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Measuring what? A comparative anatomy of five mining sustainability frameworks

Alberto Fonseca [a,*], Mary Louise McAllister [b], Patricia Fitzpatrick [c]

[a] Department of Environmental Engineering, School of Mines, Federal University of Ouro Preto, Morro do Cruzeiro, Ouro Preto, MG 35400-000, Brazil
[b] Department of Environment and Resource Studies, University of Waterloo, ON, Canada N2L 3G1
[c] Department of Geography, University of Winnipeg, Winnipeg, MB, Canada R3B 2E9

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ABSTRACT

Recent years have seen a proliferation of frameworks for assessing and reporting mining sustainability. While these frameworks vary substantially in scope and approach, they all seem to share the purported goal of better informing decision-makers about the future implications of mining to the environment and society. Whether they do so, however, remains an open question. The purpose of this paper is to describe, compare and critically analyse five sustainability assessment and reporting frameworks used by, or proposed for, the mining industry. Based on literature reviews, the paper highlights the underlying assumptions of those frameworks and presents a diagram that helps to clarify aspects such as temporal orientation, geographical scope and quantity of indicators. Three out of the five frameworks follow a siloed approach to assessing mining sustainability, overlooking trade-offs and synergies among variables and sustainability dimensions. None of the frameworks seems to fully shed light on the problem of mineral scarcity and the effective legacy of mineral operations. The paper concludes by emphasizing the need to carefully consider the information generated by the analysed frameworks and suggest more fruitful ways to foster sustainability reports.

1. Introduction: the burgeoning science of measuring mining sustainability

The public perception of the mining industry remains negative despite the proliferation of mining sustainability initiatives over the past two decades. One analysis that tracked the ethical reputation of multinationals in the media found that basic resources companies, which includes 32 mining and metals multinationals, ranked 17th out of 18 other industrial sectors (Covalence, 2009).

Fuelling this reputational problem is the reality that mining deals with non-renewable resources. It is easy to agree that the social and environmental impacts of mineral extraction need to be harnessed through eco-efficiency, community investments, equitable allocation of mineral rents, and so forth. However, there is little public consensus about how to make the extraction of non-renewable resources compatible with sustainability. Many NGOs have argued that "mining is inherently unsustainable" and that "(...) a truly sustainable global society will take fewer minerals from the earth each year" (Young and Septoff, 2002, p. 1). Yet organizations such as the International Council on Mining and Metals (ICMM) disagree that mining activities should be kept to a minimum, since the sector plays an important role in promoting sustainable development. According to that Council, mining, like any other human activity, should be "undertaken in such a way that the activity itself and the products produced provide a net positive long-term contribution to human and ecosystem well-being" (ICMM, 2012a, p. 5).

The ongoing controversy surrounding the concept of mining sustainability would probably diminish if the "science" of assessing and reporting mining sustainability were sufficiently developed. As environmental engineer Gavin Mudd asked: "How on earth do we really assess the sustainability of mining and move beyond rhetoric and policy to really understand this debate?" (Mudd, 2007, p. 27). Mudd's question awaits an answer. There is no agreement on how to assess mining sustainability, even within similar contexts and unit of analysis.

This knowledge gap has not impeded the development of mining sustainability frameworks. The Global Compendium of Sustainability Indicators Initiatives includes at least 20 records of frameworks that can be used to assess mining sustainability (IISD, 2012). A growing number of similar frameworks are being proposed by scholars as well. Nonetheless, the effectiveness of such initiatives (i.e. their capacity to generate sound information about the future socio-environmental effects of mining) has received very little scrutiny. Petrie et al. (2007, p. 144) examined this problem recently and concluded that "there is little in the public domain, which demonstrates how sustainability metrics and frameworks are actually used to support decision making, and whether better decision outcomes are achieved as a result".

* Corresponding author. Tel./fax.: +55 31 35591496.
E-mail address: albertof@em.ufop.br (A. Fonseca).

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Readers of the reports generated by mining sustainability frameworks (e.g. consultants, communities, investors, activists) might overlook the limitations of such reports. As scholars often point out, the "selected" indicators and metrics may suggest that the mining company or operational site is "generally" progressing towards sustainability (Moneva et al., 2006; Gray, 2010).

The objective of this paper is to shed light on the burgeoning and confusing practice of assessing and reporting mining sustainability. It does so by describing, comparing and critically analyzing five (5) frameworks used by or proposed for mining companies and industry associations. The underlying purpose is to assess the effectiveness and limitations of such frameworks. Findings from this assessment are particularly useful for communities and institutions interested in the mineral sector's socio-environmental accountability.

2. Methodology

The term "Sustainability assessment framework" has been described in several ways, often on an ad hoc basis. Simply put, a framework is a structure composed of *components framed together* to *support something*. When used to support sustainability assessment and reporting, it includes "components" such as indicators, conceptual models, principles, criteria, goals, and policies. A framework can be stand alone, or made up of different frameworks, which, in turn, can include other frameworks. This complexity is exacerbated as the frameworks are not always conceptualized or presented with a clear description of the assumptions and preferences taken into account during their design.

The evaluation of the mining sustainability frameworks presented here was based on recent works by Ness et al. (2007) and Hacking and Guthrie (2008). These authors propose techniques to analyze the main attributes of sustainability frameworks, in order to help clarify the assumptions of, and consequent confusion surrounding, the sustainability information generated. Ness et al. (2007) developed a two-dimensional diagram that classifies frameworks horizontally according to their temporal focus (retrospective or prospective) and vertically according to the types of indicators and/or spatial focus. Hacking and Guthrie (2008), for their part, developed a three-dimensional diagram to understand the differences among various sustainability frameworks in the context of impact assessment. These authors devised a cube with three axes. Each axis corresponded to degrees of either (a) comprehensiveness of social and environmental topics or indicators; (b) the scale and scope of assessment, i.e. the degree to which frameworks consider geographical scale variations; and (c) integration, i.e. the extent to which frameworks evaluate trade-offs and synergies among sustainability topics or indicators.

This paper draws from these approaches by creating a two-dimensional diagram, similar to that proposed by Ness et al. (2007). However, it includes variables considered by both approaches, including: (a) temporal orientation; (b) geographical focus; (c) comprehensiveness; (d) integration (trade-offs and synergies); and (e) scale and scope considerations. Each sustainability framework is plotted horizontally according to its temporal orientation and vertically according to its degrees of indicator/topic integration. Degrees of comprehensiveness are described qualitatively through the size of the sphere of the framework in the diagram: the larger the sphere, the higher the quantity of sustainability indicators/topics. Geographical foci and considerations of scale are not displayed in the diagram although they are evaluated and discussed.

Given the proliferation of sustainability frameworks, this research employed a purposive sampling approach (Babbie, 2010), i.e. the sample was selected on the basis the of the authors' judgment about which cases would best represent the frameworks used by, or proposed, for mining companies, particularly large ones. Two of the five selected mining sustainability frameworks, the Global Reporting Initiative (GRI) and the Toward Sustainable Mining (TSM), are among the most frequently used by large mining companies, particularly in Canada. The other three frameworks – seven questions to sustainability (7QS), innovation and technology driven sustainability performance management framework (ITS-PM) and Adisa Azapagic's – were proposed by analysts and academics, but arguably resulted in little or no implementation on the ground. These cases reflect a range of approaches used to assess and report mining sustainability. Although it is limited, the sample allows for an initial glimpse into the emerging practice of measuring mining sustainability.

The analysis is based on the evaluation of the five frameworks' documents (e.g. protocols, principles, and progress reports, etc.), as well as on secondary academic and grey literature. The frameworks are analysed individually in the sub-sections below. Further discussion and synthesis are presented in the following section.

3. Results: mining sustainability frameworks in the disassembly line

3.1. Global reporting initiative and the mining and metals sector supplement (GRI–MMSS)

The GRI framework (GRI, 2011) and its mining and metals sector supplement (MMSS) (GRI, 2010) is arguably the most widely adopted sustainability framework in the mining sector. The year 2011 witnessed the publication of 102 reports from mining companies, 95% of which based on the GRI framework (GRI, 2012). Several global and national mining associations adopt and promote the GRI framework among its members (ICMM, 2012b; MCA, 2010; WGC, 2010). The GRI framework has its roots in the accountability field. It was first piloted in the late 1990s and is now in its third version, known as the GRI G3.1 (GRI, 2011). This version is made up of several guidance documents providing guidance on "how to report" and "what to report", described as follows (GRI, 2010):

- *Reporting Guidelines*: The guidelines are the cornerstone of the GRI G3. They set quality and content principles, as well as managerial and performance indicators. The principles for defining content include materiality, stakeholder inclusiveness, sustainability context, and completeness. The indicators (about 130) cover several thematic categories, including organizational, managerial, economic, environmental, social, human rights, society, and product responsibility issues;
- *Sector Supplements*: The supplements provide additional guidance and indicators for sector specific issues. One of the supplements is the aforementioned mining and metals sector supplement; and
- *Indicator Protocols*: The protocols provide definitions and technical and methodological guidance on each of the performance indicators of the guidelines.

The framework's temporal orientation follows a retrospective logic, although in an implicit manner (Lenzen et al., 2004). The GRI–MMSS guides mining companies to assess and report "past year" performance in connection with various social, environmental and economic indicators.

The framework is notable for its comprehensiveness. It presents over 150 indicators of various types. Companies are encouraged to assess and report on the most material indicators. A GRI G3.1 report is not expect to bring information on all indicators, but only