

Switzerland

Capital city: Bern
Inhabitants: 8.6 Million



INSTITUTIONAL SETTING AND PURPOSE

More than 80% of Switzerland's drinking water derives from groundwater. The Federal Act on the Protection of Waters (Art. 57) requires the Swiss Confederation to carry out surveys of hydrological conditions with relevance to Switzerland as a whole. The National Groundwater Monitoring (NAQUA) programme is responsible for the monitoring of quality and quantity of groundwater resources nationwide. NAQUA is conducted by the Federal Office for the Environment (FOEN), in close collaboration with the cantonal authorities.

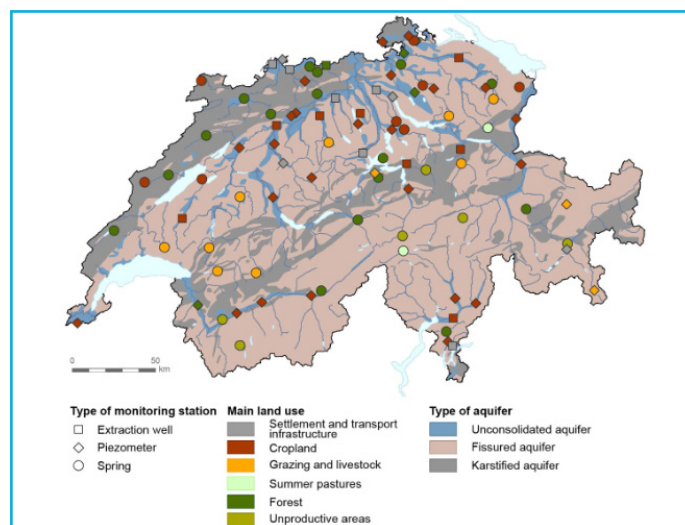
The purpose of NAQUA is manifold:

- to document the status and the trends in groundwater quantity and quality on a national level;
- identify the occurrence of problematic substances at an early stage and to systematically follow up any undesirable developments;
- check the effectiveness of protective measures already adopted (e.g. ecological measures in agriculture) and identify the need for further measures; and
- to characterise and classify the most important groundwater resources in Switzerland.

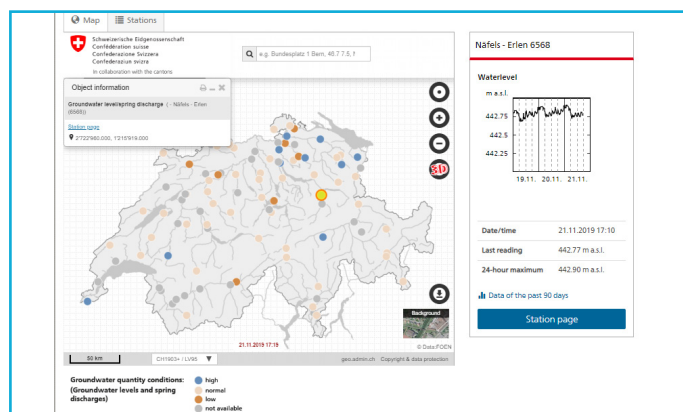
CHARACTERISTICS OF THE NETWORK

In total, 545 sites are available for groundwater quality monitoring and 91 sites for groundwater quantity monitoring. The quantity of groundwater is measured in springs, piezometers and extraction wells of the NAQUA programme's QUANT module (quantity monitoring). Half of the sites are operated by the federal administration and half by the cantons or water supply companies. Most monitoring sites are equipped for remote data transmission. Only few cantonal monitoring sites upload the data regularly, hence monitored data are only available with delay. 30 monitoring sites of the QUANT module are also part of the TREND module and 17 are part of the SPEZ module, both modules monitor groundwater quality.

Figure 1 - QUANT module sites for monitoring groundwater quantity (2019 status). Source: NAQUA National Groundwater Monitoring



PROCESSING AND DISSEMINATION



The platform "hydrodaten.admin.ch" gives an overview of the current groundwater situation in Switzerland in stations that are equipped with remote data transmission, Figure 2. Changes of the current groundwater levels and spring discharges are presented on a map and in a hydrograph; the values are compared with the expected conditions. The data are shown as below, above or equal to the long-term average for each month. The calculation is based on percentiles of the dataset for the full monitoring period (basic data in masl and l/min or m3/s). Lower

Figure 2 - Groundwater situation map as of 21.11.2019. Source: NAQUA National Groundwater Monitoring

groundwater level or spring discharge than the average conditions are reached if the current value is below the long-term 10% percentile, for example it is among the lowest 10% of all the data ever measured for the relevant month. A groundwater level or spring discharge between the 10% and 90% percentiles means that conditions are normal. If the current value is above the 90% percentile, a higher than the long-term average condition is reached, Figure 3.

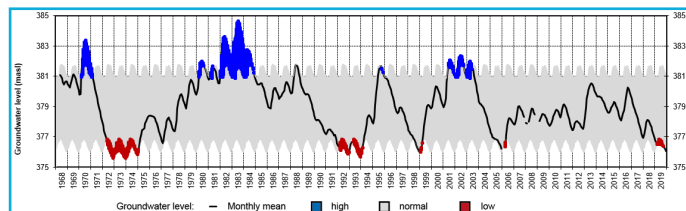


Figure 3 - Monitoring site with high, normal, and low groundwater level

The collected data from NAQUA are used in national and international reporting. Historical data for the individual monitoring sites can also be accessed on “hydrodaten.admin.ch”. The relevant datasheets contain the daily averages for each year and the long-term mean groundwater levels and spring discharges. A Groundwater Bulletin is also available on the website of FOEN in French and German. It provides textual information on the state and changes of groundwater levels and spring discharge, Figure 4.

The indicator “Groundwater levels and spring discharge rates” provides a national overview of the frequency of low, normal and high groundwater conditions year on year, Figure 5.

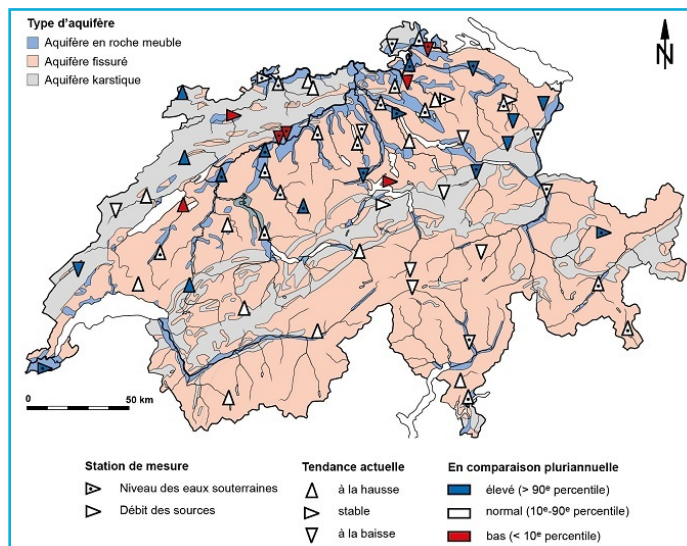


Figure 4 - Groundwater levels and spring discharge (status as of November 5, 2019) current trend and multi-year comparison. Source: NAQUA National Groundwater Monitoring

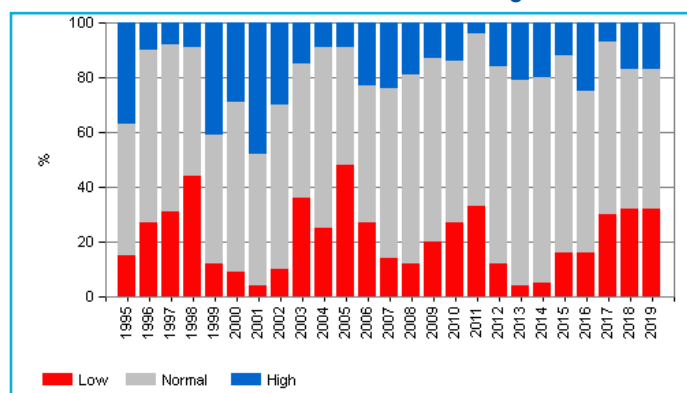


Figure 5 - Indicator Groundwater levels and spring discharge rates. Percentage of monitoring stations at which low, normal and high groundwater levels or spring discharge rates were recorded in each year. Source: NAQUA National Groundwater Monitoring

Sources

- **Feedback from the Federal Office for the Environment (FOEN)** - received on 05-10-2020;
- **Federal Office for the Environmental (FOEN). NAQUA National Groundwater Monitoring** - <https://www.bafu.admin.ch/bafu/en/home/topics/water/info-specialists/state-of-waterbodies/state-of-groundwater/naqua-national-groundwater-monitoring.html>;
- **FOEN. Groundwater bulletin (available in German and French)** - <https://www.hydrodaten.admin.ch/en/groundwater-bulletin.html>;
- **FOEN. Groundwater quantity** - <https://www.bafu.admin.ch/bafu/en/home/topics/water/info-specialists/state-of-waterbodies/state-of-groundwater/groundwater-quantity.html>;
- **FOEN. QUANT module** - <https://www.bafu.admin.ch/bafu/en/home/topics/water/info-specialists/state-of-waterbodies/state-of-groundwater/naqua-national-groundwater-monitoring/quant-module.html>; and
- **FOEN. Indicator groundwater levels and spring discharge rates** - <https://www.bafu.admin.ch/bafu/en/home/themen/thema-wasser/wasser--daten--indikatoren-und-karten/wasser--indikatoren/indikator-wasser.pt.html/aHR0cHM6Ly93d3c-uaW5kaWthdG9yZW4uYWRtaW4uY2gvUHViG/ljL0FlbURldGFpbD9pbmQ9V1MwNTYmbG5nPWVwJlN1Ymo9Tg%3d%3d.html>.