Finland

Capital city: Helsinki
Inhabitants: 5 Million

INSTITUTIONAL SETTING AND PURPOSE

The Ministry of Environment and the Ministry of Agriculture and Forestry are in charge of nation-wide surface and groundwater monitoring programmes in Finland. These programmes are coordinated by the Finnish Environment Institute (SYKE).

The actual water quantity monitoring is carried out by private laymen or by automatic monitoring equipment. Groundwater quality sampling is coordinated by SYKE and the regional ELY-centres (Centres for Economic Development, Transport and the Environment)..

CHARACTERISTICS OF THE NETWORK

The national groundwater monitoring network of Finland has ca. 95 monitoring stations distributed in 13 administrative regions, Figure 1. The monitoring stations represent variable climatic conditions, soil types and terrains where human impact has been subtle. A typical groundwater station has about ten observation tubes and one observation well. Groundwater levels are measured manually twice a month, and the average record length is almost 40 years. Additionally, many stations have groundwater table data loggers with automatic transmission of hourly data. Groundwater quality is monitored 2-4 times per year, which is dependent on the monitoring programme of each station.

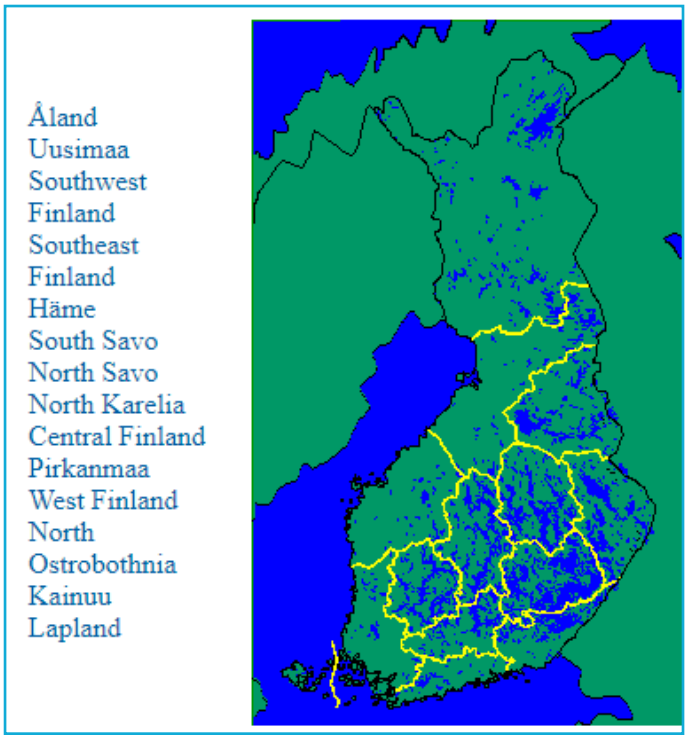

Figure 1 - Administrative regions with groundwater level monitoring. Source: SYKE

PROCESSING AND DISSEMINATION

Outcomes of groundwater quantity and quality monitoring performed within the national programme are stored into the groundwater data system (POVET). The time series of groundwater levels are also presented in graph form e.g. on SYKE's website. By clicking on an administrative region, groundwater level graphs for the previous year are shown, Figure 2. The averaged groundwater levels of the monitoring stations are presented in metres above sea level, as recorded every two weeks at monitoring sites around Finland, together with long-term monthly averages, maximums and minimums. For fully automated stations, daily groundwater levels are shown.

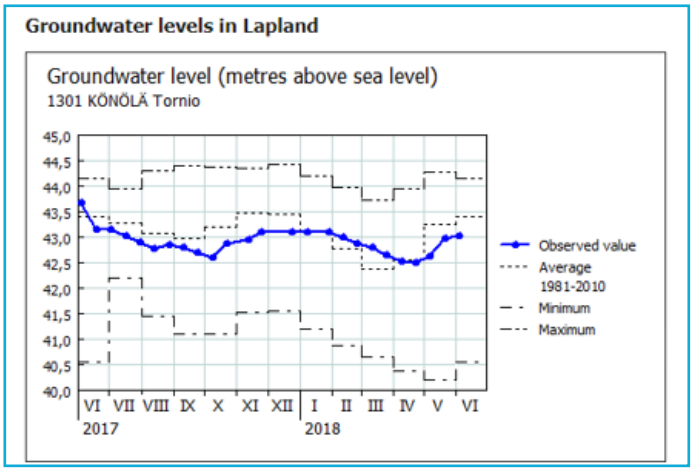

Figure 2 - Administrative regions with groundwater level monitoring. Source: SYKE

Short-term groundwater table forecasts are simulated with the Watershed Simulation and Forecasting System (WSFS), developed by SYKE, using the data from the groundwater stations, Figure 3. The water simulation uses groundwater quantity data e.g. for forecasting floods. Short-term forecasts are calculated for approximately 50 stations.

A suggestive model of nation-wide hypothetical groundwater tables is calculated with the WSFS based on approximately 50 groundwater stations, Figure 4. The map classifies groundwater levels as: above the highest value, above the annual average, above average, below average, below the annual average and below the lowest value. The system also forecasts groundwater levels for the next 3 and 9 days. Detailed maps in the same section allow users to see contour lines of groundwater levels across Finland for the last 90 days in mm.

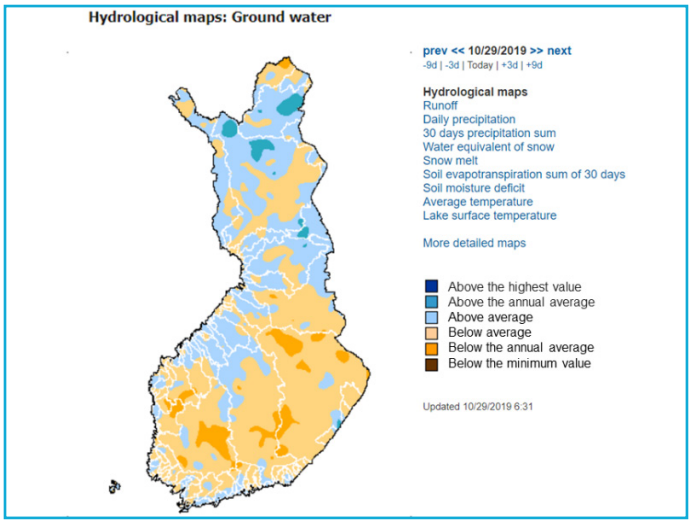

Figure 3 - Suggestive simulation of groundwater level in Finland as of October 29, 2019. Source: SYKE

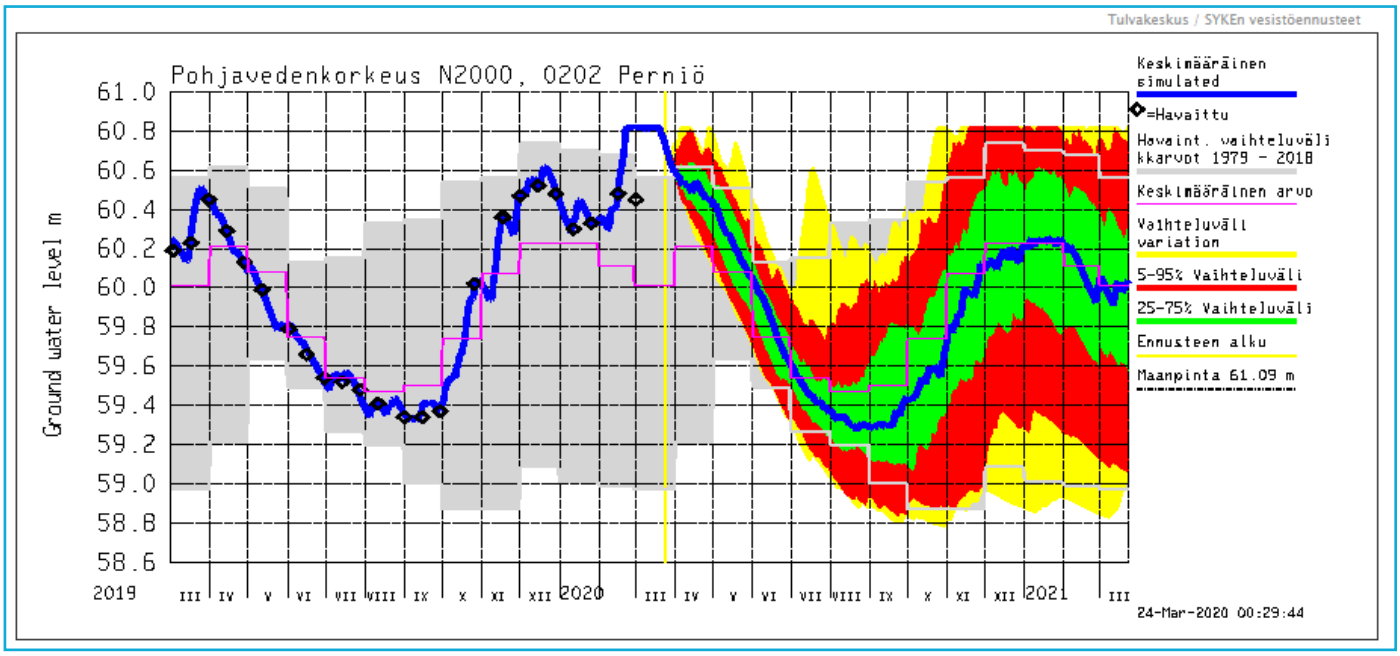

Figure 4 - Short-term forecast and actual observations for Perniö groundwater station

Sources

- **Environment.fi – Joint website of Finland's environmental administration. Quantitative and chemical status of groundwater** - https://www.ymparisto.fi/fi-FI/Vesi/Pohjavesien_tila;
- **Environment.fi. Monitoring of groundwater status** - https://www.ymparisto.fi/fi-FI/Vesi/Pohjavesien_tila/Pohjavesien_tilan_seuranta;
- **Environment.fi. Groundwater levels in Finland** - http://wwwi3.ymparisto.fi/i3/paasivu/eng/pohjavesi/pohjavesi.htm;
- **Environment.fi. Hydrological maps, groundwater** - http://wwwi2.ymparisto.fi/i2/90/gvyy2/tanaan_en.html;
- **Environment.fi. Water model system, groundwater forecast** - http://wwwi2.ymparisto.fi/i2/pohjavesiasemat.html;
- **Environment.fi. Water maps: Groundwater replenishment within 90 days** - http://wwwi2.ymparisto.fi/i2/94/finngvdfb.html;
- **Environment.fi. Hydrological forecast and maps** - https://www.environment.fi/en-US/Waters/Hydrological_situation_and_forecasts/Hydrological_forecasts_and_maps;
- **Feedback from the Finnish Environment Institute (SYKE) -** received on 15-04-2020;
- **Finnish Environment Institute SYKE** - Watershed simulation and forecasting system (WSFS) Brochure (2 and 6 pages); and
- **Lavapuro, M., Lipponen, A., Artimo, A., & Katko, T.S. (2008). Groundwater sustainability indicators: testing with Finnish data. Available in** - https://helda.helsinki.fi/bitstream/handle/10138/234763/ber13-5-381.pdf?sequence=1.