# Portugal

**Capital city:** Lisbon
**Inhabitants:** 10.3 Million

## INSTITUTIONAL SETTING AND PURPOSE

The Portuguese Environmental Agency (APA) is in charge of the National Groundwater Monitoring Network of Portugal.

The monitoring policy of APA includes not only the measurement networks but also measuring instruments, collection and validation procedures, the database system for data storage, and simulation models to support water management and planning.

## CHARACTERISTICS OF THE NETWORK

The National Water Resources Information System (SNIRH) contains 22,639 groundwater registered points, 7,864 of them have detailed information. At a national level, 592 points belong to the 'quantity network' and 780 to the 'quality network'.


*Figure 1 - Groundwater Monitoring Network of Portugal. Source: SNIRH*

## PROCESSING AND DISSEMINATION

The monitoring stations can be visualized in an interactive portal maintained by the SNIRH, Figure 1.

The groundwater quantity report (Boletim de quantidade) is based on the quantitative groundwater monitoring network and contains an assessment of groundwater level change country-wide. In most of aquifer systems the measurements started in the 70's, and the frequency of observations is monthly. In last several years, some piezometers have been equipped with sensors and the data are monitored daily. The groundwater quantity report plays an important role, especially during drought periods to alert for the decreasing of groundwater level.

The average groundwater level and the 20%-percentile are determined for every month for each well from the beginning of the measurements until the end of the previous hydrological year. A new station is included in the calculations only after 3 years of recording data. For the current hydrological year, the value from the analysed month is compared with the previous statistics and divided in three classes: above average, between the average and the 20% percentile, and below the 20% percentile. Values below the 20% percentile are considered as "very low". At the end, a groundwater body is classified according to the class with highest frequency.

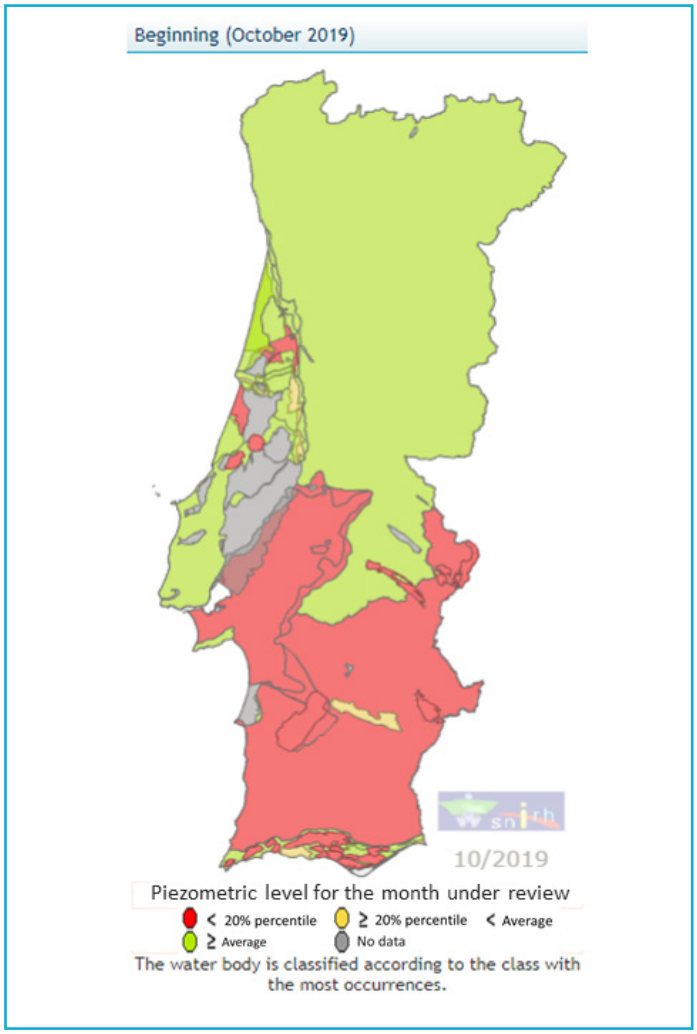


*Figure 2 - State of groundwater levels in Portugal for October 2019. Source: SNIRH, monthly bulletin*

If two classes have an equal number of occurrences, the classification considers the worst scenario according to the precautionary principle. Applying this principle, a map of piezometric levels for Portugal is built. For October 2019, the piezometric levels at 232 points were observed in 44 groundwater bodies, Figure 2.

This analysis is done each month for all the individual groundwater bodies, including a graph with the monthly evolution of the hydrological year, Figure 3.

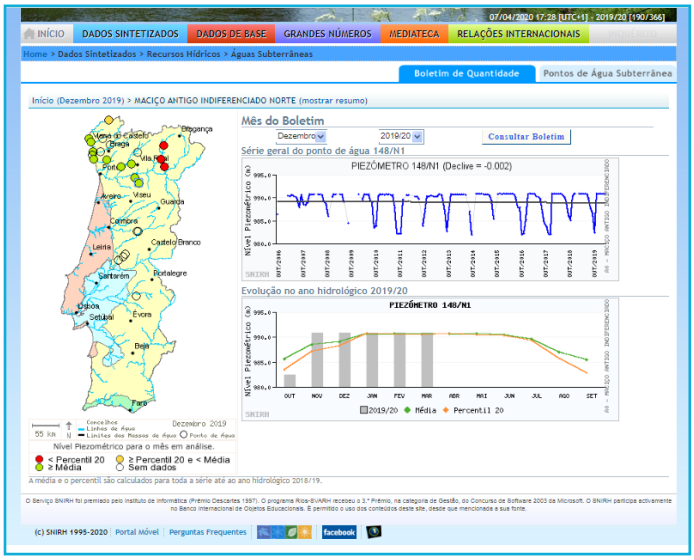


*Figure 3 - Groundwater level analyses for selected monitoring point. Source: SNIRH, monthly bulletin*

## Sources

- **National Water Resources Information System (SNIRH), National Groundwater Monitoring Network** - https://snirh.apambiente.pt/index.php?idMain=1&idItem=1.4;
- **SNIRH, National Groundwater Monitoring Network. Framework** - https://snirh.apambiente.pt/index.php?idMain=1&idItem=1.4&idSubItem=BOL; and
- **SNIRH, National Groundwater Monitoring Network, Monthly bulletin** - https://snirh.apambiente.pt/index.php?idMain=1&idItem=1.4&idSubItem=BOL&massaagua=2039044.