Preliminary identification of groundwater drought events in unconfined aquifer with standardized drought indices in single multilevel groundwater station

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More severe and frequent drought events are one of the challenges faced worldwide in the context of climate change. There are multiple anecdotal evidence of dug wells and small streams running dry during drought events in years 2015 and 2018 in Latvia. However, no comprehensive research has been made to assess groundwater drought and its ecological and socioeconomic impacts in Latvia and wider Baltic region. More intensive irrigation can further exaggerate the groundwater drought problem in the future.

We aim to analyse past drought events from meteorological and groundwater drought perspective. Groundwater drought development and propagation is complex, however, we try to find the best simple predictors that can be used for evaluating purposes. We examine groundwater level data set from “Dricani” monitoring station with 14 groundwater wells uncovering unconfined heterogenous quaternary aquifer with well depths ranging from 2.5 to 15 m and monthly data records starting from 1970.-ies. Such a high number of wells in a single monitoring station permit detailed groundwater level analysis with a focus on local scale disturbances and groundwater drought propagation that could be caused by heterogeneous sediments in the aquifer, terrain and other drivers.

We us “Dricani” groundwater level data series to calculate Standardized groundwater level index (SGI) (Bloomfield, Marchant 2013) revealing several major groundwater drought events during the last 50 years. Although largest groundwater drought events shows similar pattern within all the wells, minor changes in SGI can be identified that can be attributed to different depths of groundwater wells.

The study is supported by fundamental and applied science research programme, project No. lzp-2019/1-0165 “Spatial and temporal prediction of groundwater drought with mixed models for multilayer sedimentary basin under climate change”.

References
