

Impact of long-term changes in climate on groundwater resources in an arid setting

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Abstract Scenarios of shifts in climate calculated until 2200 were coupled with a groundwater model within an arid setting. Precipitation calculated by the climate model is converted to groundwater recharge, which is supposed to decrease by 45% during the next 200 years. Population growth models determine pumping rates of groundwater wells for human freshwater demand. Groundwater level decline and budgets are calculated for four greenhouse gas emission scenarios and for two population growth rate scenarios, respectively. Groundwater levels decline by up to 100 m until 2200 if a medium population growth scenario is assumed. However, if population grows with a smaller increase rate, a depletion of the aquifer may be prevented and a balance between in- and outflow can be reached again. Changes in climate have only a minor impact on the groundwater budget compared to human freshwater demand, emphasizing the importance of introducing new technologies to reduce water consumption in an arid environment in future.

Key words arid hydrology; climate change; groundwater management; population model; climate model; CO₂ emission