From coal to chalk: eight centuries of water supply for the city of Liège

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Even though coal was known in Liège since Antiquity, coal mining began in 1195. The exploitation started with "picking" coal blocks from the upper Carboniferous coal seams cropping out along the sides of the hills surrounding the city. After this early stage, shafts and galleries were dug but the groundwater occurrence was so dangerous for the miners that dewatering became necessary for in-depth exploitation.

As early as the 13th century, the first drainage galleries were developed in Liège. These galleries, called *areines* in Belgium, were built to lower the water levels occurring in the coal mines and had exit points at the lowest possible elevation so that the water could flow out into the Meuse River or the nearest stream in the valley. Each drainage gallery consisted of a network of galleries dug into the rocks. Taking advantage of the topography combined with these drainage galleries, the mines were drained mainly by gravity for five centuries.

The water from four of these gallery networks was directed as drinking water to the public and private fountains of the city. Due to their importance, these *areines*, called *areines franches*, were protected by strict laws to avoid potential physical damages or contaminations.

Until 1680, the *areines* were the only flowing water sources in Liège. In 1697, after merging two drinking water drainage galleries, Jean Roland, who requested this operation to improve the exploitation of his coal mines, was required to provide a new water source to replace the dried one. He built a new gallery to collect groundwater emerging from springs at the boundary between the Cretaceous chalk and marls (*Smectite de Herve*), northwest of Liège. This gallery carried water from the Hesbaye aquifer to the city's mills and fountains, demonstrating an excellent knowledge of the underground at that time.

Five more galleries were built after this first one, and they supplied water collected from the Cretaceous chalk to the city. They fed public and private fountains, and the company was named the *Société des Fontaines Roland*.

In the 19th century, when the population of Liège grew to nearly 100,000 inhabitants, the drinking water supply fed by the *areines* and the *Société des Fontaines Roland* was insufficient in quantity and quality. In 1855, at the city's request, Gustave Dumont (André Dumont's cousin) studied the feasibility of a new network of water supply galleries in the Cretaceous chalk aquifer of the Hesbaye region. His report was published in 1856 and included the first known potentiometric map.

Dumont's report described the best way to increase the city's drinking water supply and to improve the quality of this water. New galleries were built, and the works were completed by 1869. Since then,

drinking water in Liège mainly comes from the underground of the Hesbaye region. These galleries have been extended in several steps, resulting in more than 40 km of catchment galleries in the Hesbaye aquifer, now operated by the *Compagnie Intercommunale Liégeoise des Eaux*.

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