Social Life Cycle Assessment for Open Pit Gold Mining in Colombia: a case study in Tolima (Colombia)

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1. Context and scope

Cajamarca (Tolima) is a village full of natural resources, especially water-related ones. Its agricultural production for the first quarter of 2008 reached 3 153 tons of food, which reached main supply centers at the national level [1]. Meanwhile, in 2006 a multinational company established the largest open-pit gold mining project in Colombia there. A production of 26.8 million ounces was estimated [2, 3, 4, 5]. While the project is currently in its pre-feasibility phase and would be expected to begin in 2019 [2], so far it has generated local and national concern from stakeholders, due to controversy about its environmental and social impacts.

As a result, the project has an environmental license from national environmental authority, but lacks a social license to operate (as defined by [6]) from local stakeholders, including local authorities. Ideally, one would expect the company responsible to involve stakeholders in the preliminary decision-making processes and local development programs. However, at present, although the company has programs for social responsibility and community activities, this study found stakeholders were divided about the open-pit gold mine. The main concerns expressed by the community include: the effect on water bodies (supply and quality); the increase in the local cost of living; and increased pressure on the community. Moreover, a series of disagreements was identified between stakeholders with conflicting of interests (environmental protection, strengthening local community, governance, etc.).

2. Main text

This study was done through integrating the traditional Life Cycle Analysis (LCA) methodology and the one proposed by UNEP/SETAC: Social Life Cycle Analisys (S-LCA) [7]. Its main goal was to establish the social and environmental impacts associated with open-pit gold mining. An ounce of extracted gold was selected as the functional unit. The scope considered ranged from raw materials extraction (mining) to processing.

Marketing and disposal of the product were not considered. This research was divided into two phases. First, the social impact was determined using stakeholder theory and social impact assessment, adapting the social impact study of biodiversity and REDD+ manual [8, 9, 10]. Thirty-six stakeholders participated through personal interviews and surveys. Official documents from stakeholders (both local authorities and the multinational company) were also reviewed. Second, the most likely scenario of resource exploitation data was used to conduct the assessment. For this, models presented by the company were considered as well as interviews done to internal stakeholders. The company did not provide detailed information for the development of the environmental study, however, which is why the data from secondary sources was used, thereby limiting the initial inventory.

Conflicts among stakeholders were evident. First, there was conflict between the Ministry of Environment and Sustainable Development (national environmental authority) and the Regional Autonomous Corporation of Tolima (local environmental authority). Second, there was conflict between local authorities and the multinational company. Similarly there was conflict between the company and Major Groups and Stakeholders (MGS) – environmentalists, educational institutions, farmers, youth and women – who have expressed their dissatisfaction with the project through written communication, protests and other statements through the media.

Other results of this study are related to the lack of partnership between the multinational company and stakeholders in general. While the company has social responsibility programs and significant investments in social programs (education, health, entrepreneurship, etc.), local community and other stakeholders alleged they have not taken part in such a process. An opportunity for the company was thus identified to change its social responsibility model from "share the value created" to "create shared value" [11].

The different groups who disagreed with the project, expressed concern over issues such as the quality and availability of water resources, air and soil pollution, vegetation affectation, as well as a negative socio-cultural impact, related to reduction of life quality for local communities, represented in terms of an increasing cost of living, and difficulties with health and work-life balance.

As a second result, the environmental dimension of Life Cycle Assessment, SimaPro 8 (Academic Edition) software was used. Databases were adjusted to the Colombian context, specifically in the energy matrix, using the values reported by [12]. In the inventory phase, information collected was discussed as by [13].

The main findings in the impact assessment focuses on the process of recovery with electricity, which is related to the amounts of sodium cyanide and hydrochloric acid used during the process. Human health, ecosystem capacity and climate change were categories with greatest negative impact. Based on the above, one recommendation to the multinational company is to pay special attention in terms of human toxicity and respiratory organic agents to both workers and the surrounding community in the area of future operating conditions. Implementing prevention projects at CSR

programs could reduce some of the impacts on this dimension. This would include: i) incidence in workers of: silicosis, pneumoconiosis and Buruli ulcer; ii) incidence in the local community of: asthma, inhalation of arsenic, sulfur poisoning, abortions, increased congenital diseases and malnutrition; and iii) incidence in the community of problems associated with intestinal diseases by consuming poisonous traces of food from crops in the area of influence.

References

[1] Corporación Colombia Internacional, «Boletín Mensual: Abastecimiento de alimentos en los principales mercados.,» Abril 2008. [Online]. Available: http://ow.ly/zWt9G. [Last access: 15 julio 2014].

[2] AngloGold Ashanti, «Reporte del País Colombia,» 13 agosto 2008. [Online]. Available: http://ow.ly/zWtg9. [Last access: 13 septiembre 2013].

[3] AngloGold Ashanti, «Proyecto de exploración La Colosa,» AGA, Cajamarca, Tolima, 2012.

[4] AngloGold Ashanti Colombia, «La Colosa una oportunidad de Oro para el Tolima,» 01 10 2013. [Online]. Available: http://ow.ly/zWtCP

[5] A. Ruiz Caro, Situación y tendencias de la minería aurífera y del mercado internacional del Oro, Santiago de Chile: CEPAL, Naciones Unidas, 2004.

[6] K. M. W. a. R. Wilburn, «ACHIEVING SOCIAL LICENSE TO OPERATE USING STAKEHOLDER THEORY,» Journal of International Business Ethics, pp. 1-14, 2011.

[7] C. Benoît, B. Mazijn, E. S. Andrews y United Nations Environment Programme, Guidelines for social life cycle assessment of products: Social and socio-economic LCA guidelines complementing environmental LCA and Life Cycle Costing, contributing to the full assessment of goods and services within the context of sustainable development, Paris: United Nations Environmental Programme, 2009, p. 113.

[8] R. E. Freeman, Strategic Management: A stakeholder approach, Boston: Pitman, 1984.

[9] M. Richards y S. Panfil, «Manual Para le Evaluación de Impacto Social y Sobre la Biodiversidad (EISB) de los Proyectos REDD+ parte 1,» Alianza para el Clima, Comunidad y Biodoversidad, Forest trends, Fauna & Flora international y Rainforest Alliance., Washington D.C, 2011.

[10] A. M. Esteves, «Evaluating community investments in the mining sector using multi-criteria decision analysis to integrate SIA with business planning,» Environmental Impact Assessment Review, pp. 338-348, 2008.

[11] M. Porter y M. Kramer, «Creating Shared Value,» Harvard Business Review, January 2011.

[12] Unidad de Planeación Minero Energética de Colombia, "Cálculo del Factor de Emisión 2009," 29 Septiembre 2010. [Online]. Available: http://ow.ly/zWtvx [Accessed 23 Febrero 2012].

[13] T. Norgate y H. Nawshad, «Using life cycle assessment to evaluate some environmental impacts of gold production.,» Journal of Cleaner Production, pp. 53-63, 2012.