2000a, 2001a & 2003a).

2.2 Environmental Component

Energy consumption, shown in Figure 6, is an indicator of emissions and resource consumption, and reductions are therefore important for making progress towards SD. While many operations have reduced the amount of energy used per tonne of product, thereby increasing their energy efficiency, overall production has increased and consequently the impact on the biosphere has also increased.

The weight of scientific opinion suggests that increasing concentrations of greenhouse gases (GHGs) in the atmosphere are responsible for climate forcing and will result in significant increases in global average temperature. This poses a serious threat to coastal settlements and food production. As in the case of energy use, increasing levels of production are driving up the rate of GHG emissions (see Figure 7), efficiency improvements notwithstanding. Attempts by companies to contain GHG emissions have thus far not resulted in a contribution to SD in the environmental component.

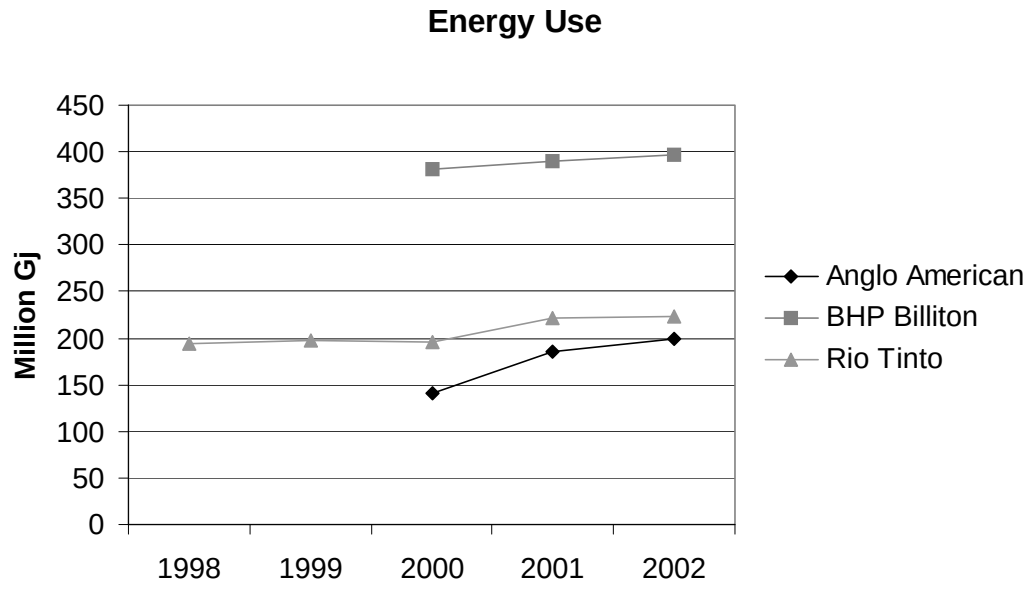

Figure 6. Energy consumption (data: Anglo American 2002b & 2003b; Billiton 2000b; BHP Billiton 2001b & 2002b; Rio Tinto 2003b).

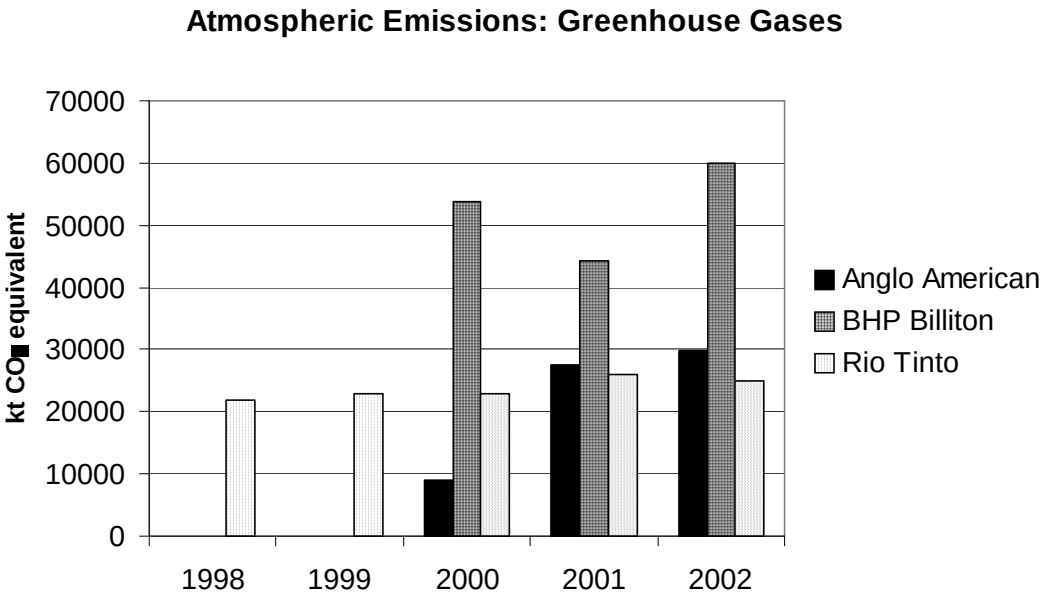

Figure 7. Greenhouse gas emissions (note: the Anglo American dataset for 2000 does not include emissions from electricity purchased) (data: Anglo American 2001b, 2002b & 2003b; BHP Billiton 2001b & 2002b; Rio Tinto 2003b).

Emissions of sulphur dioxide (SO_2) promote the formation of acid rain. This precipitation causes respiratory problems and damages crops and buildings. Companies have been successful in reducing total SO_2 emissions despite increases in production (see Figure 8).

All three companies operate in some of the driest parts of the earth: Australia and Southern Africa. In Southern Africa especially, water scarcity is likely to become a barrier to development. Water is important to livelihoods, particularly of the rural poor who depend on agriculture. Reduction in overall water usage is important to sustain development. Downward trends in water use are not apparent in Figure 9.

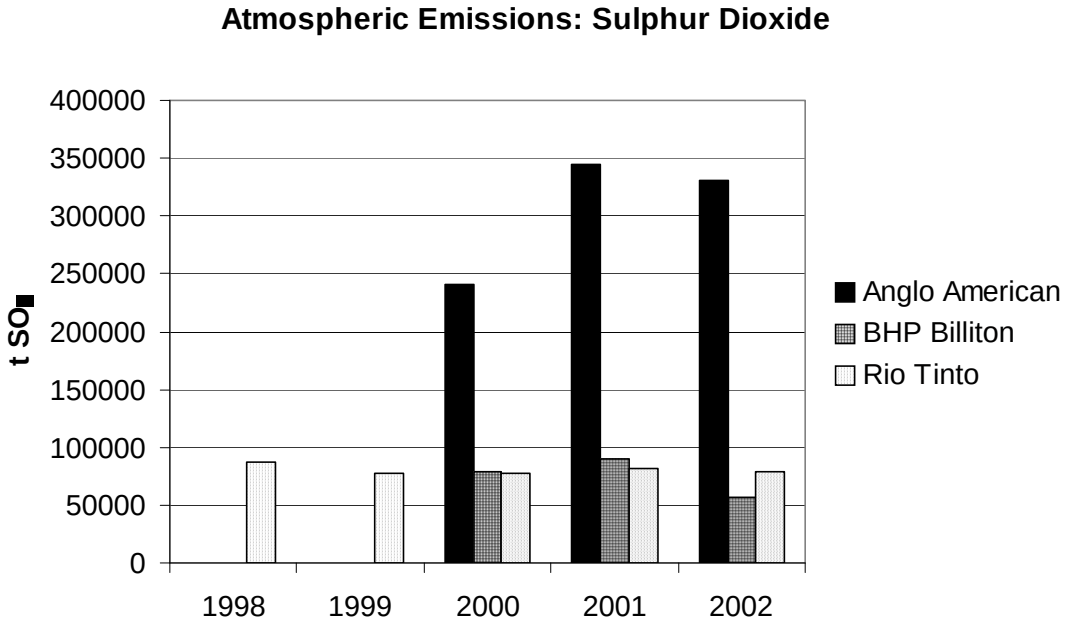

Figure 8. Sulphur dioxide emissions (data: Anglo American 2001b & 2002b; BHP Billiton 2001b & 2002b; Rio Tinto 2002b).

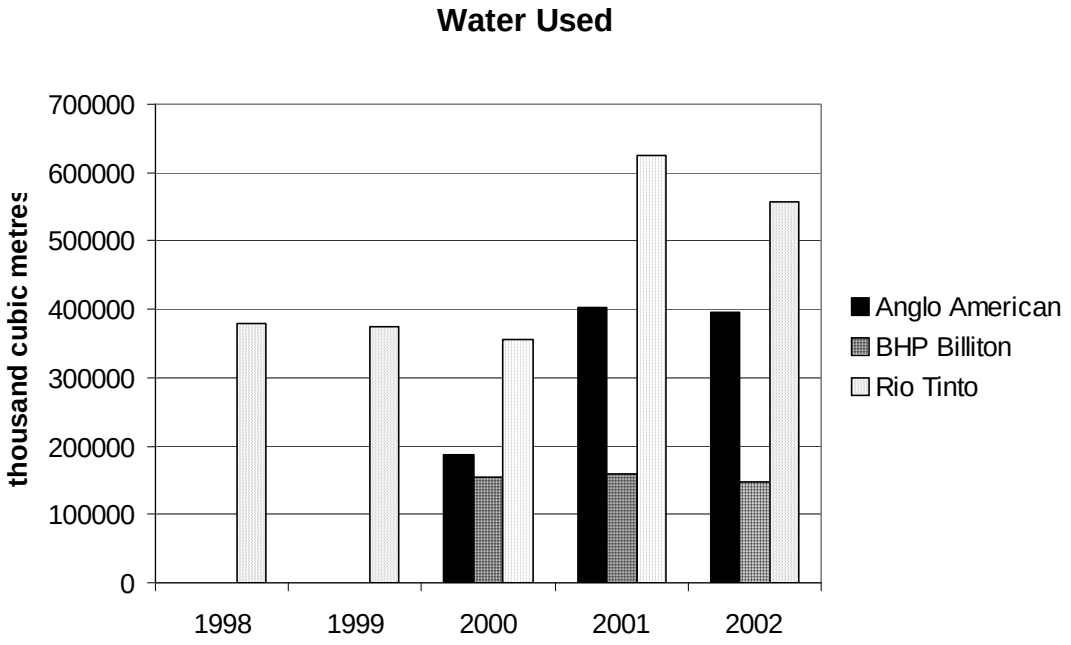

Figure 9. Water consumption excluding recycled water (data: Anglo American 2001b & 2003b; BHP Billiton 2001b & 2002b; Rio Tinto 2000b, 2002b & 2003b).

Relative to other land uses, mining has a small physical footprint, but the degree of disturbance is very high and rehabilitation is onerous. If left unrehabilitated, this land is not available for alternative land uses, and post mining wealth creation may not be possible. Figure 10 shows that the amount of land used is increasing.

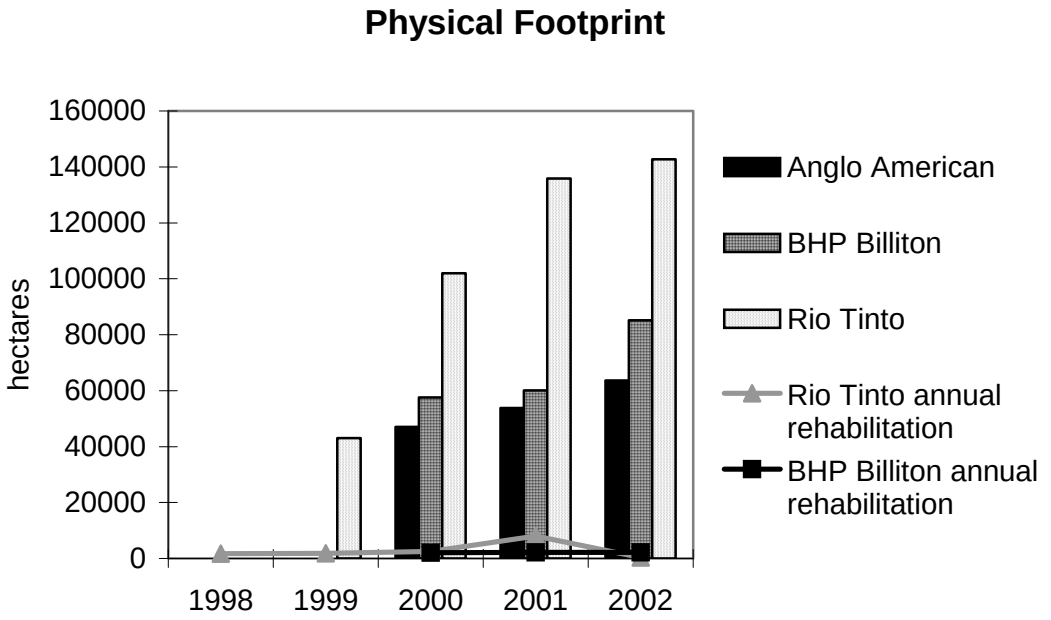

Figure 10. Physical footprint: land occupied, disturbed and the annual area of land rehabilitated (reported by BHP Billiton & Rio Tinto; Anglo American reports total land utilised) (data: Anglo American 2001b & 2003b; BHP Billiton 2001b & 2002b; Rio Tinto 2000b, 2001b & 2003b).

While different ways of reporting ISO accreditation certification, coupled with inconsistent reporting, makes it difficult to assess progress made, it is apparent that environmental management systems are being established at increasing numbers of operations. All three of the companies have a stated target of achieving 100% of their operations certified with ISO 14001.

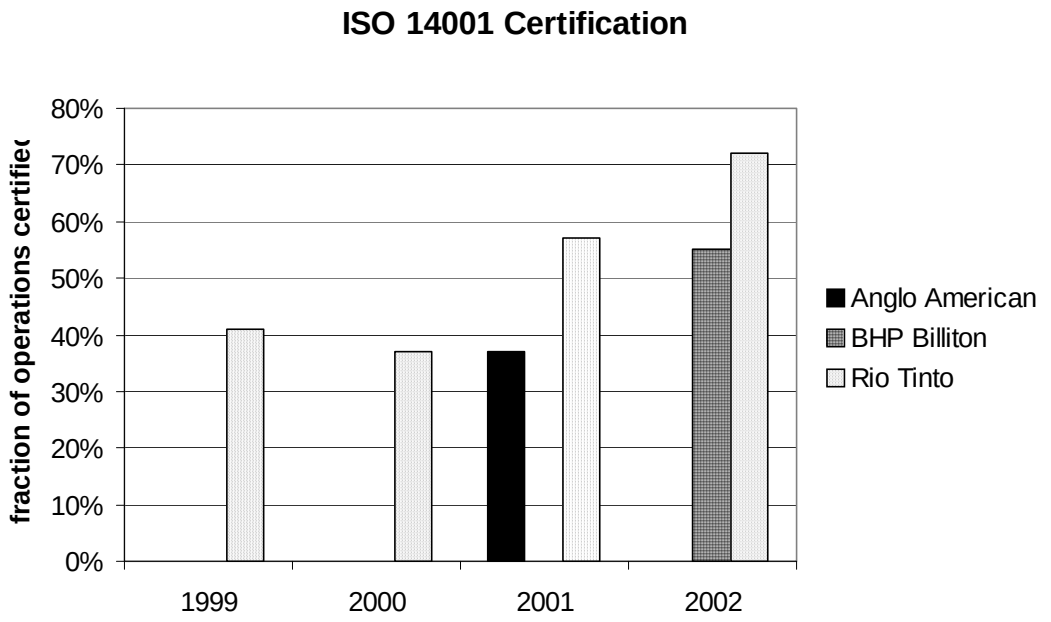

Figure 11. Proportion of company operations certified under ISO 14001 (Anglo American reports the number of sites certified but only provided this as a percentage of the whole company in 2001) (data: Anglo American 2002b; BHP Billiton 2002b; Rio Tinto 2000b & 2003b).

All three of the companies surveyed here report on fines incurred for environmental, health and safety transgressions (shown in Figure 12). This emphasises a commitment to transparency, even when the information provided is potentially damaging to their reputation.

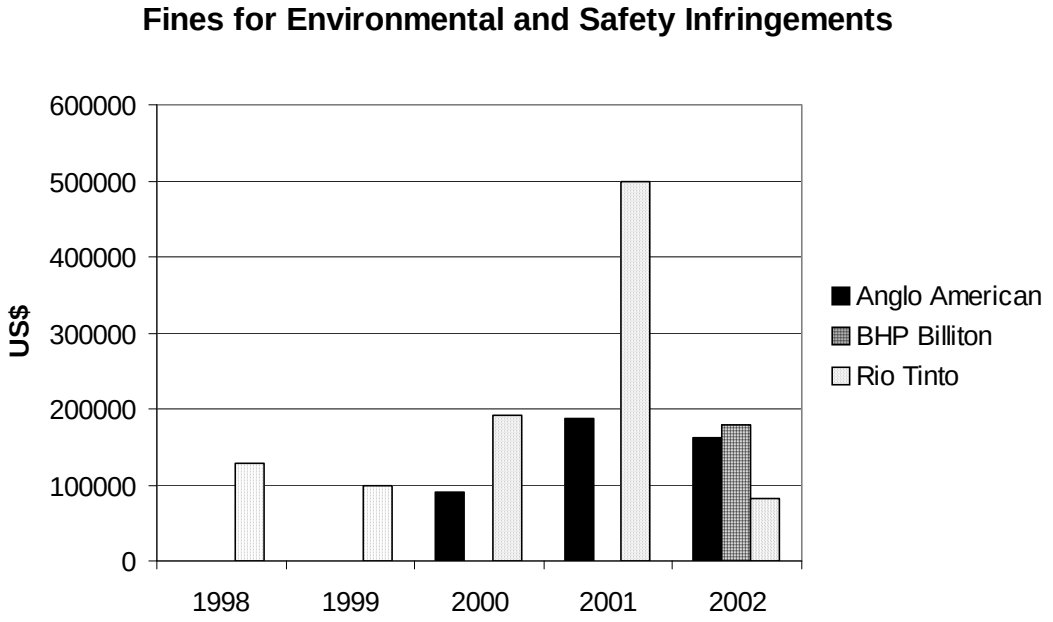

Figure 12. Fines for safety and environmental infringements. Before 2002, BHP Billiton reported fines in Australian dollars (data: Anglo American 2001b, 2002b & 2003b; BHP Billiton 2002b; Rio Tinto 2001a & 2003b).

2.3 Social Component

Social expenditure is an indicator of the amount invested by companies in the development of communities in their host countries. It is a direct financial contribution to equitable wealth distribution. Figure 13 shows that, over the review period, all the companies have increased their contribution to the social aspects of SD.

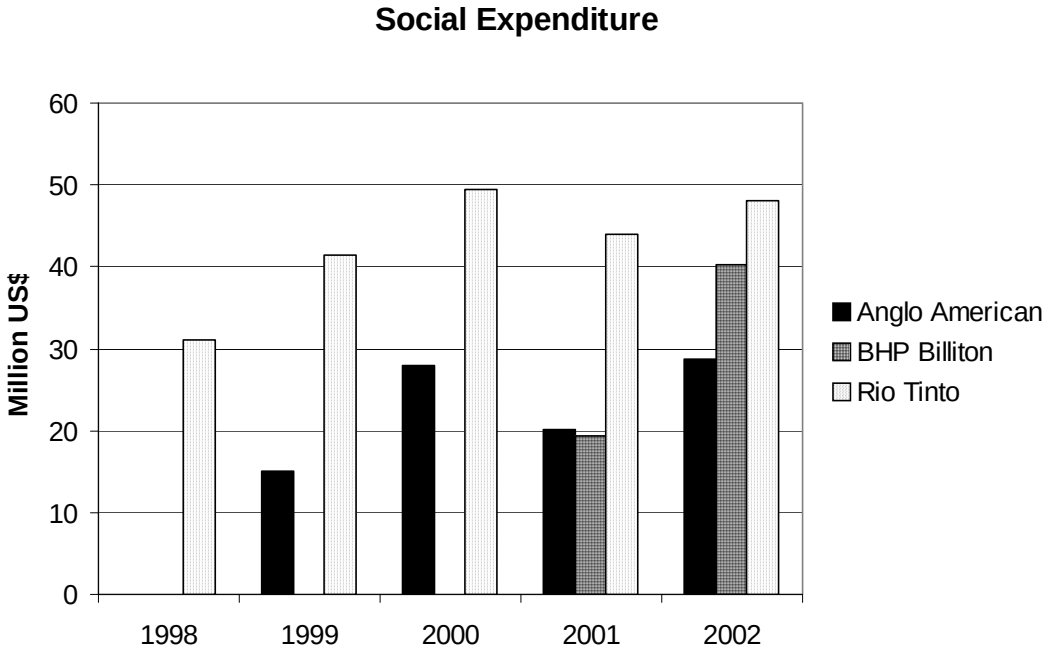

Figure 13. Social expenditure (data: Anglo American 2000a, 2001a, 2002b & 2003a; BHP Billiton 2001b, 2002b; Rio Tinto 1999a, 2000a, 2001a, 2002a, 2003a).

2.4 Governance Component

Safety in the workplace is of paramount importance. The companies surveyed emphasise this in their reports and generally show improving performance in safety management (see Figures 14 and 15).

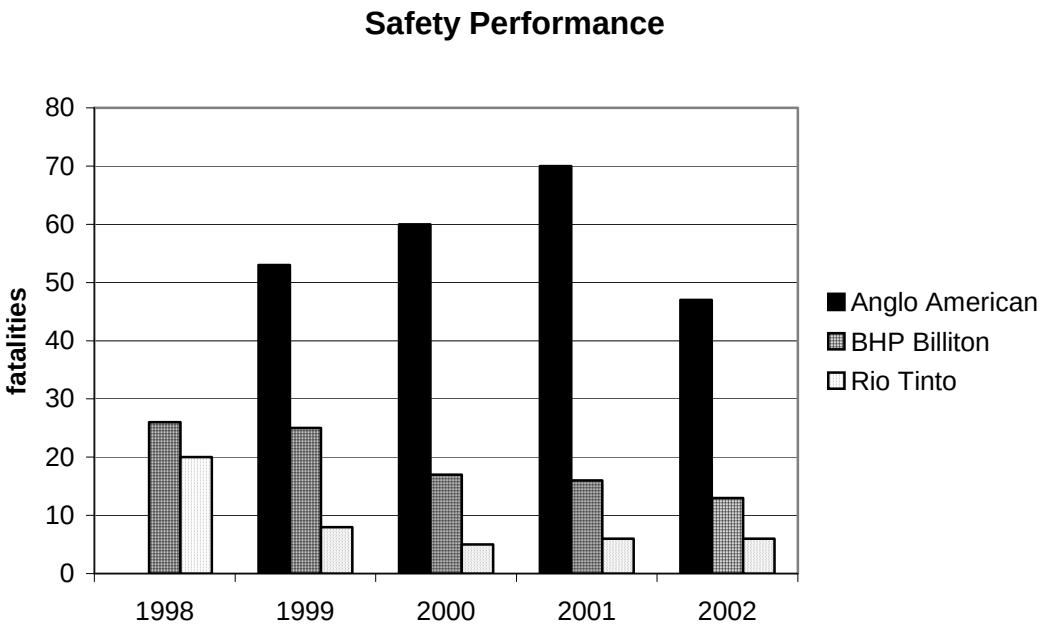

Figure 14. Employee and contractor fatalities reported by each company (data: Anglo American 2000a, 2001b & 2002b; BHP Billiton 2001b; Rio Tinto 1999a, 2000a, 2001a & 2003a).

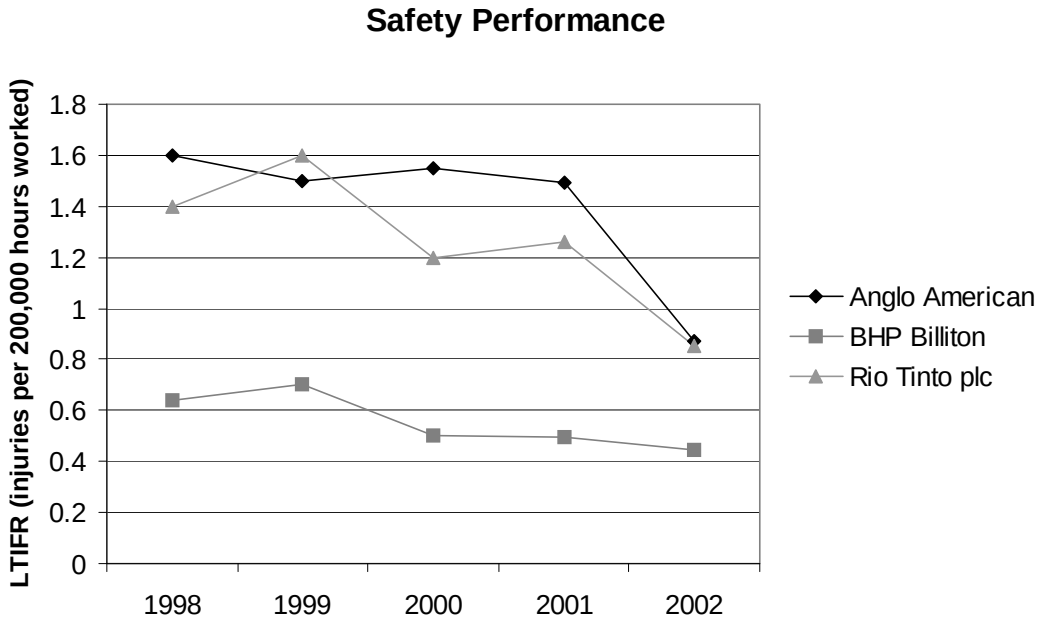

Figure 15. Lost Time Injury Frequency Rate (data[3]: Anglo American 2000a, 2001b & 2002b; BHP Billiton 2001b; Rio Tinto 1999a, 2000a, 2001a & 2003a).

The numbers of injuries and fatalities are a reflection of the degree to which employees take responsibility for their safety and the degree to which management ensure that they can. This can

[3] There are conflicting reports of Anglo American's LTIFR for the year 2000. Anglo American (2000b) has the rate at 1.49 while Anglo American (2003b) states that it is 60% higher than the 2002 rate (0.87), i.e. 2.18.

only be successful if there are good governance structures within the company. It is for this reason that safety statistics have been used as indicators of the fourth component of SD: governance. Numbers of fatalities are declining and all the companies show a clear downward trend in the rate of injury. This is effectively reducing the human cost of generating wealth and contributes towards sustainability.

3. CONCLUSIONS

Weak sustainability allows trade-offs to be made: natural capital can be converted into other forms of capital. The development is sustainable if this is done efficiently, i.e. there is no net loss of capital. From the data in their reports, the three leading mining companies considered here are increasing their profits. This is a positive contribution as it represents wealth creation, which ripples through economies creating many more jobs and services. They are also contributing to sustainability through increasing per capita employee income, improving safety performance and increasing social expenditure. Costs associated with this contribution are lower wages & salaries bills, decreasing employment, increasing energy use and associated GHG emissions and increased utilisation of water and land.

These reports also allow an individual company's efficiency of production to be assessed in a more holistic way than was previously possible. Comparisons can be made now that are based on more than just economic indicators. For example, Anglo American is the most efficient converter of energy into wealth, using 60,000 Gj per million dollars of profit compared to BHP Billiton's 205,000 Gj and Rio Tinto's 146,000 Gj. BHP Billiton is the most efficient converter of water, using 76,000 cubic metres per million dollars versus Anglo's 118,000 cubic metres and Rio's 364,000 cubic metres. Anglo uses the least land with 19 ha per million dollars[4]. In the social component of SD, Rio Tinto spends the greatest amount of money on social upliftment with more than US$ 31,000 spent per million dollars profit[5]. Anglo American employs the greatest number of people (53)[6] but also has the highest number of fatalities (0.014)[7] per million dollars of profit.

Reporting on community initiatives remains fraught with uncertainty and vagueness. There is still considerable debate around indicators for this aspect of SD. It is difficult (and undesirable) to measure progress in SD from financial contributions only, as these do not indicate the impact that the investment has on the community. The three companies surveyed all reported the amounts spent on community initiatives, and Anglo American and Rio Tinto provided comparisons with the previous year's expenditure. BHP Billiton, in its 2001 report, published some clear targets for achievements in community affairs.

Community engagement is an important aspect of governance and of the social aspect of SD. The GRI's Sustainability Guidelines emphasise that reports should include community engagement procedures and guidelines (GRI, 2002). Where these are reported on, they are mostly couched in tentative terms – "are being defined", "are being identified". They refer to policies and intentions, rather than guidelines.

Current best practice in company reporting still contains too few indicators for a holistic assessment of contributions to SD to be made. Considerably more work needs to be done to develop indicators that will reflect progress in SD holistically. Anglo American, BHP Billiton and Rio Tinto are amongst a small number of mining and metals companies producing reports that can be used to critically assess their performance. If the sector is to make the contribution to SD envisaged by the Mining, Minerals and Sustainable Development project (MMSD, 2002), then many more companies will have to follow their lead.

[4] BHP Billiton: 44 ha per million dollars; Rio Tinto: 93 ha per million dollars
[5] Anglo American: US$ 8,600 per million dollars; BHP Billiton: US$ 21,000 per million dollars
[6] BHP Billiton: 26 people per million dollars; Rio Tinto: 23 people per million dollars
[7] BHP Billiton: 0.007 fatalities per million dollars; Rio Tinto: 0.004 fatalities per million dollars

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