

Interrelation between land use changes, geological setting and water quality in an arid mountain basin, Northern Chile

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Arid regions, such as northern Chile, currently experience profound conflicts over their water resources and are especially vulnerable to water contamination owing to missing dilution. Conflicts over water quality arise due to a high competition between cash crops and mining projects. The national governments goal to make Chile a globally important food exporter, has led to widespread expansion of agricultural surface over the last 20 years, increasing pressures on limited water resources. Additionally mining, being one of the most important economic sectors in Chile, threatens both surface and groundwater quality. This is especially important for northern Chile, as nearly all important mining sites of the country are situated in these arid mountain regions.

Using the case study of the Rio Huasco watershed changes in land use and their effect on water quality are discussed. This region was chosen as an exemplary case for the development of Chiles arid regions: the valley is located at the southern edge of the Atacama Desert where water scarcity is a major problem. At present the watershed is predominantly used for agriculture. Many small farmers still practice strip cultivation but are pressured to shift towards an international export-orientated future with monocultures. International companies are planning to mine one of the world's biggest gold reserves in the headwaters of the Rio Huasco, the Pascua Lama Mine.

The study is based on the analysis of spatial and temporal variations of water samples taken from the river system and different wells during the Chilean summer of 2015/16. A combination of various analytical methods is used to better understand the hydro-geochemical composition and the interactions between the competing industries for water and their impacts in water quality. Additional long term data from the Chilean Water Authority collected at various locations in the basin allow for historical trend analysis.