



Management of the water balance and quality in mining areas

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Although mining companies have long been conscious of water related risks they still face environmental management problems. These problems mainly emerge because mine sites' water balances have not been adequately assessed in the stage of the planning of mines. More consistent approach is required to help mining companies identify risks and opportunities related to the management of water resources in all stages of mining. This approach requires that the water cycle of a mine site is interconnected with the general hydrologic water cycle. In addition to knowledge on hydrological conditions, the control of the water balance in the mining processes require knowledge of mining processes, the ability to adjust process parameters to variable hydrological conditions, adaptation of suitable water management tools and systems, systematic monitoring of amounts and quality of water, adequate capacity in water management infrastructure to handle the variable water flows, best practices to assess the dispersion, mixing and dilution of mine water and pollutant loading to receiving water bodies, and dewatering and separation of water from tailing and precipitates.

WaterSmart project aims to improve the awareness of actual quantities of water, and water balances in mine areas to improve the forecasting and the management of the water volumes. The study is executed through hydrogeological and hydrological surveys and online monitoring procedures. One of the aims is to exploit on-line water quantity and quality monitoring for the better management of the water balances. The target is to develop a practical and end-user-specific on-line input and output procedures. The second objective is to develop mathematical models to calculate combined water balances including the surface, ground and process waters. WSFS, the Hydrological Modeling and Forecasting System of SYKE is being modified for mining areas. New modelling tools are developed on spreadsheet and system dynamics platforms to systematically integrate all water balance components (groundwater, surface water, infiltration, precipitation, mine water facilities and operations etc.) into overall dynamic mine site considerations. After coupling the surface and ground water models (e.g. Feflow and WSFS) with each other, they are compared with Goldsim. The third objective is to integrate the monitoring and modelling tools into the mine management system and process control. The modelling and predictive process control can prevent flood situations, ensure water adequacy, and enable the controlled mine water treatment. The project will develop a constantly updated management system for water balance including both natural waters and process waters.