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Assessing the Impact of Agriculture on Water Quality — A Case Study from Central Chile

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Abstract

Irrigated Agriculture has an impact on the quality of ground and surface waters. These impairments in turn can have negative effects on ecology and economic development. In order to quantify these impacts there is a need to develop adequate methodologies and modelling approaches. These approaches should be reliable and built on readily available data or data which can be measured cost-effectively.

In this paper a planned project in Central Chile taking the Aconcagua and La Ligua watersheds as an example is presented. The study is focusing on the impact of fertilizer application in irrigated agriculture on the quality of ground and surface waters. First the human and physical environment of the region are presented. In a second step the conceptual model is described and finally the related monitoring plan. One of the major challenges in the region is high spatial and temporal variability of the determining factors for water pollution like precipitation, discharge, soil types and fertilizer application. On the basis of test areas which are studied in detail the factors that have the biggest impact on water quality are singled out and are quantified. In a further step these factors are applied to a larger (watershed) scale in order to quantify the impact of agriculture on ground and surface waters. Various deterministic and stochastic approaches are applied.

The modelling is supported by a GIS and data are kept in a central database accessible via web by the project partners and other interested groups via the internet. This project is realized by an interdisciplinary team consisting of agronomists, hydrologists, chemists and economists of the catholic University of Valparaíso, Chile and the University of Applied Sciences Cologne, Germany.

Keywords: Irrigation practice, monitoring, non-point pollution, watershed management

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