GC8-Hydro-88, updated on 19 Apr 2024
https://doi.org/10.5194/egusphere-gc8-hydro-88
A European vision for hydrological observations and experimentation

Future drought and groundwater availability in the Netherlands: a growing concern

Victor Bense, Adriaan Teuling, Syed Mustafa, and Martine van der Ploeg
Wageningen University and Research, Department of Environmental Sciences, Wageningen, Netherlands
(victor.bense@wur.nl)

Groundwater depletion from aquifers worldwide is of increasing intensity and this is reason for serious societal concern especially in areas of continuing population growth and where future dry periods are predicted to be more frequent in a changing climate. Groundwater depletion will occur, and groundwater development eventually unsustainable, where groundwater withdrawal rates exceed the groundwater recharge flux. However, the limited ability to assess groundwater recharge conditions gravely hampers effective groundwater resources management to avoid their overexploitation leading to groundwater depletion. Hence, mapping and quantifying groundwater flows is therefore increasingly recognized as one of human societies grand challenges. The Veluwe area is of the few topographically elevated areas in the Netherlands to enable appreciable groundwater recharge. Therefore, it hosts the largest fresh groundwater system of the Netherlands covering a surface area of approximately 1100 km^2. The 2018 and subsequent 2021-2022 summer droughts led to a strongly increased demand for drinking water across the Netherlands which brought some groundwater abstraction licenses, set by regulatory government bodies, across the Veluwe area close to being exceeded. This cunningly demonstrated that, similar to many areas globally, in periods of water stress groundwater resources often are of crucial importance in maintaining a reliable supply of domestic water, and to meet agricultural and industrial demands. However, the relation between climate and groundwater drought is complex, in particular for areas with deep unsaturated zones such as the Veluwe, yet needs to be understood in the face of projected climate change. For this reason, already prior to 2018, the Veluwe area was listed as a nationally strategic water reserve, and as such should receive ample attention in considerations of National Security on the long term. However, since the mid-1990s the regional hydrogeological system of the Veluwe has not been subject of extensive experimental academic study as result of which it is highly questionable whether we can now reliably assess groundwater availability across the area in the decades to come. In this presentation, we outline ongoing and future efforts to monitor water fluxes in the Veluwe region. Past measurements have been focussing on water table fluctuations and soil-water modeling to estimate recharge. Current plans include establishing a drought observatory consisting of a precision lysimeter array complemented by eddy covariance observations of ET, that transects the from the high sandy grounds with deep groundwater tables to the seepage areas with shallow groundwater tables.