

Hydro-geochemical modeling of subalpine urbanized area: geochemical characterization of the shallow and deep aquifers of the urban district of Como (first results).

Silvia Terrana, Fabio Brunamonte, Francesca Frascoli, Maria Francesca Ferrario, Alessandro Maria Michetti, Andrea Pozzi, Roberto Gambillara, and Gilberto Binda

Insubria University, Department of Science and High Technology, Como, Italy (silvia.terrana@uninsubria.it)

One of the greatest environmental and social-economics threats is climate change. This topic, in the next few years, will have a significant impact on the availability of water resources of many regions.

This is compounded by the strong anthropization of water systems that shows an intensification of conflicts for water resource exploitation. Therefore, it is necessary a sustainable manage of natural resources thorough knowledge of the hosting territories.

The development of investigation and data processing methods are essential to reduce costs for the suitable use and protection of resources.

Identify a sample area for testing the best approach is crucial.

This research aims to find a valid methodology for the characterization, modeling and management of subalpine urban aquifers, and the urban district of Como appears perfect.

The city of Como is located at the southern end of the western sector of Lake Como (N Italy). It is a coastal town, placed on a small alluvial plain, therefore in close communication with the lake. The plain is drained by two streams, which are presently artificially buried, and have an underground flow path in the urban section till the mouth.

This city area, so, is suitable for this project as it is intensely urbanized, its dimensions is not too extensive and it is characterized by two aquifers very important and little known. These are a shallow aquifer and a deep aquifer, which are important not only for any water supply, but also for the stability of the ground subsidence in the city.

This research is also the opportunity to work in a particular well-known area with high scientific significance; however, there is complete absence of information regarding the deep aquifer.

Great importance has also the chosen and used of the more powerful open source software for this type of area, such as PHREEQC, EnvironInsite, PHREEQE etc., used for geological and geochemical data processing. The main goal of this preliminary work is the characterization of both aquifers and the comprehension of the interaction between the shallow one and deep one.

The first results of geochemical and hydrological analyses in nine piezometer, seven in the shallow aquifer and two in the deep one, permit to identify a general characterization of groundwater: the waters of both the aquifers are calcium bicarbonate, with discontinuous enrichment in sulphate and silicate. The conductivity values are higher in the shallow aquifer then in the deep aquifer, this is an indication of the high flow rate of the deep one and of the higher level of vulnerability of the shallow water respect the urban pollutant. Particular is also the relatively high temperature for the deep water (15.5°C to 16.1°C). The next steps of work are an increase of geochemical analysis, with trace element, and the correlation with hydro-chemical surface water.