



Co-evolution of land use changes, water quality deterioration and social conflicts in arid Northern Chile

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Water scarcity concerns not only the limited availability of water but also water of inadequate quality in terms of its designated purposes. Arid regions, such as found in Northern Chile, are especially vulnerable to water contamination, owing to missing dilution. Additionally, the national government of Chile's goal to make the country a globally important food exporter has led to the widespread expansion of agricultural surfaces over the last 20 years, thereby increasing pressure on limited water resources and water quality. Mining, being one of the most important economic sectors in Chile, threatens both surface and groundwater quality. This scenario increases the potential for water use conflicts, which is further compounded by the demand for potable water provided by rivers and groundwater.

In order to better understand the role of both physical and human dimensions of water quality, this research uses a socio-hydrological conceptual framework. This approach is used in order to broaden the scope of hydrology to include the anthropogenic impact on the environment. It therefore focuses on human and natural interactions and two-sided feedback loops, instead of purely hydrological cycles.

Using the case study of the Rio Huasco watershed changes in water quality, which originate at the nexus of physical parameters, social conflicts and changing land use regimes in Northern Chile, are discussed. This region was chosen as an exemplary case for the development of Chile's 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 practise strip cultivation, but are pressured to shift towards an international export-orientated future with monocultures. International companies are planning to mine the Pascua Lama Mine, one of the world's biggest gold reserves located in the headwaters of the Rio Huasco. Meanwhile, the problem of scarce water is complicated by the privatization of water rights in Chile. Within the watershed, the amount of sold water rights already exceeds the real water availability by far.

An interdisciplinary set of methods was used, including measurements of the chemical and physical parameters of water quality, as well as semi-structured interviews. Water samples across spatial scales were analysed, with the results compared with local people's perceptions of water quality and how this affects their use decisions. The study showed that perceptions of water quality and fear of contamination were influenced by the social conflicts surrounding the controversial construction of the Pascua Lama Mine. The social conflicts were further aggravated by local mistrust towards the multilayered and so-perceived neoliberal and top-down governance structures of water resources in Chile.