Sweden

Capital city: Stockholm
Inhabitants: 10.2 Million

INSTITUTIONAL SETTING AND PURPOSE

The Geological Survey of Sweden (SGU) has been commissioned by the Swedish Ministry of Enterprise and Innovation to carry out and manage national monitoring of groundwater.

The network aims to study temporal variation in quantity and composition of groundwater, in relation to geology, topography and climate, for reference purposes, forecasts, environmental control and resource estimations.

CHARACTERISTICS OF THE NETWORK

The groundwater network consists of 600 monitoring stations in some 200 areas (Figure 1). Of these, about half date back to c. 1970, whereas the other half was established quite recently (2018-2020). As of today, the monitored levels are recorded automatically, 4-6 times per day, and transmitted to an online database. The historic part of the data set (c. 1970 to 2018) was measured manually at a typical frequency of twice a month.

The Swedish groundwater resources are mainly found in quaternary deposits on top of fractured crystalline bedrock; to reflect the different roles in drinking-water supply, as well as, differences in the dynamics of groundwater-level fluctuation, the resources are divided into two conceptual entities. Glacifluvial eskers form the major resources, with potential to serve as supplies for municipal water works. In contrast, minor resources are abundant and widespread, but typically limited to supply private wells (drilled boreholes). Although the concept of a minor resource includes several hydrogeological settings, the most typical setting is a thin layer of glacial till (a few meters) on top of sparsely fractured crystalline bedrock.

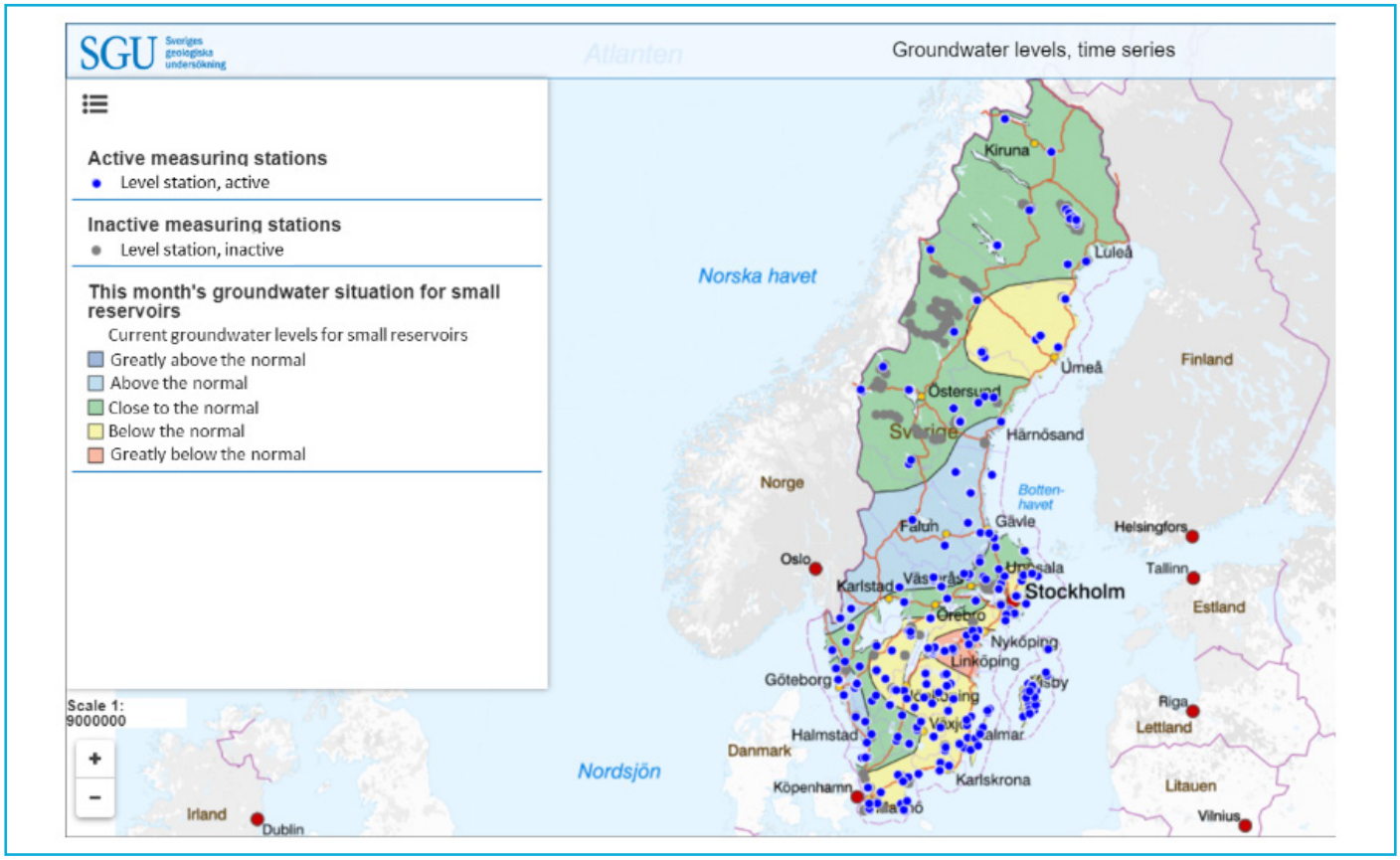

Figure 1 - Groundwater monitoring network in Sweden. Source: SGU

PROCESSING AND DISSEMINATION

Groundwater data are used to set up a semi-distributed, process-based catchment model (HYPE; Hydrological Predictions for the Environment, developed by SMHI; the Swedish Meteorological and Hydrological Institute). The model is operated at the national scale to provide weekly reports of the prevailing groundwater situation (calculated groundwater level in context of its normal seasonal variation; Figure 2). Moreover, the model estimates a range for the expected change in groundwater situation within the next 1 to 6 months, which is based on weather forecasts combined with climatological data.

Measured and simulated groundwater-level time-series are available for all monitoring stations (black line in Figure 3) and presented in context of reference statistics (coloured fields in Figure 3). The reference statistics is based on long-term monitoring (ranging from 10 to 50 years) and used to interpret groundwater levels in perspective of the past, either with respect to seasonal patterns (Figure 3a) or, more simply, just in terms of historic variability.

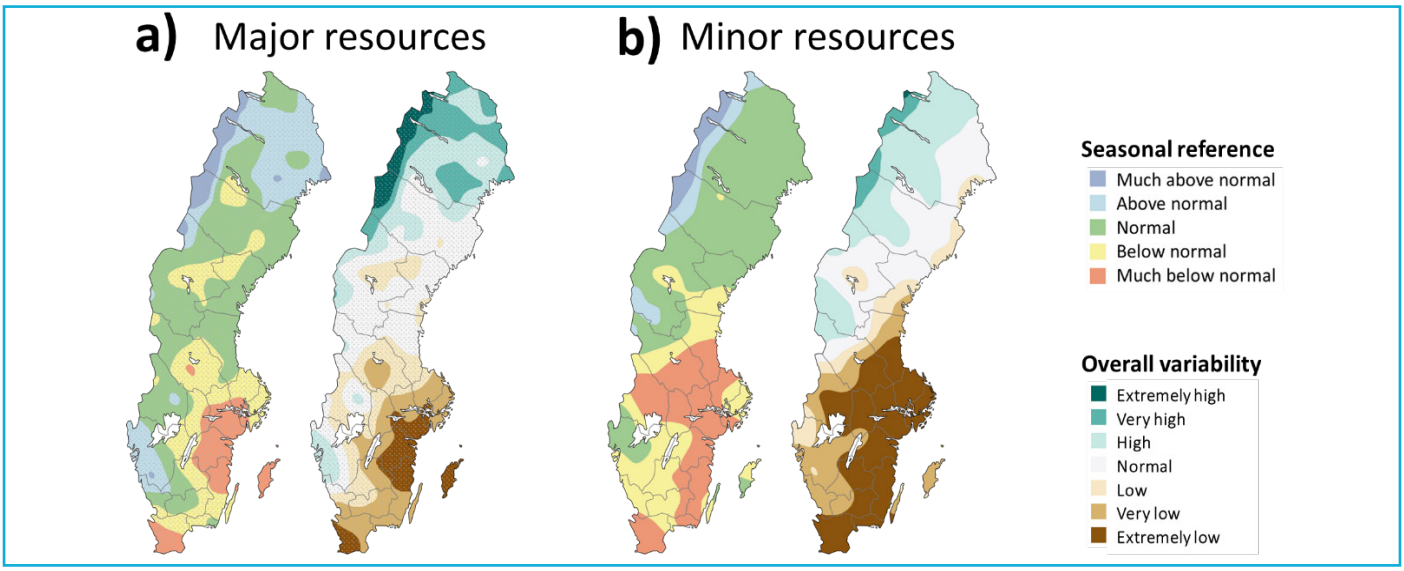

Figure 2 - Groundwater situation in Sweden, October 2020, in: a) major resources (i.e., glacifluvial eskers) and b) minor resources (e.g., thin glacial till on top of fractured crystalline bedrock). Two statistical references are employed: groundwater situation in context of seasonal variation and in terms of overall variability. Source: SGU

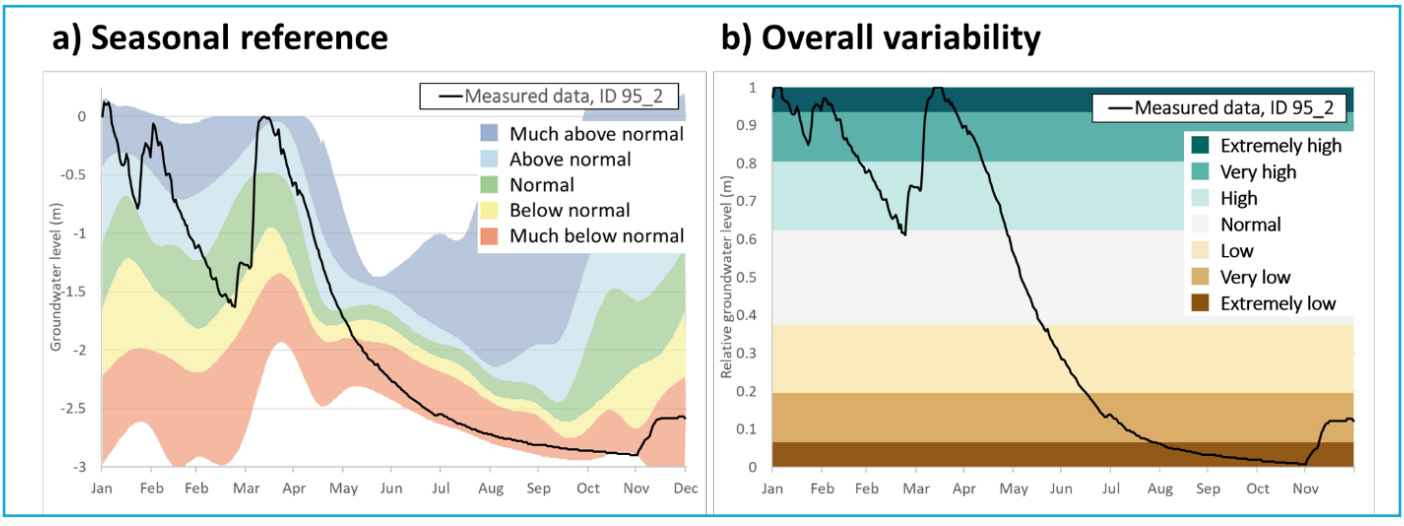

Figure 3 - Groundwater time-series (2018) for monitoring station 95_2; in context of a) seasonal variation and b) in terms of overall variability. Source: SGU

Sources

- **Feedback from SGU** - received on 13-10-2020;
- **SGU. General information on the SGU monitoring program and concepts used** - https://apps.sgu.se/grundvattennivaer/;
- **SGU. Current groundwater levels** - https://apps.sgu.se/grundvattennivaer/aktuella-grundvattennivaer.html;
- **SGU. Groundwater levels (map application)** - https://apps.sgu.se/kartvisare/kartvisare-grundvattenniva.html; and
- **SGU. Environmental monitoring of groundwater** - https://www.sgu.se/grundvatten/miljoovervakning-av-grundvatten/.