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Management of groundwater in China - Policies and remedies for overpumping

Wolfgang Kinzelbach (1), Yu Li (1), Lu Wang (1), Ning Li (1), Haijing Wang (2), and Beatrice Marti (2)
(1) ETH Zurich, IfU, DBAUG, Switzerland (kin@ethz.ch), (2) hydrosolutions, Zurich, Switzerland

Overpumping of aquifers is a phenomenon of global scale, mainly caused by agricultural irrigation with groundwater. It implies attaching no value to stored groundwater resources by using them up until pumping becomes infeasible due to physical or economic constraints. In times of climate change and increasing occurrence of extremes an intact multi-year storage - accessible at reasonable cost - is a valuable mitigation tool. Preserving such an asset requires active management of groundwater levels to ensure environmental services, to hedge the risk of extreme drought, and to maintain feasible well yields. This task is much more challenging than the management of a surface water reservoir as there are large numbers of “selfish” actors involved, which are not easily controlled and exposed to the danger of a “Tragedy of the Commons”.
Some progress has been made in China towards the implementation of groundwater policy and management systems. In this work we discuss our first-hand experience stemming from two distinctive pilot projects jointly financed by the Swiss Development and Cooperation Agency and the Chinese Ministry of Water Resources. A smart meter system with real-time monitoring and control by modern technology in Gansu’s Zhangye region is contrasted with a simpler system in the North China Plain, which uses electric energy consumed for groundwater pumping as an indicator both for monitoring and control of abstractions. In both cases groundwater models bring together the monitoring data from pumping and groundwater level observations in a real-time prediction of groundwater level development and allow to decide on abstraction quota year by year depending on surface water and/or rain water availability.