Germany

Capital city: Berlin
Inhabitants: 83 Million

INSTITUTIONAL SETTING AND PURPOSE

The Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB) is responsible for regulating the water resources through the Federal legislation. State Geological Surveys (SGDs) are the specialized institutions of federal states in charge of subsoil information, including groundwater. The federal states are responsible for collection, processing and dissemination of regional data and related products. The case of the federal state of Bavaria is shown below as an example.

The Bavarian Environment Agency (LfU) offers several web services. Among these, the Low Water Information Service (NID) of Bavaria was created in order to classify the actual situation and to offer decision makers and the public a basis to evaluate and, if necessary, to prepare against dry periods on an early stage. The NID provides data from regional monitoring networks (surface water and groundwater) and, in case of low water conditions, publishing short reports interpreting those data.

CHARACTERISTICS OF THE NETWORK

The Bavarian Environment Agency operates, together with the regional water authorities, a monitoring network of around 3,000 groundwater monitoring sites. This network consists of the basic network (620 monitoring sites), the compaction network (341 monitoring sites) and regional networks (2,063 monitoring sites). Additionally, a network of around 110 spring sites is monitored.

A high number of monitoring sites is equipped with continuously recording instruments (electronic data loggers) to collect the groundwater data. The basic network focuses on supra-regional and representative aquifers with high water management importance. The monitoring sites in the basic network are usually equipped with remote data transmission devices. The compaction network complements the work of the basic network. It is usually used for hydrogeological tasks for a limited period or only at certain times. The regional networks are set up for small-scale groundwater investigations, mainly for a limited period. The depth of the monitoring sites ranges between 2 m to 1400 m below surface.

PROCESSING AND DISSEMINATION

The NID web service offers groundwater data of selected monitoring sites to the public and various users such as planners or municipalities. Overview maps with a daily groundwater classification of each monitoring site situated in shallow (Figure 1, left) and deeper aquifers (Figure 2, left) are provided. This information is also available in a table format. When a user selects an observation well from the map or the table, time-series of groundwater levels are presented for the entire monitoring period, an annual period (Figure 1 and Figure 2, right) as well as an annual comparison.

Values for each well are classified in new lowest value (or level), very low, low, no low water, no classification, and currently no data. This classification is based on a statistical analysis of the available data which is carried out only at measuring points with more than 5 years of measurements available. The statistical limits are calculated for a 31-day moving period to account for natural, seasonal variations in the water levels.

- No low water (kein Niedrigwasser): current value belongs to the highest 25% of previous values (higher than 75-percentile);
- Low (niedrig): current value is lower than the 75% of previous values (less than 25-percentile);
- Very low (sehr niedrig): current value is lower than 90% of previous values (less than 10-percentile);
- New lowest value (neuer Niedrigstwert): current value is lower than the lowest value documented up to that point in time.

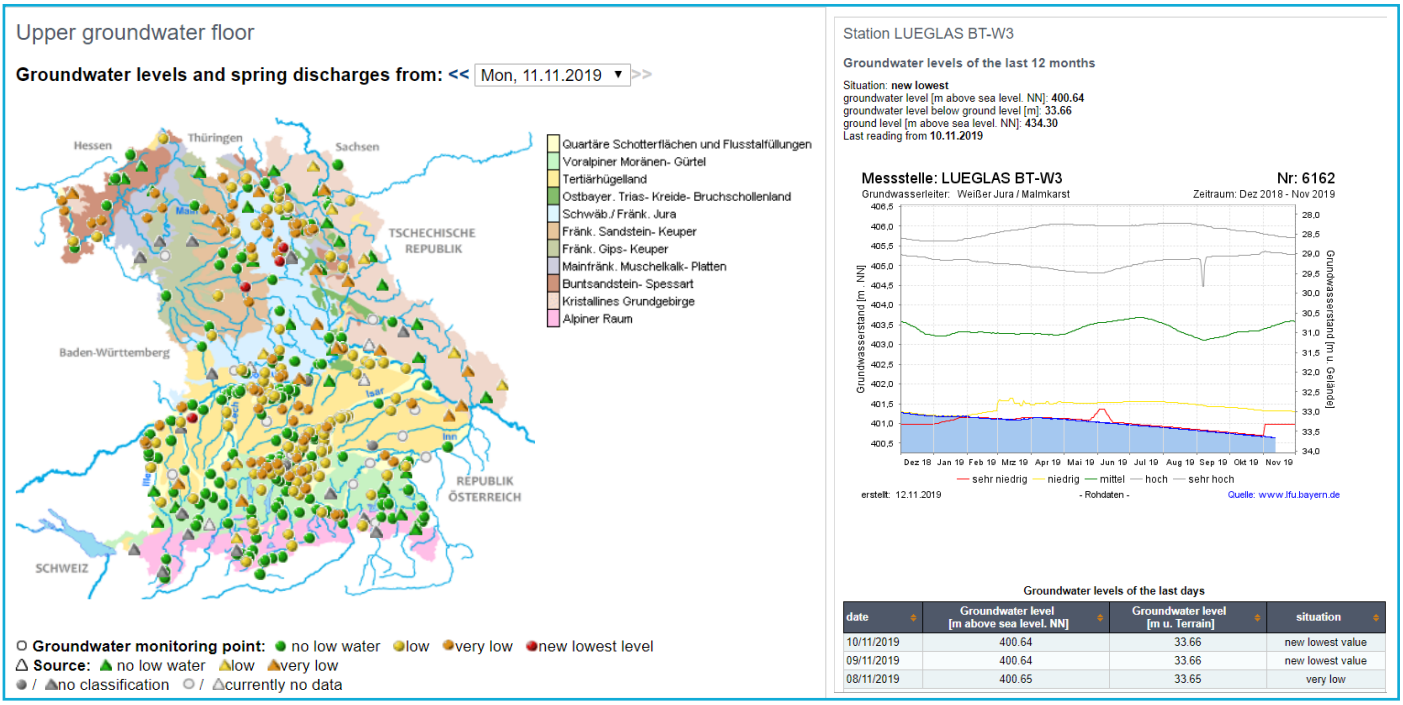

Figure 1 - Classified groundwater monitoring sites for the shallow aquifer with time-series from the station LUEGLAS BT-W3. Source: www.nid.bayern.de/grundwasser

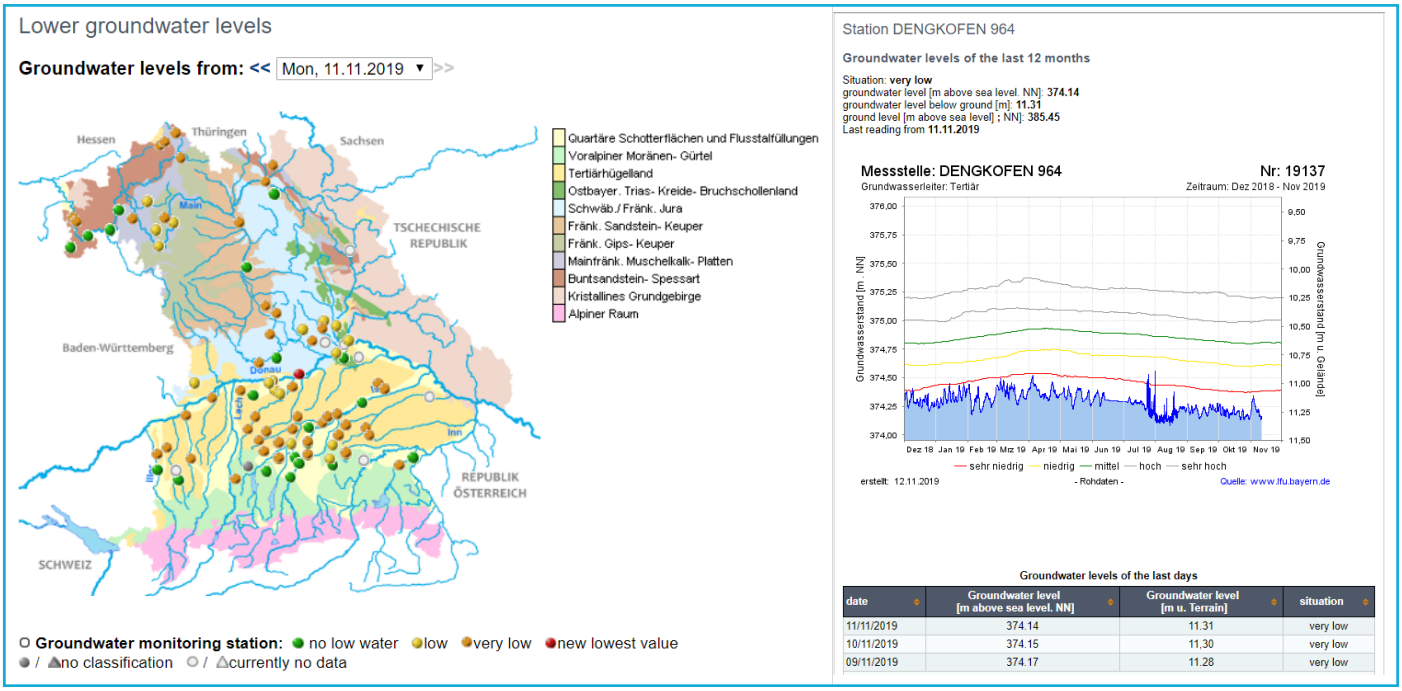

Figure 2 - Classified of groundwater monitoring sites for the deep aquifer with time-series from the station DENGKOFEN 964. Source: www.nid.bayern.de/grundwasser

Sources

- **Bavarian Environment Agency, groundwater level** - https://www.lfu.bayern.de/wasser/grundwasserstand/index.htm;
- **Feedback from the Bavarian Environment Agency** - received on 17-04-2020;
- **Low water information service Bavaria, groundwater** - https://www.nid.bayern.de/grundwasser; and
- **State Geological Surveys of Germany** - https://www.infogeo.de/Infogeo/EN/Startseite/startseite_node_en.html.