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Responsible Mining: The Key to Profitable Resource Development

Defining “Best Practice Responsible Mining”

Robert Goodland

Better mining corporations want to adopt “Responsible Mining”. This paper outlines what responsible mining actually is and offers a guide to corporations wanting more information on how to become responsible.

Eight principles are outlined on how to become responsible: (1) Social and environmental assessment, (2) Transparency, (3) Acceptance by stakeholders, (4) Food production trumps questionable mining, (5) Compliance with international standards (6) Corporate prequalification before permitting (7) Insurance and performance bonds (8) Royalties, taxes and fees.

These principles are followed by a discussion of No-Go Zones to mining: which sites are off-limits to all mining and why. The Annex on Compensatory Offsets suggests that, on occasion, there may be some exceptions to a No-Go Zone.

The Author

Robert Goodland served as the World Bank Group’s environmental adviser from 1978 for 23 years, where he drafted and persuaded the Bank to adopt most of its mandatory social and environmental safeguard policies. In 2001, he was appointed technical director of the independent Extractive Industry Review of the World Bank’s oil, gas, and mining portfolio. The Library of Congress lists 39 of his books and monographs. His most recent book, with Clive Wicks, is *Philippines: Mining or Food?* He was elected chair of the Ecological Society of America (Metropolitan), and president of the International Association for Impact Assessment. Last year, he was awarded IUCN’s Coolidge Medal for outstanding lifetime achievement in environmental conservation.

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Mining is an issue of social justice. Mining privatizes benefits and socializes costs.

Nobel Laureate Paul Krugman¹

Not only have the oil, gas, and mining industries not helped the poorest people in developing countries, they have often made them worse off.

His Excellency Minister Emil Salim²

Abbreviations and Acronyms

AMD	acid mine drainage
C.	approximately
CAC	citizens' advisory council
CSR	corporate social responsibility
E & S	environmental and social
EIA	Environmental Impact Assessment
EIR	Extractive Industry Review
EISA	Environmental and Social Impact Assessment
FPIC	free, prior, informed consent
GDP	gross domestic product
GHG	greenhouse gas
IFC	International Finance Corporation
IUCN	World Conservation Council
MCEP	mining certification evaluation project; www.minerals.csiro.au/certification
MMSD	mines, minerals, and sustainable development
OECD	Organisation for Economic Co-operation and Development
PNG	Papua New Guinea
PoE	Panel of Experts
ppm	parts per million
SLO	social licence to operate
UNDRIP	United Nations Declaration on Indigenous Peoples
UNEP	United Nations Environment Program
WCC	World Conservation Congress

1 Krugman, P.R. 2009. The return of depression economics and the crisis of 2008. New York: WW Norton, 207 pp.

2 President of the Extractive Industry Review, [UK] The Times 16 June 2004.

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1.0 Introduction and Perspective

Why should mining become responsible? First, mining is wreaking havoc with communities and ecosystems worldwide. When the earth was relatively empty of people and ecosystems were intact, a mine here or there seemed acceptable. The world was huge and the human economy tiny. That idyll has shifted and the natural world has become vulnerable. Our energy and industrial activities have released enough carbon into the atmosphere to damage the climate. Industrial waste has so polluted the oceans that they have acidified by 30 percent.³ Slowing the pace of destruction is no longer adequate. The human economy must back down to an earlier and safer state of environmental resilience and ecological wealth by actively reversing damage.

Second, responsible mining⁴ can actually offer more and quicker profits, but with fewer impacts and no conflicts with surrounding communities. Industrial mines present both opportunities and risks to local residents, governments, and the environment. Clearly, mining can provide significant local employment, economic opportunity, and government revenue. But minerals are public assets so decisions about their exploitation must be transparent, participatory and subject to informed scrutiny by civil society. Conversely, major mining projects pose significant risks of environmental and social degradation. Problems arise from the gross asymmetry of power between rich and knowledgeable mining corporations and the impacted people, who remain unprotected by weak governance. Best-practice responsible mining seeks to redress this imbalance.

Because new mines are increasingly squeezed between communities or placed where they damage already scarce life-support systems such as forests or wetlands, they have greater impact on communities. Thus, communities and their life-support systems need more protection from them. In addition, the richest ores

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- 3 The oceans are becoming more acidic faster than they have in the past 300 million years. Increases in carbon dioxide in the atmosphere warmed the planet and made the oceans more acidic (i.e.: lowered the pH). These changes are associated with major shifts in climate and mass extinctions. We have acidified the oceans over the last 40 years, with no signs that we have the political will to halt or reverse the process. See: Honisch *et al.* 2012. Marine ecosystems, like mangroves and sea grasses, contain far more carbon than terrestrial forests but are being degraded faster and are not yet included in carbon offset schemes. That is why ocean dumping of mining wastes is so damaging (Moran 2008).
 - 4 The term “responsible mining” is widely used by mining corporations, but rarely with a definition. For example, on February 12, 2012, the *Philippine Daily Enquirer’s* full page advertisement (p. 20), paid for by the Chamber of Mines, asserts: “Responsible mining boosts the economy, attracts investment, generates employment, improves the quality of life, protects the environment.” And yet there many are calls for Mining No-Go Zones, such as in Australia: www.miningaustralia.com.au/.../margaret-river-declared-no-go-zone-for-coal-mining; www.sunshine-coastdaily.com.au/story/2012/02/14; India: www.downtoearth.org.in/content/environment-ministry-firm-no-go-zones; Peru: mining.in.paradise.org/en/node/79; and the Philippines: rosancruz.blogspot.com/2011/10/gina-lopez-wants-no-go-zones-in-mining.html.

have already been depleted. Mining of leaner ores produces more severe impacts because it requires the processing of a greater volume of material – producing more waste – to produce the same amount of valuable ore. (See: Klare, 2012).

Responsible mining is a relatively new concept, and it is taking time for companies to understand it. Mining corporations are under pressure to deliver results. Their contractors may have cut corners, and the remoteness of sites limits government oversight.

Responsible mining's default position – the course of action that takes precedence when no overriding alternative is specified – is that mining should not damage any life-support systems. Mining should be designed to secure optimal net benefit for the citizens of the host country over the long term with the lowest social and environmental impact.

The conditions outlined in this paper are robust. Some regions are not suitable for mining, which is why an increasing number of governmental jurisdictions have mandatory moratoria on mining. El Salvador, Costa Rica, and the Philippines are examples where moratoria on mining are in place or proposed as the prudent course.⁵ Government regulators on their own cannot assure responsible mining. That is why an increasing number of jurisdictions are enacting forms of moratoria. Mining corporations that adhere to responsible mining principles, reduce conflicts, prevent impacts, and improve profits.

2.0 Eight Principles of Responsible Mining

Following the eight principles outlined here would ensure that risky mines are never proposed. These principles encourage the best mining corporations, while keeping away the corporations causing the most damage. The principles are aimed mainly at big mining corporations.

Mining corporations wanting to follow best practices for responsible mining will find this section useful in selecting future projects.⁶ The term “responsible” means having a capacity for moral decisions and therefore being accountable; liable to

5 For example: The 2012 “Mindanao Declaration: Defending the Dignity of Life, Securing our Future.” taborasj.wordpress.com/2012/01/27/mindanao-declaration-defending-the-dignity-of-life-securing-our-future. The Philippines is the most vulnerable nation in the world to typhoons, third in disaster risk and natural hazards, and sixth in risks to climate change.

6 Best practice means fully espousing all relevant policies and procedures as set out in OECD's Guidelines, plus the eight principles, plus the no go zone section. These recommendations should be addressed by governments to multinational enterprises operating in or from adhering countries. They provide voluntary principles and standards for responsible business conduct in areas such as employment and industrial relations, human rights, environment, information disclosure, combating bribery, consumer interests, science and technology, competition, and taxation. www.oecd.org/daf/investment/guidelines.

legal review or, in case of fault, to penalties; based on or characterized by good judgment; and honest, reliable, and trustworthy. Decisions, sound thinking, and good judgment require accurate information. The term “mining” is used to mean the extractive industries of oil, gas, as well as mining both metals and nonmetals. This definition focuses on large-scale industrial mining, not on artisanal mining. It outlines the sort of information required for better corporations to make mining responsible.⁷ Responsible mining will be achieved when all eight principles are met in each mining project.

The benefits to corporations of mining in a socially responsible manner include reduced labor shortages though investing in local education and skills training; more consistent production as a result of a healthier workforce; less likelihood of conflict by building better relationships with local indigenous people and artisanal miners by means of functioning grievance procedures, which lead to fewer impacts and faster remediation; better access to lower cost services and supplies through regional business development; and faster access to financing because of lower perceived risk by equity markets. Socially responsible mining corporations will have few, if any, conflicts with Indigenous Peoples and communities surrounding the mine site. Absence of conflicts and fostering of the consensual approach will avoid lengthy delays and will accelerate the permitting process. The race to adapt to social responsibility will benefit best-practice corporations and severely hamper slow adapters. Corporations that earn the people’s and government’s trust will ultimately be rewarded with a higher stock price. Ethical investors will shun corporations in conflict with communities and government, thus depressing stock prices.

To be frank, no modern, large-scale, open-pit mine can be operated without significant long-term impacts, partly because 99 percent of all rock moved and processed at modern open-cast mines ends as waste. To pretend otherwise is to ignore the world’s mining track record. All other decisions, such as how best to follow the mitigation hierarchy of “avoid, minimize, restore, and offset,” follow from accepting this reality.⁸

7 The best single source of further information on responsible mining is: IRMA: The Initiative for Responsible Mining Assurance: a multi sector effort to develop a voluntary system to independently verify compliance with environmental, human rights, and social standards for mining operations. Participants include mining companies, jewelry retailers, NGOs, organized labor, and affected communities (responsiblemining.net). See also: Miranda et al. 2005), and IUCN’s WCC Resolution 4.088 of 2008: Establishing the IUCN Extractive Industry Responsibility Initiative.

8 “No net loss” of biodiversity is required as part of the mitigation hierarchy by IFC as of 1 Jan 2012 in Performance Standard 6. This requires no net loss for impacts on natural habitat, and a net gain for impacts on critical habitat (Annex 1). As mentioned above, the mitigation hierarchy is usually defined as: (1) avoidance of impacts; (2) minimization; (3) rehabilitation/restoration; (4) offset (see Annex 1).

2.1 Principle 1: Social and Environmental Assessment

An objective, skilled assessment team is the starting point to determine the path toward responsible mining.

The laws of many national governments mandate social and environmental assessment (ESIAs) with procedures and steps that have become standard (Goodland, 2008a). However, the quality and professionalism used in preparing some ESIAAs are questionable. For example, when the mining proponent selects the ESIA team, there is a clear conflict of interest; the ESIA team is motivated to not find too many serious impacts against its employer. In addition, Canada, the World Bank Group and others seems bent on weakening rather than strengthening ESIA procedures.⁹ Mechanisms to foster the objectivity of ESIA teams paid by the mining proponent have become standard procedure over the past few decades. The first effective mechanism is for a small team or panel of social and environmental experts (PoE, see Goodland *et al.* 2011) to help the proponent select the most appropriate ESIA team.¹⁰

2.2 Principle 2: Transparency vs. Secrecy

No social and environmental assessment should be kept secret from potentially impacted stakeholders.

Potentially impacted people must fully and openly participate in or be meaningfully involved throughout the approximately two-year EIA preparation period, from stakeholder identification, through Panel of Experts review, ESIA report, Impact/Benefit Contract, to restoration, rehabilitation, and monitoring. Citizens groups must actually participate in the collection and interpretation of data. Simply talking at public meetings has little or no value. Corporations must be compelled to pay

9 Canada's Conservative government will unveil new rules late March 2012 designed to cut the time it takes for environmental assessments of major energy and industrial projects. The government says the current complex system of regulations means it can take far too long to approve pipelines and mines. The seven years it took to approve Imperial Oil Ltd's Mackenzie Valley Arctic gas pipeline project conserved a huge swath of environment and saved billions of dollars because much cheaper sources of gas have been discovered, so the pipeline never started. Canada seems better off because of this prudence.

10 The PoE is composed of about three highly seasoned professionals who care more for their lifetime professional reputations and scientific objectivity, than for their next consultancy. They meet on site a couple of times a year to ensure the ESIA is off to a reliable start and that it is of good quality when the final draft appears in about 24 months time. PoE members usually let their names be known. If the ESIA team members are not identified by name, suspicion may arise about their capabilities. The PoE supports and strengthens the in-house E&S unit of the proponent and may liaise with the governments E&S staff. The second mechanism to foster quality is to ensure independent third-party reviews of the final draft ESIA report to ensure it is reliable before it is released.

for such efforts, but remain at arms-length in terms of influence on civil society. Affected people and communities may need access to independent technical and legal assistance. The Canadian government routinely finances this assistance, called intervener financing. At present, all project data comes from the financially interested project proponent. Transparency is one of the most important key principles; therefore, publicizing the names of the PoE members should be mandatory, not optional. An “expert” who is willing to be paid by the mining company for expert advice, but not willing to risk tarnishing his/her name, is not an expert, but a consultant.

Most mining operations take place at remote sites. Before the age of the Internet, mobile phones, and social networking, this meant that mining companies could operate with relative impunity. Not anymore. We’re in the “age of transparency” and corporations have to be accountable to a degree that was never anticipated. Stories about mining operations can and are now spread worldwide at a moment’s notice. The March 7, 2012 Prospectors and Developers Association of Canada’s (PDAC) Annual International Convention in Toronto concluded that a growing number of companies want to take responsibility for social change because it’s good for business and it’s the right thing to do.

2.3 Principle 3: Acceptance by Stakeholders

If stakeholders don’t want the proposed project, it should not go ahead.

Stakeholders include mining company employees, local communities and residents, and the government units that receive taxes and royalties and grant permits, as well as the stockholders and managers of the company. Responsible mining corporations don’t force mines on people and communities who don’t want them.

Soon after the stakeholder identification (See Section 2.2), as one of the earliest best-practice steps in the ESIA process, all mines should establish legitimate, independent, and representative citizens’ advisory councils (CACs) (Steiner 2012), as called for by the International Union for Nature Conservation (IUCN).¹¹ For example, Nautilus Minerals, of Canada has agreed to establish a CAC for its deep-sea mining project in the Bismarck Sea off Papua New Guinea.¹² Even after free prior informed consent (FPIC) has been achieved, active citizen engagement in the EIA process is necessary. Still, this engagement is insufficient: local stakeholders need legitimate independent oversight responsibility of a mining project over its entire life. If the grievance mechanisms cease functioning, or if unforeseen impacts are not mitigated, the CAC negotiates, halting the project until the situation is remedied.

11 WCC Resolution 4.089

12 Nautilus Minerals is the first company to commercially explore the sea floor for massive sulphide systems, a potential source of high-grade copper and gold. Its Environmental Impact Statement (EIS) is at: Community Accountable, Responsible Environmentally, Safe: www.cares.nautilus-minerals.com.

Corporations should follow some degree of corporate social responsibility (CSR). The best corporations aim to ensure that all potentially impacted stakeholders actually welcome a project because the risks are slight; compensation is great; and job training, employment, and local procurement are attractive. FPIC, as mandated by the UN's Declaration on Indigenous Peoples (UNDRIP), is the best practice. FPIC means the days when exchanging beads, blankets or footballs to Indigenous People for the rights to mine on their territory are over.¹³ FPIC is mandatory for IFC projects; the rest of the World Bank refuses to adopt FPIC.

2.4 Principle 4: Food Production Trumps Questionable Mining

Mining must not decrease resources in areas of scarce land or water.

The threats to life through depletion of water and food from mining are severe. Many national laws set priorities for water use with domestic use, first; municipal water supply, second; irrigation, third; power generation, fourth; fisheries, livestock raising, and industrial use, fifth; and mining, last. Mining proponents often claim that people will benefit from the mine because the royalties the company pays to the government will permit it to import foreign food. This "trickle down" theory of economics is grossly inefficient, and most often fails to work at all. Domestic agriculture, especially irrigation for food crops, must always be given priority over mining in water allocation.

13 The Wall Street Journal (online.wsj.com/article/SB10001424052702303863404577283321113646182.html) put it well. Mining companies are under new pressure to comply with a 2004 Supreme Court of Canada ruling giving the country's aboriginal peoples the right to review land-use decisions by mining companies that might affect their legal right to harvest, hunt and fish on lands they don't own. Mining companies say the best strategy is to avoid court battles by getting aboriginal groups to agree in writing to mining projects before drilling begins. When a proposed mine is on land directly owned by an aboriginal group, the mining company has to negotiate [an Impact/Compensation Contract in the public domain] and pay a royalty.

2.5 Principle 5: Compliance with International Standards

Responsible mining corporations will uphold all international social and environmental agreements.¹⁴

Better corporations possess in-house environmental and social units staffed by seasoned social and environmental professionals, which are adequately resourced to ensure the corporation follows best practices. Better companies have clear policies on CSR¹⁵ and comply with all applicable social and environmental policies of the host country and of the proponent's home country. Double standards must be avoided.

14 International Environmental and Social Agreements, such as treaties, etc., include: African-Eurasian Waterbird Agreement (AEWA, 1995); UNESCO Biosphere Reserves (1968); the Convention on Biological Diversity (CBD, 1992); Cartagena Protocol on Biosafety to the Convention on Biological Diversity (2000); the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity (2010); the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, 1973); the Convention on the Conservation of Migratory Species of Wild Animals (CMS or Bonn Convention, 1979); the International Treaty on Plant Genetic Resources for Food and Agriculture (Plant Treaty, 2004), the Convention on Wetlands (Ramsar, 1971); Convention concerning the Protection of the World Cultural and Natural Heritage (1972); Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (1989); Rotterdam Convention on the Prior Informed Consent Procedure for certain hazardous Chemicals and Pesticides in International Trade (1998); The Stockholm Convention on Persistent Organic Pollutants (2001); Convention to Combat Desertification (UNCCD, 2007); the Convention on Climate Change (UNFCCC, 1992); Kyoto Protocol; Montreal Convention on Substances that Deplete the Ozone Layer (1987); the Vienna Convention for the Protection of the Ozone Layer (1985), and the Vienna Convention on the Law of Treaties (1969).

15 CSR seeks to ensure that the interests of all stakeholders about social and environmental impacts are met in corporate policies and projects. In a narrow sense, CSR means operating a business in a manner that accounts for the social and environmental impacts created by the business. CSR is a form of voluntary corporate self-regulation such that the company actively complies with the spirit of the law, ethical standards, and international norms (see: UN Principles for Responsible Investment).

CSR becomes the social license to operate (SLO)¹⁶ for mining as it includes rigorous independent certification of compliance with the agreed standards, donation of 1 percent of profits to environmental conservation initiatives, and functioning CACs to ensure meaningful public participation. The SLO usually includes three goals for successful development: first, maximize advantages of the mining project to local national economies; second, minimize damages to communities, environment, and to sociocultural assets; and third, strengthen the capacity of impacted communities and their advocates (civil society) and governments to participate meaningfully in the mining process.

A sample of standards and codes of conduct followed by better mining corporations is provided in Figure 1. Weak corporations sometimes attempt to get away with whatever they can – especially when the median educational level encourages such abuse, and where weak governance provides no real buffer for the citizenry. For example, many recent ESAs are essentially public relations documents or “greenwash” – yet national regulators approved them all.

2.6 Principle 6: Prequalification or certification of potential mining permit seekers

The best practice is for all mines to engage in a rigorous independent certification regime, as suggested in the IUCN World Conservation Congress’ Resolution 4.088.

This certification should be funded by the payments from the mining corporation (out of profits or revenues, irrespective of taxes, royalties, etc., to the government), and be entirely independent. National governments often mandate prequalification or certification of potential bidders on governmental work. This prequalification mechanism encourages the better corporations that have in-house environmental and social (E&S) units, E&S codes and standards, and a reputable track record of

16 The social license to operate (SLO) is one of the main goals of CSR and is formalized in free prior informed consent (FPIC). Having a “social license to operate” a mine is an emerging concept within the hard rock mining community. Acceptance of the definition and application is broadening as more attention is given to the concept. SLO is a comprehensive and thoroughly documented process in which local stakeholders identify their values and beliefs as they participate meaningfully throughout the environmental and social impact assessment process of the proposed project, from scoping through mine closure and restoration. Social license, amplified at: www.appl-ecosys.com/publications/social-license.pdf, has to be earned and then maintained. It is dynamic and nonpermanent because beliefs, opinions, and perceptions are subject to change as new information is acquired. A social license is usually granted on a site-specific basis. Hence a company may have a social license for one operation but not for another. The bigger the impacts of a project, the more difficult it becomes to earn the social license. For example, an independent fisherman who is member of an indigenous group will normally get an automatic social license from his community. A mining company wanting to relocate an entire village faces a much bigger challenge (sociallicense.com/definition.html).

E&S quality in previous projects. For example, Solomon (2006) evaluated whether independent, third-party certification of environmental and social performance could be applied to mine sites. Three questions were investigated encompassing governance, standards and assessment, and assurance. Mining corporations with reprehensible track records, with no in-house E&S units, and no CRS or E&S policies often fail to meet prequalification criteria. Prequalification promotes the better companies, and discourages the weaker companies.

Third-party independent review is powerful. An ESIA Consortium on Mining, largely funded by corporate contributions to IUCN or the United Nations Environment Program UNEP, or another independent body, could be responsible for ESIA contracting, guidelines, international standards, and quality review. For most mining projects, which generally cost a few billion dollars, the added cost would be trivial, but the benefits enormous: they would, finally, get objective advice. An increasing number of organizations are capable of undertaking independent third-party monitoring, including Global Witness (www.globalwitness.org), Environmental Investigation Agency (www.eia-international.org), and the Environmental Law Institute (www.eli.org), SGS of Geneva, Switzerland, (www.sgs.com). This does not preclude participatory monitoring by impacted communities, which can be very effective.

2.7 Principle 7: Insurance and Performance Bonds

Insurance and performance bonds, mechanisms to foster compliance with contractual obligations and to improve the quality of results, should become standard in mining.

Bonds are in widespread use in the construction industries and elsewhere. The challenge is setting the insurance and bonds high enough to cover accidents and noncompliance adequately and for far enough into the future. Often, after mine closure, a mining corporation may declare bankruptcy or be taken over by another company. If, some decades after a mine closes, a toxic waste lagoon ruptures, liability may not be clear. Reclamation bonds are designed to finance clean-up and restoration. The most notorious case is in Ecuador where Texaco polluted vast areas of Amazon forest for 30 years before it was bought out by Chevron. After 18 years of court trials in Ecuador and the United States, Chevron was fined US\$18 billion. The transferability of insurance bonds with the sale of the company needs to be clarified in advance. Frequently, the “interested party” or proponent is allowed to choose the consultant that will calculate the amount of the bond / insurance. And, even more frequently, the bond calculator fails to make truly conservative assumptions about future costs. Mostly they succeed in bonding only for earth-moving activities and avoid bonding for expensive tasks, such as collecting and treating contaminated waters – often in perpetuity. Thus, they are thinking only in the short-term and passing the actual costs to the future generations.

2.8 Principle 8: Royalties, Taxes and Fees

Responsible mining accurately assesses all relevant costs and benefits to ascertain whether the proposed mine will earn a significant net benefit.

Net benefit means the profits, benefits, etc., accruing to the corporation, government, etc., minus the environmental and social impacts accruing mainly to the impacted communities. Bauer (2012) shows how to enhance payments from the mining corporation to the government, and how to prevent corruption. Could emphasizing how much foreign investment the mine will bring, as Pearce (2011) does for the Philippines' Tampakan mine, while omitting all costs, especially social and environmental costs, border on being a joke? Although it is true that social and environmental costs are more difficult to estimate than the costs of bulldozers, diesel, cement, and steel, it must be attempted and corroborated by independent third parties. For example, in the case of acid mine drainage to be controlled in perpetuity, the cost for a 'typical' mine may well rise to US\$1 billion (See: below). Full cost allocation means that all the internal and external costs and benefits, including social and ecological, of alternative decisions concerning the use of natural and social capital should be identified and allocated.

Countries need robust governance if they are to verify data on the volume and value of resources being extracted and exported. It is relatively easy to estimate engineering costs and financial payments to governments. Estimating social and environmental costs is more difficult but unavoidable. If the impacted people find that social and environmental costs are significantly underestimated, or if they find the compensation of residual impacts are too low, the project is best halted until agreement can be reached. Above all, following the idea of No-Go Zones (See Section 4) will prevent damage to agricultural lands, water catchments, fresh water, and marine ecosystems.

Caveat: Responsible mining also can be achieved by ensuring that the benefits accruing to the potentially impacted people clearly exceed the costs and impacts. This issue comes down to payments and other compensation from the mining proponent to the impacted people. Best-practice mining companies should agree to contribute at least 1 percent of profits (or revenues) to environmental conservation efforts in their area of operation.¹⁷ This contribution should be above and beyond any compensatory offsets (See Annex), and should be standard even if the project does not offset.

Investing part of the mining revenue to finance mine closure and restoration, community retraining as mine jobs dry up, and creation of alternative sources of livelihood is standard. World experience shows that, most unfortunately, compensation

17 IUCN's WCC Resolution 4.085 of 2008: Establishing the *1% Earth Profits Fund* and sustaining government conservation finance. Payments based on the value of the minerals extracted, which may vary markedly, are often preferable to payments based on profits, which are more difficult to ascertain. Profits may fall if some activities are classified as costs. Linkage to inflation is essential.

to impacted peoples and to their government is almost always marginal at best.¹⁸ Information asymmetry means companies know the value of minerals much better than the government, hence can game the tax/royalty system. Setting royalties, taxes, fees, etc., and other compensation sufficiently high is an important financial and economic issue not dealt with here, but outlined by Bauer (2012). Royalties differ markedly among countries, roughly from 1 to 15 percent of profits. Taxes vary from 10 to 30 percent, but tax holidays are commonplace.

In struggles over resource rights, transnational companies are increasingly using a powerful new weapon – the right to sue governments in international arbitration tribunals granted under a complex web of free trade agreements and thousands of bilateral investment treaties. In June 2009, Canadian mining company Pacific Rim Cayman LLC (Pacific Rim) sued the state of El Salvador under CAFTA for \$77 million, after the Ministry of the Environment of that country denied the company extraction permits for its “El Dorado” gold mine. The permits were denied on environmental and public health grounds. Pacific Rim is the first company to pursue international arbitration against El Salvador using CAFTA provisions. Since Canada is not part of that free trade agreement, Pacific Rim is using its U.S. subsidiary in Reno, Nevada to gain access to CAFTA’s investor-state dispute settlement mechanism (Anderson et al. 2011).

18 Fiscal instruments include: royalties, signing and other bonuses, tax on profit, windfall profit tax, government’s equity, tax on dividend (minus withholding tax). Revenue Watch calculates that in the Philippines from 2005 onwards, the mining industry’s contribution increased to 1 percent and above. To date, its greatest input to the country’s GDP has been 1.4 percent in 2007. no2miningin-palawan.com/2011/12/26/transparency-issues-in-the-philippine-mining-industry-maitagomez.

Figure 1: Codes of Conduct and Standards Followed by Better Mining Corporations

<p>Most of these codes and performance standards are voluntary; they need to become mandatory; compliance must be monitored by independent third parties and enforced. Of course, not all of these codes and standards will apply to every mine. But the mining corporation's in-house E&S unit should be aware of the codes, keep up to date as the codes evolve, and tell their corporation which codes it has to meet and how.</p>	
EITI: The Extractive Industries Transparency Initiative Plus.	The London Convention on the Prevention of Marine Pollution by Dumping of Wastes, UN IMO, 1996.
UNDRIP: The United Nations Declaration on the Rights of Indigenous Peoples.	The European Parliament's Environmental Liability Directive to foster the polluter pays principle.
UNHCR The United Nations High Commission for Human Rights.	International Petroleum Industry Environmental Conservation Association (IPIECA) Guidance Document on Sustainable Social Investment.
The Voluntary Principles on Security and Human Rights.	Economic Community Of West African States (ECOWAS) Directive on the Harmonization of Guiding Principles and Policies in the Mining Sector.
IRMA: The Initiative for Responsible Mining Assurance.	UN ILO Convention 169: Core Labor Standards.
UN Convention Against Corruption.	The International Convention on Economic, Social and Civil Rights.
UN Precautionary Principle. The 1990 Bergen Declaration on Sustainable Development. The Equator Principles: www.equator-principles.com .	The International Convention on Elimination of all Forms of Racial Discrimination.
The UN Århus Convention.	Convention on the Prevention and Punishment of the Crime of Genocide.
The Extractive Industry Review.	UN Guiding Principles on Business and Human Rights.
Corporate Social Responsibility.	The OECD Guidelines for Multinational Enterprises.
The UN Global Compact.	Fairtrade & Fairmined gold certification standard (www.fairgold.org/).
The Global Reporting Initiative (GRI).	The Akwé: Kon Guidelines.
UN Principles of Responsible Investment (PRI).	

3.0 Government and Social Support for Best-Practice Responsible Mining

The above eight principles for best-practice responsible mining all apply to mining

corporations, which are the focus of the eight principles. Mining corporations need support from government, which is important, but not the focus of this paper. For real changes to occur, societies cannot rely on the good intentions and aspirations of corporations. Self-regulation and voluntary compliance are not enough. The founders of most developed, Western countries mandated the creation of checks and balances, although many seem to be eroding in the natural resource / environmental arenas. Instead, we seem to be evolving towards Mussolini's ideal of a partnership between business and governments, with the desires of the citizens largely ignored. For example, right now there are more than 200 ongoing demonstrations / disputes around mining projects in Peru alone.

The widespread and strengthening opposition to mining, the increasing number of jurisdictions adopting mining moratoria, and the soaring need for improved protection of the earth, are evidence that voluntary, nonbinding, and self-reported standards are not working adequately. The perspective here is that mining improvements are best achieved by mandatory regulations, with third-party monitoring, and government sanctions for violations. These regulations should be backed up by performance bonds, escrow accounts, insurance, and meaningful penalties, including in the stock markets where mining corporations are listed. In establishing the creditworthiness of a mining company, credit agencies should weigh the corporation's environmental and social risk taking, along with its ability to prevent catastrophic damage (e.g., waste dump breaches), conduct effective post-mining restoration, clean-up toxic spills, and prevention of acid mine drainage in perpetuity.¹⁹

4.0 No-Go Zones for Mining

Five types of socially or environmentally sensitive areas need special consideration in mining regulations.²⁰ These areas are valuable when intact, and their value

19 Acid mine drainage (AMD) is the number one environmental impact facing the mining industry. AMD occurs when sulphide-bearing minerals in rock are exposed to air and water, converting sulphide to sulphuric acid. It can devastate aquatic habitats, is difficult and very expensive to treat, and, once started, can continue for centuries. Roman mines in Great Britain and Spain continue to generate acid drainage more than 2000 years after the mining ceased. Moran (2012) notes that mine sites where water treatment costs exceed hundreds of millions of U. S. dollars, the contamination problems persist, and the collection and treatment continues (e.g. Summitville, Leadville, Eagle Mine, Crested Butte, Colorado, Clark Fork and Zortman-Landusky, Montana, Bingham Canyon-Kennecott, Utah). Acid mine drainage can develop throughout the mining process: in underground workings, open pit mine faces, waste rock dumps, tailings deposits, and ore stockpiles. www.grida.no/graphicslib/detail/mining-effects-on-rainfall-drainage_cac4. Many coal mines also suffer from acid mine drainage. Much AMD also contains toxic heavy metals, such as lead, mercury, arsenic, and cadmium.

20 Based on Dudley and Stolton 2002. See: IUCN, The Forest Stewardship Council, World Bank Group and BBOP (2009) for definitions of terms such as sensitive areas, and high conservation value areas.

would be jeopardized by extractive industries. If the potentially affected communities reject a project on one of these categories of lands, the area would be off-limits to mining. Meaningfully informed, with free prior consent as a precondition for licensing, mining operations should ensure these categories are excluded. The default position is clear: no-go zones to mining are nonnegotiable.

The five main types of areas off limits to mining are:

4.1 Indigenous Peoples Reserves:

Areas in which Indigenous Peoples live, or on which they depend. The territories, reserves or usucapion lands²¹ and ancestral domains of Indigenous Peoples, tribal people, forest dwellers, and vulnerable ethnic minorities are off limits to mining. Experience shows that Indigenous Peoples cannot be resettled successfully. The World Bank Group concluded that projects should be moved and the Indigenous Peoples left in peace.

4.2 Conflict Zones:

Areas of overt or simmering/latent social conflict, especially armed conflict. Worldwide, experience shows that mining in such conflict zones almost invariably exacerbates conflict. Land grabbing, deforestation, and illegal expansion of mining, cattle ranching, and oil palm plantations are fuelled by violence.

4.3 Fragile Watersheds:

Areas providing critical water resources, locally or downstream, such as those protecting a dependent project downstream, and riparian ecosystems important for conserving riparian services. Watersheds that conserve water for irrigation or intensive agriculture are included. Any mining activity is illegal within 1,000 meters of any source of water. Some nations ban mining in all mountainous zones. Areas with active seismicity or geological faults should be avoided for mining because of the risk that toxic lagoons and heaps of mine wastes will rupture or leak. Steep slopes should be protected. Areas prone to landslides, lahars, or mudslides should be off limits. No mining should be permitted in a wide swath either side of possible hurricane or cyclone paths. Areas subject to very high rainfall should also be off limits. All water catchments above or feeding into irrigation systems need conservation. Small islands are no-go zones for industrial mines.²² Unfortunately, many of

21 Usucapion is very important for citizens who have no paper titles to their lands. Usucapion means the acquisition of the title or right to property by the uninterrupted possession of it for a certain term prescribed by law; acquisition to a property by usage over time.

22 According to Indonesian law it is illegal to mine anything on small Islands. The main reasons for such bans is that a big mine on a small island is likely to damage water supplies and marine livelihoods by dumping wastes (See: Earthworks et al., 2012). Witness current decadal struggles

the highest-grade metal ore bodies exist in the headwaters of some of the highest and most seismically active regions of the world. Leaders, such as the present Prime Minister of Peru argue that these restrictions would essentially stop mining in such countries.

of BHPBilliton on Indonesia's Gag Island (56 km²) in which a nickel mine proposed to dump all wastes into the coral reefs surrounding this proposed UN World Heritage Island and protected forest. On Bangka Island (12,000 km²) in Sulawesi, the Chinese iron ore mining project would devastate the entire island and destroy all life in the coral gardens, one of the most species-rich marine regions on earth: the Coral Triangle. Since 2000, Newmont's Batu Hijau copper/gold mine on Sumbawa Island (15,448 km²) dumps 40 million tons of untreated wastes off the coast. Marcopper and Placer Dome's damages in 1996 on Marinduque Island (920 km²) in the Philippines are one of the worst environmental disasters ever. In 1997, the World Bank Group financed Newcrest's Lihir Island (22 km long by 14.5 km wide) gold mine in PNG, which dumps five million tons of exceptionally acidic wastes, containing cyanide and heavy metals, annually into the ocean. From the early 1970s, on Bougainville Island (9318 km²), partly because of Australian colonialism and Rio Tinto Zinc's social and environmental imprudence, the impacts of Rio Tinto's Panguna copper mine led to bloodshed in the 1970s-1980s, and to civil war in 1990. Misima is a mountainous and densely forested volcanic island (202 km²) in Papua New Guinea. Placer Dome opened a gold and silver mine in 1990, which was closed in 2004. The pipe carrying waste containing cyanide for dumping in the ocean broke in 2004 killing fish. Placer Dome refuted the Australian Mineral Policy Institute's 2005 report on the social and environmental impacts. The Philippines' forested and highly endemic mountainous Sibuyan Island (445 km²) is mainly under protected status, but much of the protected area is concessioned for mining. Mario Kingo, head of security of the Canadian Altai Resources nickel mine martyred a protester, Municipal Councilor and former WWF official, the Hon. Armin Rios-Marin on 3 October 2007. Most output is bought by BHPBilliton.

Box 1: The New Priority of Conserving Forest for Carbon Sequestration

In the last few years, forests have become much more important for their GHG sequestration function. The world urgently needs more GHG sequestration. (Of course, a price on GHG emissions would earn a double dividend, first by decreasing fossil fuel use, and second by providing a huge fund for measures to combat climate risks.) The planet's two biggest sinks of GHG emissions, forests and oceans, are both being vitiated by deforestation and forest fires, and by acidification of oceans. A warmer world surely means more forest fires.¹ Forest and grassland fires worldwide already burn about 400 million hectares annually, an area bigger than the size of India. Indonesia's 1997-1998 peat-land forest fires smoldered for months over 8 million ha, releasing the equivalent of at least 30 percent of worldwide fossil fuel GHG emissions for the entire year. As possibly the biggest forest fire in recorded history, it polluted much of Southeast Asia, almost from Northern Australia, Kalimantan, Sumatra, Java, Malaysia, Singapore, Vietnam, Thailand, Philippines, and Sri Lanka to the Horn of Africa. Deforestation must be halted as soon as possible and promptly reversed. Any tree cutting must be more than compensated for by tree plantations or regeneration. There is little or no suitable land left for expansion even for food production. This is all in addition to the value of forest for community livelihoods, providing water in the dry season, attenuating floods, and conservation of biodiversity.

1. www.fire.uni-freiburg.de/iffn/country/id/id_32.htm.

4.4 Biodiversity, Habitats, and Wildlands:

Areas of high biodiversity and endemism, rare or endangered species, rare habitats, and intactness (e.g., coral reefs, mangroves, tropical rain forest, remaining old growth forests, biological hotspots, wetlands, and wilderness, as defined by IUCN and by Phillips [2001]). Includes all conservation units, IUCN's Categories I thru IV and to a certain extent Categories V and VI, such as National Parks, state or provincial parks, UN Biosphere Reserves, UN World Heritage Sites, areas scheduled for inclusion in the national system of conservation units, protected forests, UN Ramsar Convention wetland sites, as well as their buffer zones. Most mangroves and old-growth tropical forests should be included.

4.5 Cultural Property:

Areas of Indigenous Peoples' religious sites, sacred groves, battlefields, archeological sites, petroglyphs, geoglyphs or rich fossil sites. There may conceivably be exceptions, for example, when a compensatory offset reserve is purchased by the mining proponent, which is unambiguously bigger in size and richer in contents than the area sought for the mine (See Annex 1).

5.0 Conclusion

This paper outlines what “responsible mining” means in practice. It is designed for mining corporations that want to adopt responsible mining. Responsible mining would become a valuable goal if mining corporations agree with this definition. Mining corporations that follow all international environmental agreements, strive to achieve best practices, and avoid No-Go Zones would become industry leaders. The transition from voluntarily following these measures to accepting mandatory regulations with third-party monitoring should be made as smoothly as possible. Many mining corporations already have adopted responsible mining rhetorically. The best mining corporations will put it into practice.

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Annex 1: Compensatory Offsets

Sources: ten Kate *et al.* (2004), BBOP (2009, 2012), Soloman *et al.* (2006, 2011), Goodland (2003). www.environment.nsw.gov.au/biocertification/offsets.htm.

This paper focuses on best practices for responsible mining. A fundamental part of best practice is to thoroughly follow the mitigation hierarchy, of which offsets are an integral part. This paper does not focus on offsets,²³ but this Annex to the main text outlines the issues of compensatory offsets.

23 The term “mitigate,” meaning to minimize harm or to make it less severe, is often used in the USA for precautions to compensate for unavoidable environmental damage. In the USA, therefore, it is generally interchangeable with the term “offset.” “Offset” is often used interchangeably with “compensate”. “Compensation” itself has several meanings, however. It can mean financial payment for impacts as in “impact-compensation contracts,” or it can mean measures designed to counteract harm or impacts.

Box A1 The Precautionary Principle

Pliny's (61 AD – ca. 112 AD) *Quod dubitas ne feceris* (When in doubt, don't do it) is one origin of the Precautionary Principle, in the sense of first do no harm, an ounce of prevention is worth a pound of cure, better safe than sorry, err on the side of caution, and look before you leap.

In case of risks of social or environmental damage, precautionary measures should be taken even in uncertainty, if cause and effect are plausible, but not fully established scientifically. Precautionary measures are an investment in insurance. Such risk-aversion means that the burden of proof is on the mining proponents, rather than the people or communities potentially impacted. We should not wait for scientific certainty, because impacts on people and their environment may be irreversible. ESIA mandates the analysis of alternatives – better, safer, cheaper ways to do things – and the development of “cleaner” products and technologies. One powerful alternative is simply slowing down in order to learn more about potential harm – or doing nothing – the “no project” alternative (UNESCO, 2005).

In 1854, without evidence for the causal link between the spread of cholera and contact with an infected London drinking-water pump, and certainly without proof beyond a reasonable doubt, Dr. John Snow recommended removing the handle of the suspected pump to stop a cholera epidemic. This simple and cheap measure was effective in halting the epidemic. The harmful impacts of inhaling asbestos dust were known from 1898. Now 55 nations ban asbestos; Canada still subsidizes its export to developing nations as of March 2012.

As mentioned in the introduction, the overall position for responsible mining has become to permit no harm to communities or to their life-support systems; the precautionary principle should prevail (see Box A1). This position means that in the face of uncertainty about potentially irreversible impacts to natural and social capital assets, decisions concerning their use should err on the side of caution. The burden of proof should shift to those whose activities potentially damage natural and social capital, namely the mining corporations. After best efforts – first at prevention of impacts, followed by minimization, then by mitigation as needed – there may be some rare exceptions to No-Go Zones.

Developers should always seek to avoid impacts through good initial project design. Normally damage to high-conservation-value areas ('No-Go Zones' discussed in Section 4.0) is avoided by not mining there. Mining No-Go Zones are nonnegotiable, but there may be a rare exception to development in such areas for reasons of overriding public interest. In such cases, the impacts or losses must be fully compensated. Areas are usually defined as No-Go Zones because of the irreplaceable and vulnerable nature of their ecosystem services. If it is not possible to achieve “no net loss” (as required for a best-practice offset), the project should not proceed. A compensatory offset substantially greater than “no net loss,” is the best practice.

In other circumstances, development in the area concerned can proceed, but the developer should still seek to avoid impacts to the extent feasible. After best efforts to first, prevent, second to minimize, and third to restore impacts, offsets should address significant residual impacts on ecosystem values.

Offsets near the project area can often be more valuable for local communities and for conservation than significant expenditure on restoration of areas directly affected, and this should be taken into consideration when deciding how to apply the mitigation hierarchy. In some cases, offsets can be more valuable than restoration to local communities and even for conservation, so the possibility of trade-offs is available in certain cases.

1. Definition of Compensatory Offsets

Compensatory environmental offsets are usually environmental conservation measures designed to compensate for unavoidable environmental impacts caused by a development project. The conservation outcomes resulting from these measures are designed to compensate for significant residual adverse environmental and social impacts arising from project's implementation, after appropriate preventive, minimization, and mitigatory measures have been taken. The goal of compensatory offsets is to achieve a clear net gain of ecosystem function. The standard of "no net loss" of ecosystem function is no longer adequate.

The advantage of using offsets for the mining proponent is that offsets enhance a company's social license to operate; strengthen trust between proponent, impacted people, and government; bolster regulatory goodwill; and boost the company's reputation -- usually at low cost. Offsets often provide proactive companies (ones that move quickly) a "first-mover advantage," as other, more reactive, companies find themselves dealing with high entry costs, unforeseen regulatory hurdles, and fully developed and complex regulatory regimes.

2. Carbon Offsets

As greenhouse gas emissions (GHG) have risen to their highest level – 390 ppm – since humans evolved; a clear case for offsets is when a mining company wants its project to be carbon neutral. To become carbon neutral, the company would calculate the amounts of GHG it expects to emit over the course of the mine's life, then plant and protect enough trees to sequester that amount of GHG.²⁴ Thus the

24 The number of trees needed will vary by species chosen, and by soil fertility, climate, and elevation etc of the offset site. As an example, say 120 tonnes of carbon per hectare corresponds to 440 tonnes of carbon dioxide equivalent per hectare of mature forest trees. Carbon's atomic mass = 12 Carbon dioxide. CO₂ - molecular mass - 12 + 16 + 16 = 44. So a mature forest can soak up the equivalent of 440 tonnes of atmospheric carbon dioxide per hectare in the 50-100 years it takes to reach maturity. That's a one-off total, not per year and may take several decades to get there. From: coolantarctica.com/Antarctica%20fact%20file/science/carbon_offsetting_tree_planting.htm. If seedlings cost \$40 per thousand, and if the typical planting density is roughly 800 per acre, then seedlings cost \$32 per acre. Labor costs for planting trees are high, but since much of the labor would consist of locally mobilized volunteers, we are assuming a total of \$160 per acre, including both seedlings and labor. With a total of 380 million acres to be planted over the next decade or so, this will come to roughly 38 million acres per year at \$160 each for an annual expenditure of \$6 billion (Brown 2011).

carbon offset could be a tree plantation or could be a degraded forest tract rehabilitated to a semi-natural forest through the years. The trees should preferably be native species (not eucalyptus or pines) and must be planted on appropriate formerly forested land. Support of the local people is essential and they can often be trained as forest managers.

GHG sequestration capacity is severely impaired worldwide by deforestation. Therefore offsets should expand carbon sequestration capacity. For a discussion of “by how much” see Section 4. Multiplier, below. No net loss is now far too modest as a goal; we have already lost too much biodiversity, and too much carbon sequestration capacity. Newmont’s Conga²⁵ proposal to convert a Peruvian natural water system (including lakes and wetlands) into an engineered system (e.g., managed reservoirs and treatment) is a perverse example of a narrow “compensatory offset.” The bigger issue is: who controls (and pays for) the new system? Clearly the private corporation will control the waters of many basins and communities, following the “offset.”

3. Biodiversity Offsets

Another type of compensatory offset is a biodiversity offset. For example, if a mine cannot avoid converting, say, 10 km² of forest, a biodiversity offset would be to conserve in perpetuity a similar nearby tract of unconserved forest of a small multiple of the 10 km² lost. The key here is “similar.” Similar means similar in area

25 Newmont’s \$4.8 billion Conga Project 3,700m above sea level, is an opencast copper/gold mine, near its Yanacocha Gold Mine, the largest gold producer in Latin America. The municipality of Celendín passed a law that declared all watersheds, wetlands, and lakes within the Conga project area as protected. The pro-mining federal government did not view this favorably; in 2007 then President Alan Garcia signed a decree revoking all protection granted from municipalities. Thereafter, only regional governments had the authority to do so. This seemed like a roadblock, but a temporary one. In 2010 the regional government of Cajamarca came to support the Celendín municipality’s protection law. The then minister of the environment ordered that protected areas could only be declared protected after the owner of the concession allows them to do so. Essentially, Newmont would have to allow local communities to protect their land from Newmont’s own mega mine. “Getting rid of the lakes would be like dynamiting the glaciers in the Andes, we’d be creating a problem that impacts the ecosystem,” observed Environment Minister Ricardo Giesecke. www.earthworksaction.org/earthblog/detail/newmonts_conga_mine_brings_major_clean_water_problems. Peru’s Deputy Environment Minister Jose De Echave resigned, calling the official environmental impact studies on the project “weak, outdated and lacking in credibility.” Political leaders in Cajamarca began a general strike against the project in November 2011, and violence has been escalating, with sabotage of machinery and clashes with the police. The Prime Minister said in January 2012 that the stalled Conga project would be developed as the government could end up with a “huge” compensation payment if the \$4.8 billion mine does not go ahead.

(e.g., km²), and in ecosystem function,²⁶ including species diversity, carbon sequestration capacity, condition, etc., to the lost tract.

Often a “paper park”²⁷ is usefully converted into a viable conservation unit by conservation financing by the project proponent as an offset. Bolstering an existing conservation unit, such as by financing the purchase of a critical tract currently adjacent to the existing conservation unit, is more cost effective than financing a new conservation unit. Inclusion or addition of buffer zones or conservation of corridors between conservation units also can be cost effective.

Rehabilitation of a degraded area into some simulacrum of the ecosystem lost can be a valuable offset. The goal would be restoration of the degraded area into a fully functioning, stable ecosystem with the same ecosystem functions, including the species diversity index, as the surrounding area, or the tract lost to the mine.

Any compensation for biodiversity loss should leave the environment clearly better off than before the project, partly for the reasons outlined in Section 1. Introduction and Perspective. The area is better off if there is “informed agreement of stakeholders that the proposed offset is more extensive in area, greater in environmental value (less disturbed, less damaged, more biodiversity, greater environmental service value), higher in ecosystem function, and under a more secure level of protection, such as by financing in perpetuity” (Goodland, 2003).

4. *The Multiplier*

The difference between “no net loss,” or a 1:1 ratio of the area lost (e.g., in area, ecosystem function, or environmental value) to the area conserved in perpetuity as the compensatory offset is key. The one-for-one ratio or “like-for-like” would be the outdated 1960s-1970s-style “no net loss,” aka stagnation, or acceptance of business as usual. The 1:1 ratio would normally be a big net loss. Differences in ecosystem quality between the lost and replacement tracts ensure that the outdated “one-for-one replacement” in terms of hectares, would result in a net loss of ecosystem functions or services. “No net loss” aspirations don’t stem the tide – let alone reverse – environmental damage. The needs of the world have become much greater than no net loss. The world has moved from “no net loss” to “net gain” or “net benefit.” “Net benefit” is increasingly the accepted standard; the

26 Ecosystem services are the benefits or functions that people, including businesses, derive from ecosystems. They include four types of function: (1) provisioning services for food, freshwater, timber, fibers, medicinal plants; (2) regulating services such as surface water purification, carbon storage and sequestration, climate regulation, protection from natural hazards; (3) cultural service include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment; and (4) supporting services include soil formation, nutrient cycling, primary production (From: IFC’s Performance Standard 6).

27 “Paper parks” are protected areas on maps and in legislation but are actually afforded little real protection on the ground. Such sites represent a failure of efforts to protect resources and ecosystems. They are surprisingly common.

decision devolves more around how big the multiplier or ratio should be between the area lost for the project and the area and value of similar ecosystem conserved in perpetuity as the compensatory offset.

There is increasing agreement that the best practice for a compensatory offset should be more than the 1:1 ratio, meaning there should be a substantial net gain in ecosystem function with the offset. In other words, the area, value, etc., of the tract lost is multiplied by a “small multiple” of more than one, commonly three, and less than ten.

The small multiplier must be big enough to compensate fully and unambiguously for all areas lost to the project. For example, if the mine has a 100 km access road, then should an area of 100 km x 10 km wide be counted as an area lost to account for unplanned settlements inevitably springing up along the road? Or should the area be 100 km x 20 km assuming traffic, fires, and settlers may use the road to convert or burn forest 10 km either side of the road? Some species require more than say 10 km² in order to support a viable breeding population. The “edge effect” reduces reproduction in small conserved plots. The drying out of small plots of forest remnants boosts fire risks, which could destroy a large area.

The uncertainty about the relative “value” of different types of ecosystem is an advantage to those interested in controlling permitting costs and has contributed to failure of compensatory offsets. Offsets are inherently risky, and it takes time for even successful ecosystem offsets to achieve full functional capacity, so the multiplier should also account for uncertainty and for time lags in maturation of habitat. Redressing historic losses would be best practice. Ultimately debates over compensatory ecosystem values and the “equivalency” of ecosystem gains and losses are usually reduced to establishing a “compensation ratio,” a number that establishes the number of compensatory hectares required per hectare of ecosystem impacts (King & Price, 2004; NMFS, 2011). The US 1972 Clean Water Act (and the US 1990 Clean Air Act) (NRC, 2001) is interpreted as a rule of thumb to be approximately a 3:1 ratio for wetland banking, although this would now be considered minimal. Nowadays, a 10:1 ratio would be best practice. This discussion is important theoretically, but in practice, in reality on the ground, without theoretical environmental scientists on hand and with weak governance prevailing, it usually comes down to a pragmatic choice of what is realistic. Conservation of an entire watershed of similar ecosystems to the tract to be lost to the mine, if such is available, would be ideal. An offset protected on much of its flanks by a river also would be valuable. The metric of say 5-10 ha of offset for each hectare of lost ecosystem is not theoretically ideal, but in practice often becomes the feasible alternative.

A major caveat is that climate change is already forcing ecosystems to shift polewards, currently at about 4 km/year. What is protected today may be worthless a decade later if such changes are not factored in.

5. *Graduated Multiplier*

Best practice could be some sort of graduated multiplier. A greater multiplier – say 10 – for the most valuable ecosystems converted by the mining project, such as old-growth tropical forest, or coral reefs. Discussion is needed on the graduated approach to balance rehabilitation of degraded sites into intact ecosystems can in some instances be more appropriate than conservation of intact ecosystem.

Rehabilitated degraded areas should be given more credit as soon as they begin to function. Even buying time for natural regeneration such as by keeping out fires and goats can a useful option.

Possibly a lower multiplier could be applied for less valuable ecosystems such as degraded areas or Brownfield sites, or one of the very many ruined castles in Turkey.

Thus the term “compensatory environmental offset” extends the conservation hierarchy of first, do no harm or prevent harm; second, minimize; and third, mitigate any residual impacts. By such sequencing, offsets become the fourth in the conservation hierarchy to supplement the mitigatory measures.

6. *Social Impacts*

The impacted people sometimes can be compensated for social impacts in monetary terms. Financial transfers can sometimes win the free and informed consent of the impacted community. When an agreed ESIA is ready, the miner pays the impacted community a sum of money negotiated in the publicly Impact-Compensation Contract,²⁸ often into an escrow account or trust fund, which can be drawn down only for community-approved expenditures.²⁹

28 The Impact-Compensation Contract (ICC) or Impact-Benefit Agreement (Sosa & Keenan 2001, Martin 2007, O’Faircheallaigh 2010, Gibson et al. 2010; www.impactandbenefit.com) are designed to compensate for adverse impacts of mining on local communities and their livelihoods, and to ensure that Indigenous Peoples receive compensation from a mine their ancestral domains or traditional territories. ICCs should be transparently negotiated in good faith in the public domain between the mining corporation and the impacted people, preferably with government approval as a formal legal contract. The contract should be justiciable and is usually based on the last section of the ESIA, often called the management plan or mitigation plan. If and when the impacted communities sign the contract, that is taken as evidence that FPIC has been achieved. The contract is re-negotiated or amended if there are any changes in the mine project. ICCs may include training and employment in the project, local procurement and services to the project, revenue sharing, environmental provisions, health and safety, reclamation procedures, scholarships, apprenticeships, cross-cultural training, relationships between communities and mine employees, control of employees behavior, penalties & incentives, and dispute resolution. Some ICCs include equity by the impacted community in the mine project.

29 In Ecuador’s first-ever big open-cast mine, the Chinese corporation Ecuacorriente is paying \$100 million in advance royalties to fund social projects in areas neighboring their \$1.72 billion

El Mirador copper mine. Indigenous Peoples have already been impacted and at least one community displaced to make room for the mine to be more than 2 km in diameter by 1 km deep in the Amazon forest region, some of which is a protected area. Including royalties, value-added taxes, income tax and other duties, Ecuacorriente may pay the state a disputed 52 percent of its revenue, and has created an environmental mitigation fund, with plans to contribute \$2.5 million to it annually. The Government expects to receive at least \$4.5 billion over the mine's 25-year life. However, thousands of protesters are marching on Quito as of mid-March 2012 partly because FPIC has not been sought, an environmental impact study has not been approved, the potentially impacted indigenous communities have not been consulted, and because of fears the mine will pollute the water supply.