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SMHI Aqua: a new co-generated hydro-climate service to enable sustainable freshwater management

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Water management is strongly dependent both on the short-term and seasonal variability of weather patterns. The increase in evapotranspiration and temporal shift of snow melt due to temperature rise is expected to have strong impact on water resources in Sweden with risk of severe deficit in summer and surplus in winter. For drinking water producers and freshwater managers a good understanding of the current hydro-meteorological situation is essential to ensure both urban water supply and compliance of water regulations.

This study is the result of collaboration between SMHI and Nodra, the municipal water company in Norrköping, Sweden. In 2016, warmer temperatures and reduced precipitation rates led to very low water levels in a ground water treatment plant used to supply drinking water to Kolmården, a region highly influenced by tourism in the summer season. This raised the need of monitoring freshwater availability and hydrological seasonal forecasts to be implemented for ensuring optimal water usage. To this end, a hydrological model is setup to simulate the water balance in freshwater reservoirs for evaluating groundwater recharge in the soil. Short to medium range (1-10 days) weather forecasts and seasonal climatological forecasts (6 months ahead) of water levels are produced at the local scale. Aiming at supporting long-term water planning, different management strategies of water withdrawal are used to feed the operational forecasting systems to assess groundwater availability in the following months.

Within the framework of the Horizon 2020 CLARA project; SMHI co-developed Aqua, a water supply assessment service tailored to the needs of public authorities and private companies involved in the water supply sector. Aqua includes a web-based platform that incorporates real-time station observations of precipitation, temperature, water levels, water discharge and raw water withdrawal. Forecasts of relevant hydro-meteorological modelled parameters are also included and presented in an intuitive way through maps, graphs and tables. To overcome the challenges of communicating results of the probabilistic component of hydrological seasonal forecasts to the users, the visualization of forecasted groundwater levels is kept simple, whilst the provision of historical values allows an easy comparison against normal conditions.

The availability of tools displaying observations, modelled results and forecasts facilitates the understanding of the current hydro-meteorological situations as well as future wet/dry periods

also to non-expert users, increasing preparedness of public and private organizations to extreme conditions while ensuring water security. Operational since March 2019, the Aqua service has provided Nodra with valuable insights for planning of groundwater withdrawal and decision support for coping with water scarcity, showing the potential of the co-generated hydro-climate service to bridge the gap between operational management and scientific innovation.