The Guidelines for Water Management in arid and semi-arid Zones with Mining, produced by the CAMINAR Project

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ABSTRACT

The FP6 project CAMINAR (Catchment Management and Mining Impacts in Arid and Semi-Arid South America) has the general aim of contributing to the establishment of policy options, management strategies and technologies for the sustainable management of ecosystems in those river-basins of arid and semi-arid South America which are subject to impacts from mining. The project works in Peru, Bolivia and Chile as ‘demonstration’ countries. One of the project objectives is to develop guidelines for integrated water resources and ecosystem management in arid/semi-arid zones of South America with particular emphasis on mining impacts.

The purpose of these guidelines is to provide a wide range of stakeholders with practical advice on the key issues which should be considered when developing mining operations and river basin management plans in arid and semi-arid zones.

The focus of the guidelines is on the full life-cycle of mining, considering the following phases sequentially:

- exploration and planning
- mine development
- active exploitation
- mine closure
- after-care period
- long-term legacy of ancient mined land

The guidelines will consider all these issues within the context of integrated water management at the river-basin level, with particular attention to the equitable use of resources. Both surface and subsurface mines will be considered. Emphasis is placed on climatic and hydrometeorological conditions relevant to arid and semi-arid zones, especially those in South America, and on how to achieve participatory river basin planning in these environments.

Additional Key Words: integrated river basin management, best practices, Best Available Technology Not Entailing Excessive Costs (BATNEEC).

\footnote{1 Paper presented at Securing the Future and 8th ICARD, June 23-26, 2009, Skellefteå, Sweden.}
INTRODUCTION
The CAMINAR project (Catchment Management and Mining Impacts in Arid and Semi-Arid South America), as the full title suggests, is aimed at the problems of arid and semiarid basins of South America where mining has been developed since the early colonial and even from the pre-colonial period. Even though the surge of mining developments in recent years in these areas has been driven mainly by large international mining companies that operate under strict national and corporate environmental standards, arid climatic conditions imply that every drop of water has a tremendous value, and that water resources management and the minimization of negative impacts must be prioritized.

THE CAMINAR PROJECT
The CAMINAR project includes the study of three watersheds in Peru, Bolivia and Chile (Figure 1), which have mining activities with varying levels of environmental impacts and different watershed management policies. Details of the case studies, river basin characteristics and environmental and social issues can be found elsewhere in these proceedings (Rötting et al, 2009). Stakeholder dialogue groups were set up in each case study basin to discuss the conflicts regarding water quality and quantities, develop possible solutions, and to devise a catchment management plan. Moreover, dialogue groups at national level were created to critically evaluate the effectiveness of existing regulatory strategies for mining and catchment management in arid/semi-arid areas and to discuss alternative policy options. CAMINAR also develops decision support tools for river basin management based on computer modelling of environmental parameters, and guidelines for local and national authorities and the mining community, which give advice on the environmental management of watersheds and on the mitigation of mining impacts, based on local and international experience. The review of international experience was focused on semi-arid and arid mining areas in Australia, Spain, USA and South Africa. It is available online at http://www.labor.org.pe/descargas/CAMINAR_D6_Review_of_international_experience.pdf.

This paper presents the main ideas of the CAMINAR Guidelines for Water Management in arid and semi-arid Zones with Mining which are currently being produced.

Figure 1: Location of the three case study catchments in the three demonstration countries
OBJECTIVES OF THE CAMINAR GUIDELINES
The CAMINAR Guidelines are aimed at providing information on Water Management in arid and semi-arid Zones with Mining to small and medium scale mining operations that want to improve their performance, and also to inform public administrations and other stakeholders on the state-of-the-art and available methods when evaluating environmental impact assessments of proposed mining operations.

MAIN IDEAS OF THE CAMINAR GUIDELINES
The mining activities developed since the early twentieth century until around 1980 were not greatly concerned with environmental and social aspects, which in fact were not well understood. They left many environmental liabilities that continue to affect the environment and quality of water supplies in many rural areas, often inhabited by indigenous peoples.

At present, given the change in mentality on the concept of mining that emerged in the seventies, the co-existence of mining and environmental protection is possible. In order to achieve this, a planning of the extractive activity is necessary that integrates the environmental factors from the earliest stages of the project. All mining activity must be projected in the medium to long term according to what is now understood as sustainable development, balancing the geological factors that define the site with those of the mining industry and those of environmental preservation of the region. The need for preservation and environmental resource management is based on the concept of ‘sustainable’ or ‘responsible’ mining. There is a school of thought in most mining companies calling for a reconciliation of economic efficiency and production quality with the preservation of environmental values. This means to integrate, as noted above, the prevention of possible negative impacts on the environment during all the stages of the lifecycle of a mine, in order to produce resources necessary and irreplaceable for the development of a society without deteriorating the environmental quality of the region where the mines are located.

It is necessary to know the life cycle of a mine in order to properly understand the basic pillars of the management of mining impacts. Mining operations have a long life cycle, and the various stages that occur during the development process of the project the impacts are very different. The special situation in the arid and semiarid areas of South America also has to be taken into account, where modern median and large-scale mining operations coexist with small informal mines, archaic and without the means for a correct environmental management. Therefore, the particular characteristics of both types are treated in different sections of the CAMINAR Guidelines.

The Guidelines are still being produced, and will be available in September 2009 online at http://www.labor.org.pe/caminar.

The main sections of the Guidelines will be:

EXECUTIVE SUMMARY

1 INTRODUCTION

Objectives of the CAMINAR Project

Focus of the Guidelines

Other published Guidelines
2 MINING AND INTEGRATED RIVER BASIN MANAGEMENT

With regard to water resources management in mining operations it is increasingly accepted that it is necessary to have a global vision and to consider the Integrated River Basin Management within a watershed, where the availability and use of water affects all stakeholders and the environment, especially in arid and semiarid areas. This section explains the aspects that should be covered by the characterization of the site and river basin prior to the opening of a mining operation, such as water demand, hydrological and hydrogeological research methodology, water balance, and alternative sources of water. It also explains the other components of an integrated management approach, such as stakeholder participation, monitoring, management tools (efficient use of water, GIS, decision support tools, vulnerability analysis etc.).

3 MINING MANAGEMENT IN ARID AND SEMI-ARID ZONES

This section explains aspects to be taken into account during the Life-cycle in Medium and Large-Scale Mining (Exploration Phase and Economic Evaluation, Operational Phase, Closing Phase of the Exploitation and Post-Closing Phase). It also describes mitigation measures for Artisanal and Small Scale Mining during the Operational Phase and Abandonment Phase of the Exploitation. The last section is dedicated to Best Available Technologies and Emerging Techniques for Mining Liabilities and Abandoned Mines.

4 CONCLUSIONS

REFERENCES

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