Chapter 6 Other Contributing Factors

Governance and certain mine practices may expose vulnerable areas to hazards.

The previous three chapters have highlighted areas that are environmentally and socially vulnerable to mining. However, the degree to which these areas are exposed to negative impacts from mining depends in large part on the quality of national regulations, governance (as defined by transparency, accountability, and the rule of law), and the relative footprint of certain mine practices. Good governance practices help to ensure that mining companies are held accountable and that citizens have a hand in shaping positive development outcomes. On the other hand, weak governance indicates a lack of important safeguards to ensure that responsible mining occurs. Therefore, we chose to analyze determining factors that may increase the exposure of environmentally and socially vulnerable areas to the potential hazards posed by mining, as defined by: 1) governance and 2) certain mine practices. The results of this analysis indicate that:

- Many countries, especially in the developing world, are plagued by corruption, civil unrest, and lack of opportunity for civil society to participate meaningfully in defining development options that are most likely to benefit them.
- Nearly one quarter of active mines and exploration sites are located in countries exhibiting the weakest governance structures, indicating that mining in these countries is less likely to contribute positively to economic development.
- Disposing of mine waste in rivers has resulted in particularly high environmental and social costs. Dumping waste in the deep-sea environment carries with it great uncertainty regarding potential environmental impacts and should only be considered if there is a high degree of assurance that such practice would not damage vulnerable ecosystems, especially in the case of small islands.

A complete analysis of governance would include an evaluation of the quality of environmental regulations. Unfortunately, such an assessment has not been conducted globally and data were limited for both case studies, making it difficult to measure the quality of regulations in each country. For this reason, the analysis presented in this chapter focuses largely on global governance datasets, supplemented by information collected in the Philippines and in Papua New Guinea.

GOVERNANCE

Strong governance structures are important.

Transparent and democratic governance structures are a critical element in ensuring that corporations and governments are held accountable for their actions (MMSD, 2002; TI, 2002; Kaufmann et al. 1999a, 1999b, 2002; Petkova, 2002). A recent study of the relationship between governance and national economic performance found that countries with weak governance are less likely to experience economic growth, although economic growth by itself does not lead to better governance. In other words, the increased revenue that may accrue from mining will not result in economic growth if a country lacks good governance in

part because of "state capture," a phenomenon the authors define as, "the undue and illicit influence of the elite in shaping the laws, policies and regulations of the state" (Kaufmann and Kray, 2002: 31).

Governance may be measured by examining a country's political and civil liberties, transparency, control of corruption, and rule of law. While it appears obvious that developing countries struggle more with governance issues than developed countries, countries such as the U.S. are by no means immune from governance problems. We sought to portray areas where governance may be weakest and hence, represent areas where mines may be less likely to contribute positively to the welfare of a country's citizens. Three aspects of governance are reviewed: control of corruption, voice and accountability, and rule of law. These elements of governance, as well as indicators reflecting government effectiveness and political stability, have also been aggregated into a global governance index.

CONTROL OF CORRUPTION

Corruption impedes the mining industry's contribution to economic growth.

Corruption represents a major impediment to ensuring that revenues from mining contribute to national economic growth and has been identified by the World Bank as the single greatest obstacle to poverty reduction. A recent study by Transparency International found that mining, oil, and gas rated among the industries most likely to pay bribes, with the oil and gas sector ranking the third most corrupt (TI, 2003: 268). In Papua New Guinea, weak governance and rampant corruption have been recognized as the principal deterrent to the wise use of revenues from the extractive industries. A World Bank report recommended that continued investments in extractive industries in Papua New Guinea occur only if governance problems are addressed (World Bank, 2002b:7).

Corruption appears to be related to a country's reliance on mineral wealth; of the 32 mineral-dependant countries listed in Transparency International's corruption index, nearly three quarters scored less than 5 on a scale of 0-10, where 0 is considered highly corrupt (MMSD, 2002). Nowhere is this clearer than in Nigeria, where oil development fuels a well-developed network of corruption, which permeates every level of society. One Shell Oil executive remarked to a major European newspaper that the company spends more money on bribes and corruption than on implementing community development projects (Human Rights Watch, 1999: 9).

Corruption is most problematic in parts of the developing world.

Map 14 summarizes corruption according to Kauffman et al. (2002). Control of corruption is most problematic in parts of Southeast Asia (Indonesia, Papua New Guinea, and Vietnam) and throughout Africa (e.g., Angola, Cameroon, Kenya, Libya, Madagascar, Mauritania, Niger, Nigeria, Somalia, Uganda, Zambia, and Zimbabwe). In Latin America, controlling corruption appears to be most challenging in Bolivia, Ecuador, Guatemala, Nicaragua, and Paraguay. Control of corruption also appears to be poor in Russia and many of the newly independent states (Kyrgzistan, Tajikistan, Turkmenistan, and Uzbekistan), as well as in Afghanistan and Pakistan. Countries with the lowest levels of corruption include many of the industrialized countries of the OECD (Organisation for Economic Co-operation and Development). Countries in the southern cone of Africa and in parts of Latin America and the Baltics also show strong performance, particularly Chile and Namibia, which appear to perform as strongly as the OECD nations.

RULE OF LAW

Papua New Guinea and the Philippines do not enforce rigorous rules.

The degree to which citizens abide by the law is related to a country's ability to control corruption. At the global level, the resulting map for this indicator largely resembled Map 14. According to this dataset, both Papua New Guinea and the Philippines score in the second lowest quartile for this indicator. Data collected for this study in Papua New Guinea and the Philippines underscored problems in this area of governance. The largest mines in Papua New Guinea—Ok Tedi and Porgera—have been subject to their own legislation, which supersedes national law (Shearman, 2001). In the Philippines, nearly one mine-related pollution incident has been reported per year in the past 18 years. In nearly 40 percent of the cases, the government did not impose a fine. Even when fines were levied, these were minimal (less than $5,000) with the exception of three cases, in which fines and/or compensation exceeded $50,000. In the highest profile pollution case (Marcopper), the company offered a $2 million compensation payment, but this did not cover even 5 percent of the estimated cost of clean-up (DENR-PAB, 2000).

VOICE AND ACCOUNTABILITY

The UN considers civil and political liberties essential for human development (UNDP, 2002). A broad range of such liberties is reflected in the Kaufmann et al. (2002) voice and accountability aggregate indicator, which measures the degree to which a country's citizens are able to participate in the selection of governments, including civil liberties, political rights, and independence of the media. Another measure of civil liberties is the degree to which environmental impact assessments (EIAs) are subjected to public comment and review, although EIAs suffer from poor quality and inherent conflicts of interest (see Box 4).

Box 4. Environmental Impact Assessments and Public Participation

Many countries require environmental impact assessments (EIAs) for mine development. In some countries, EIAs are subject to public review, allowing citizens an opportunity to comment on the potential impacts of projects before they are constructed. In practice, however, public consultation on EIAs often occurs late in the project development process and some countries do not guarantee sufficient time for citizens to comment. An analysis of the EIA process in Latin America revealed that half of the countries in that region do not require public consultation until governments have formally approved EIAs (Petkova et al., 2002: 76). In the Philippines, public consultation is required at several stages of EIA development, including during initial drafting. In Papua New Guinea, public consultation is required by law; however, in practice, this is commonly ignored or circumvented.

Although EIAs are an important component of minimizing negative environmental and social impacts, other problems may render them ineffective. In most cases, EIAs are prepared by company consultants and generally include an analysis of anticipated environmental and social impacts as well as plans to mitigate negative environmental and social impacts. Independent review is necessary to ensure that any potential environmental and social problems have not been downplayed. However, many developing countries lack trained personnel to review EIAs and ensure they comply with the highest scientific standards (ESMAP, 1999:23).

In addition, estimating potential impacts requires data collection prior to development to establish baseline levels for environmental quality. However, baseline data may not exist, forcing environmental managers to set arbitrary standards based on what little information is available. For example, the "mixing zone" set by the Papua New Guinea government for the Porgera mine was based on ease of access to the nearest collection point for baseline flow data, rather than scientific analysis of aquatic biodiversity in the river (CSIRO, 1996).

Some developing countries also fare poorly in measures of voice and accountability.

Many of the same countries that perform poorly in terms of corruption also fare poorly in measures of voice and accountability (e.g., Afghanistan, Angola, Cameroon, Iraq, Libya, the Newly Independent States, Pakistan, Somalia, Syria, Uganda, Vietnam, and Zimbabwe), although civil and political liberties appear to be a greater problem for some than corruption (e.g., China, Guinea, Guinea-Bissau, Saudi Arabia, and Sierra Leone). Citizens in most of Latin America appear to have greater civil and political liberties than in other parts of the developing world, with the exception of Cuba (see Map 15).

MULTIPLE VULNERABILITIES

Multiple vulnerabilities may pose additional challenges where governance is weak.

Because an adequate regulatory framework, public participation, and freedom from corruption are important for ensuring environmentally and socially responsible mining, it stands to reason that weak governance exposes environmentally and socially vulnerable areas to potential hazards from mining. Proposed mines in areas with multiple hazards and vulnerabilities may be especially problematic, as they imply the need for careful and deliberate decision-making that may be less likely in areas of weak governance. Unfortunately, due to the coarse and unreliable nature of governance data, it is not possible to combine the ecological and social vulnerability maps developed for this study with the governance maps presented in this chapter. However, some inferences can be made by examining the results of both analyses.

To examine these relationships, we combined all of the aggregate governance indicators developed by Kaufmann et al. (2002) except regulatory burden to create a combined indicator of governance. We then compared global indicators measuring seismicity, watershed stress, and ecological value to the InfoMine database to estimate the degree to which mines face multiple vulnerabilities or hazards.[6] This analysis revealed that:

- Nearly one quarter of active mines and exploration sites are located in countries with weak governance.
- Nearly one third of the countries for which data are available rank poorly in both governance and capacity for informed decision-making, indicating that mining may be less likely to improve the human development of citizens in these countries.
- Nearly one third of countries with high watershed stress also rate poorly in governance, reducing the likelihood of sound water resource management.
- Approximately 4 percent of active mines and exploration sites face multiple vulnerabilities, including seismicity, watershed stress, and ecological value.

In Papua New Guinea and the Philippines, an analysis of multiple vulnerabilities revealed that a significant proportion of mining and exploratory concessions are exposed to more than one vulnerability or risk:

[6] We did not include excessive moisture in this analysis due to the coarseness of the evaporation dataset.

- In Papua New Guinea, 71 percent of exploratory and mining concessions overlap with areas of low capacity for informed decision-making and fragile forests. More than 80 percent of all mining concessions overlap with areas of low capacity for informed decision-making and intact forests.

- In the Philippines, 40 percent of exploratory and mining concessions overlap with high vulnerability or risk areas in more than one indicator, including watershed stress, seismic risk, ecological value, and capacity for informed decision-making.

Multiple vulnerabilities imply higher costs for companies.

The vulnerabilities analyzed in this study may not be directly linked to one another; however, the presence of multiple vulnerabilities implies higher costs for companies developing or investing in a potential mine. If mining occurs in areas with multiple vulnerabilities and weak governance, these costs may be borne by citizens unless adequate safeguards are put in place to ensure that mining revenues are managed for the benefit of the majority of citizens.

ENVIRONMENTALLY AND SOCIALLY RISKY MINE PRACTICES

Some waste disposal practices may pose problems for vulnerable areas.

Certain mine practices are more likely to increase the exposure of vulnerable ecosystems and communities to the potential hazards of mining. In some cases, the type of mine constructed (e.g., underground versus open pit) is determined primarily by the characteristics of the deposit. In others, the choice of engineering design for mine structures has a direct bearing on the exposure of nearby critical ecosystems or communities to mine-related hazards. For example, most tailings impoundment failures in seismically active zones have been associated with the upstream method of construction, rather than downstream or centerline construction (ICOLD, 2001:47-48). This section examines the waste disposal practices that may be especially problematic for sensitive ecosystems and communities.

RIVERINE TAILINGS DISPOSAL

In some parts of the world, seismic instability and high landslide probability have led companies to abandon the construction of tailings impoundments in favor of dumping treated wastes directly into rivers, a practice known as riverine tailings disposal. For example, BHP argued that dumping tailings into the Ok Tedi River was the only viable option at the company's copper and gold mine in Papua New Guinea, given that a tailings impoundment had failed due to landslides in the region (BHP, 1997:37). Few mines around the world currently utilize riverine tailings disposal for waste management, and all are located on the island of New Guinea.

The environmental costs of riverine tailings disposal have been high.

The environmental costs of riverine tailings disposal have been high. The Panguna copper mine in Papua New Guinea dumped approximately 150,000 tonnes of waste rock and tailings per day into the Jaba River. The practice of riverine tailings disposal resulted in significant negative impacts on the river and surrounding local communities, including the loss of fish in the entire 480 km^2 watershed, declines in local wildlife populations, loss of agricultural land, and declines in coastal fish stocks (Boge, 1998:212). More than 60 percent of the tailings and waste rock deposited in the Jaba River have been carried out to sea and aquatic

species in the upper tributaries of the Jaba River were unable to migrate to the sea to spawn (Brown, 1974:25-26).

By the company's own admission, nearly two decades of riverine tailings disposal at the Ok Tedi mine has resulted in the degradation of more than 2,000 km² of forests. Approximately 50,000 residents in 120 villages have been affected by the 70 million tonnes of tailings and waste rock dumped into the Ok Tedi River. Fish stocks are estimated to have declined 70-90 percent. As a result, BHP divested itself of the Ok Tedi mine, leaving management to a government-owned subsidiary. The company has since committed never to develop another mine using riverine tailings disposal as a waste management option (WRI, 2003: 188-197).

Papua New Guinea legislation facilitates such practices by allowing companies large exemptions from meeting water quality standards in discharge areas known as "mixing zones." The mixing zones for the Ok Tedi and Porgera mines are 200 and 150 kilometers, respectively. According to analysis conducted in this study, more than 37,000 people live within 5 kilometers of these mixing zones, suggesting that they may suffer lower water quality.

MARINE TAILINGS DISPOSAL

Waste disposal in the marine environment has resulted in environmental damage.

Disposing mine tailings in the marine environment has been used as an alternative to riverine tailings disposal, especially for mines located in coastal areas. Impacts from marine disposal systems have consistently included increased water turbidity, seabed smothering, and trace metal accumulation (Ellis,1998:94; Ripley, 1996; Loring and Asmund, 1989). The shallower waste disposal systems are among the most destructive because tailings are dumped in areas of greatest marine biodiversity (MMSD, 2002). However, even tailings disposal at greater depths may produce significant impacts on aquatic biodiversity, as pipes used to transport waste to deep sea environments have been known to break at shallower depths, causing a loss of fish and other aquatic organisms (MMSD, 2002; Coumans, 2002).

Deep-sea tailings disposal requires deposition of mine waste below the euphotic zone (i.e., sufficient light is not available for photosynthesis). In theory, the impacts of such disposal should be minimal, given that the deep sea is generally more stable than coastal environments and the lack of light would preclude the existence of highly diverse aquatic organisms. Although this has been found to be true for some mines practicing this method (Jones and Ellis, 1995), one study found short-term reductions in growth rate and avoidance of mine tailings in juvenile yellowfin tuna, suggesting that aquatic organisms that depend on the seabed floor may have difficulty adapting to the disposal of mine tailings (Johnson, 1997).

Not enough is known about the impacts of tailings deposited in the deep-sea environment.

To date, there have been few independent, peer-reviewed studies on the impacts of submarine tailings disposal on the deep-sea environment. Scientists point to a high degree of uncertainty regarding the nature of the deep-sea environment, due to lack of data on how deep-sea benthic organisms react to human-induced changes. Predicting the behavior of tailings deposited in the deep-sea environment is hampered by a general lack of knowledge regarding the physics of sediment transport in the marine environment (Coumans, 2002). Some have noted that the deep-sea environment is characterized by significantly diverse microbial activity, the loss of which could result in the decline and extinction of specific taxa, some of which may be critically important for the maintenance of fisheries (Mooney et al., 1995).

Some areas may be too vulnerable to justify the use of submarine tailings disposal systems.

Despite the scientific uncertainties regarding the deep-sea environment and the recorded incidents of pipe breaks at shallower depths, this waste management practice is increasingly proposed for new mines, especially in the Asia-Pacific region. Four mines in Indonesia and Papua New Guinea use submarine tailings disposal systems and six of eight mines proposing submarine tailings disposal are in the Asia-Pacific region. Because the Asia-Pacific region is endowed with the world's greatest coastal and marine biodiversity, submarine tailing disposal should only be considered if there is a high degree of assurance that these vulnerable ecosystems will not be damaged.