



International Association
of Hydrogeologists
the World-wide Groundwater Organisation

IAH Commission on
Managing Aquifer Recharge

Online MAR Seminars

#11. Long-standing experience in MAR

Wednesday, 2 September 2026, 15:30 – 17:00 PM CEST

<https://recharge.iah.org/online-mar-seminars>



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“Lessons learned from about 40 years’ MAR experiences in Belgium”

“The MAR of the Geneva aquifer (CH-F): after more than 40 years of successful operation, what are the next challenges?”

“Decades of drinking water treatment using MAR in Finland: aspects of sustainability and resiliency”

Booking and Zoom link: <https://recharge.iah.org/online-mar-seminars>



**International Association
of Hydrogeologists**
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**IAH Commission on
Managing Aquifer Recharge**

Webinar 2 September 2026

THE MAR of the Geneva aquifer (Switzerland-France):

**After more than 40 years of successful operation, what are
the next challenges ?**

Dr Gabriel de los Cobos

Former head of hydrogeology branch OCEV/GESDEC - Canton of Geneva / Switzerland

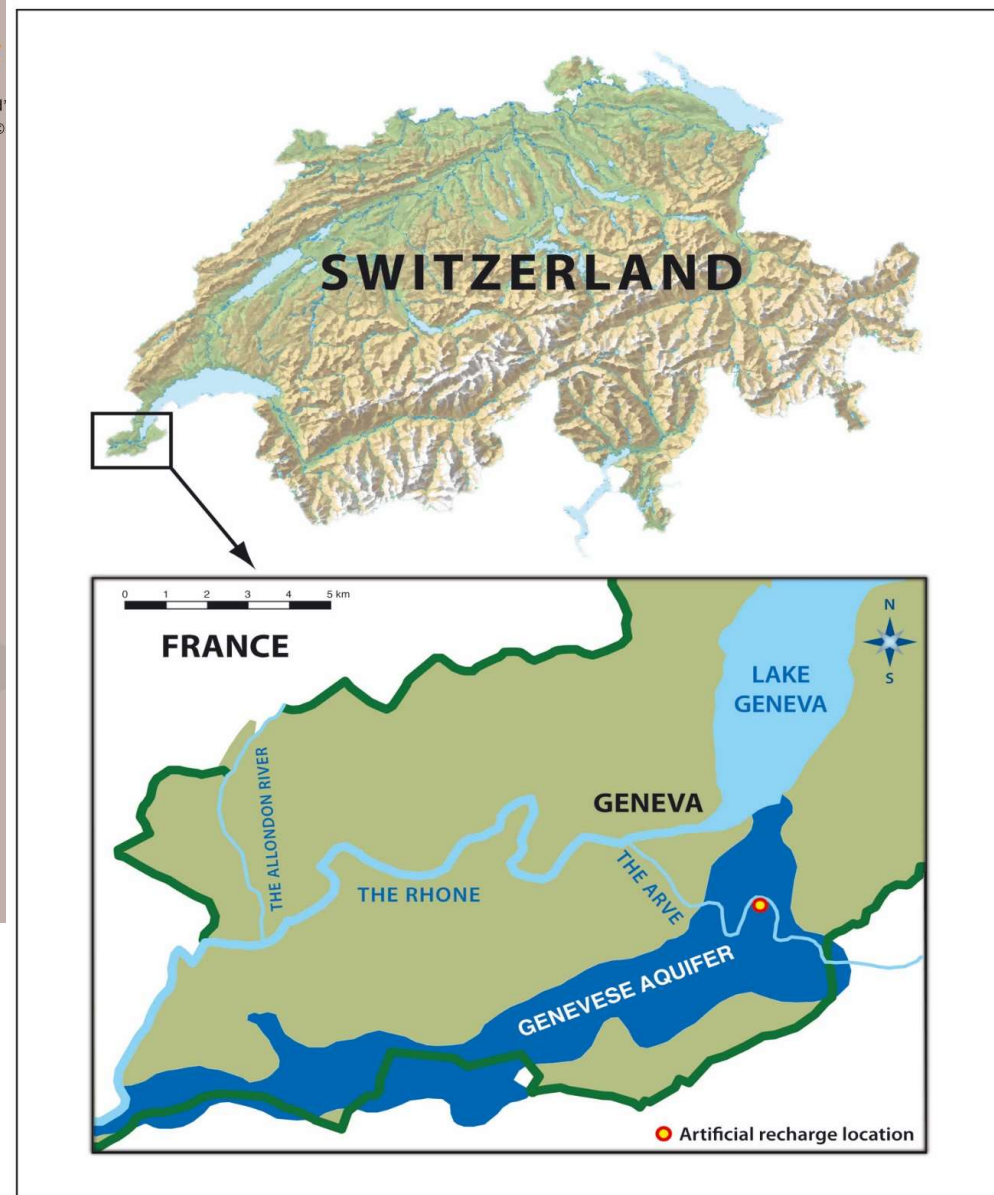
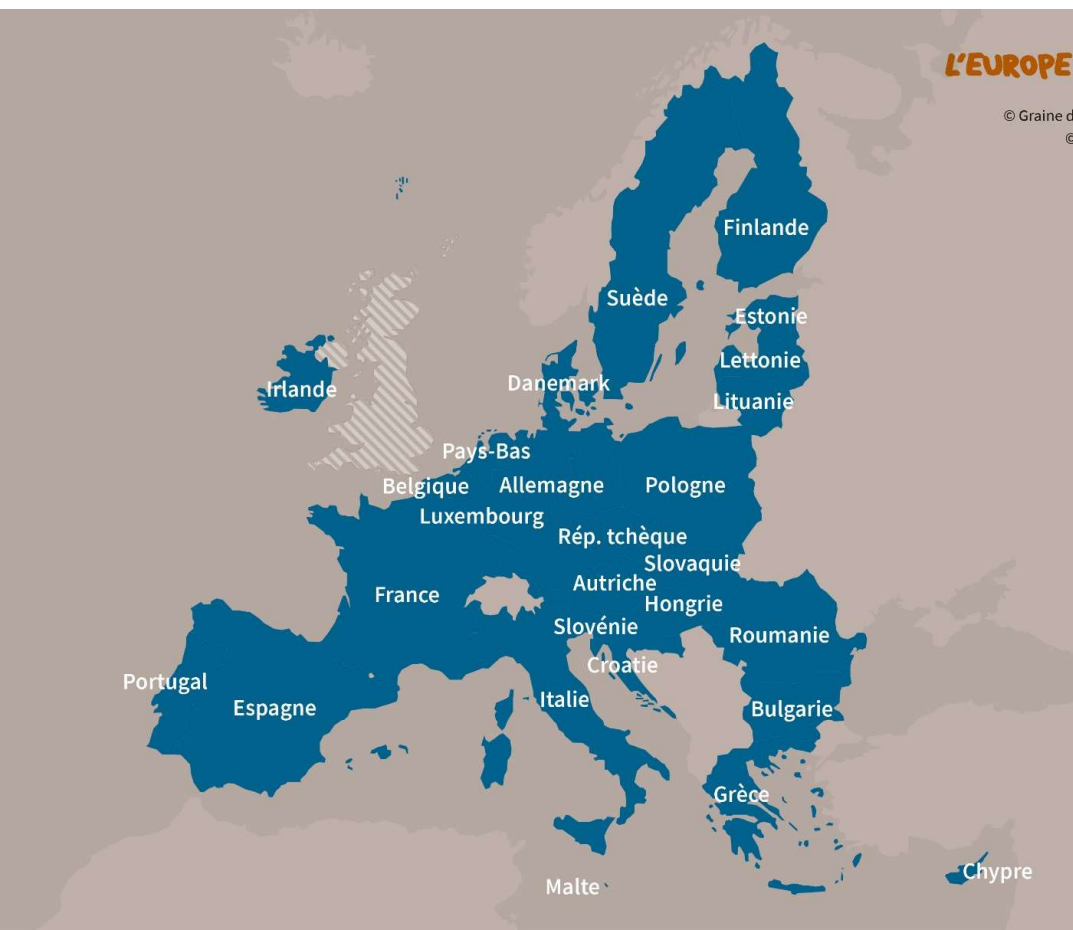
Currently member of the Implementation committee under the water convention (UNECE)

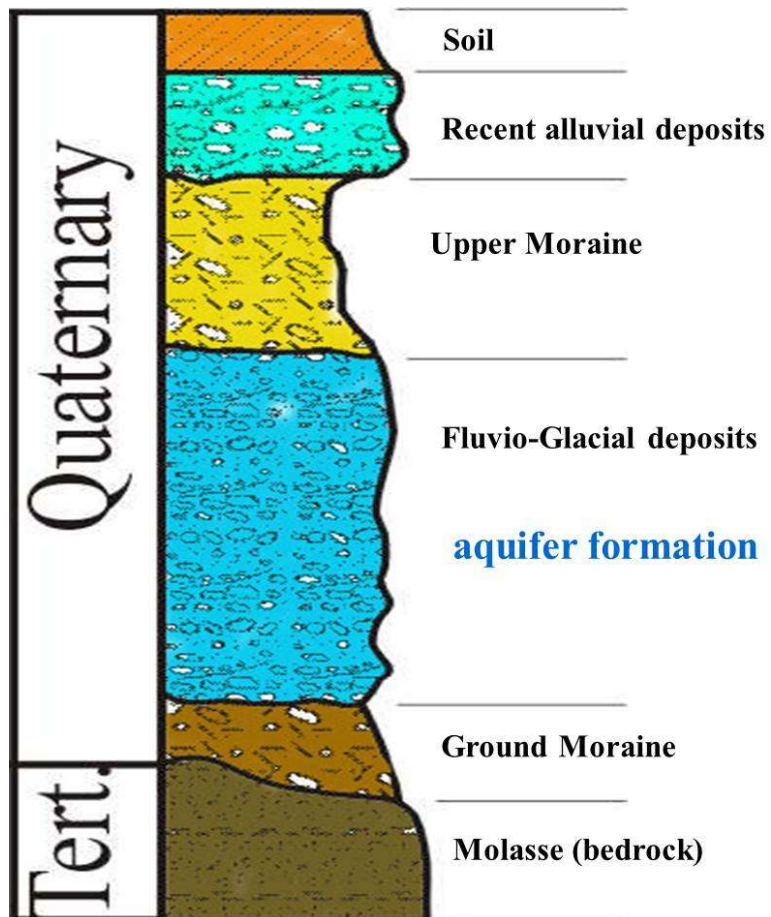


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General characteristics of the Genevese aquifer

Area extension: $\sim 30 \text{ km}^2$

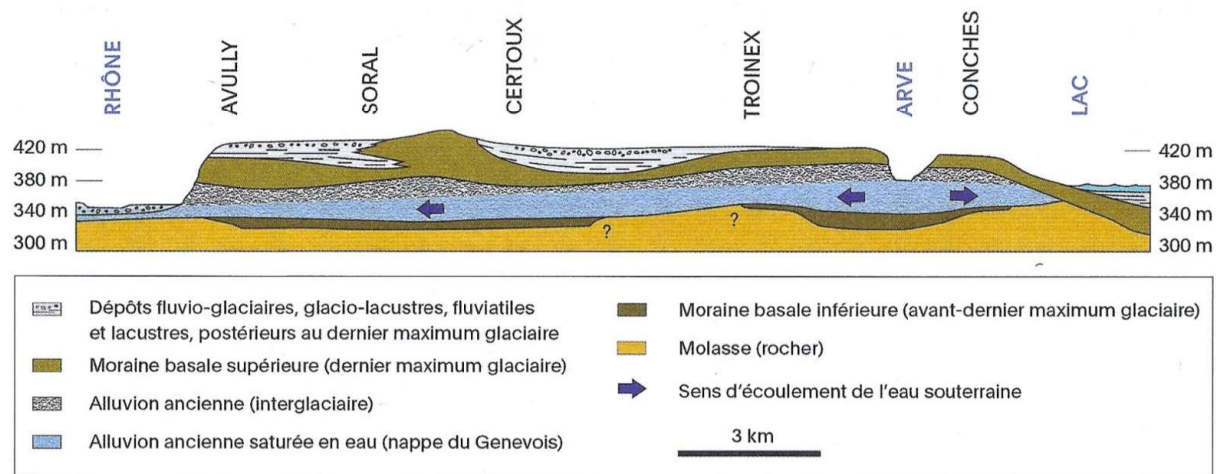
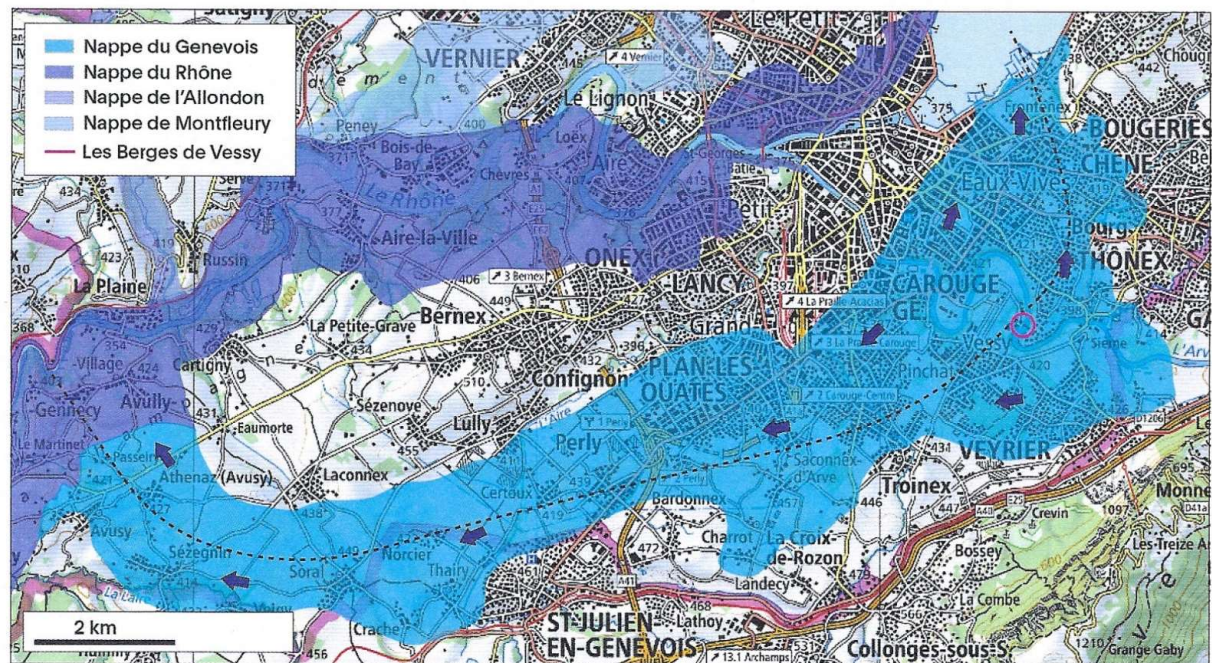
Length extension: $\sim 19 \text{ km}$

Width: 1 to 3.5 km

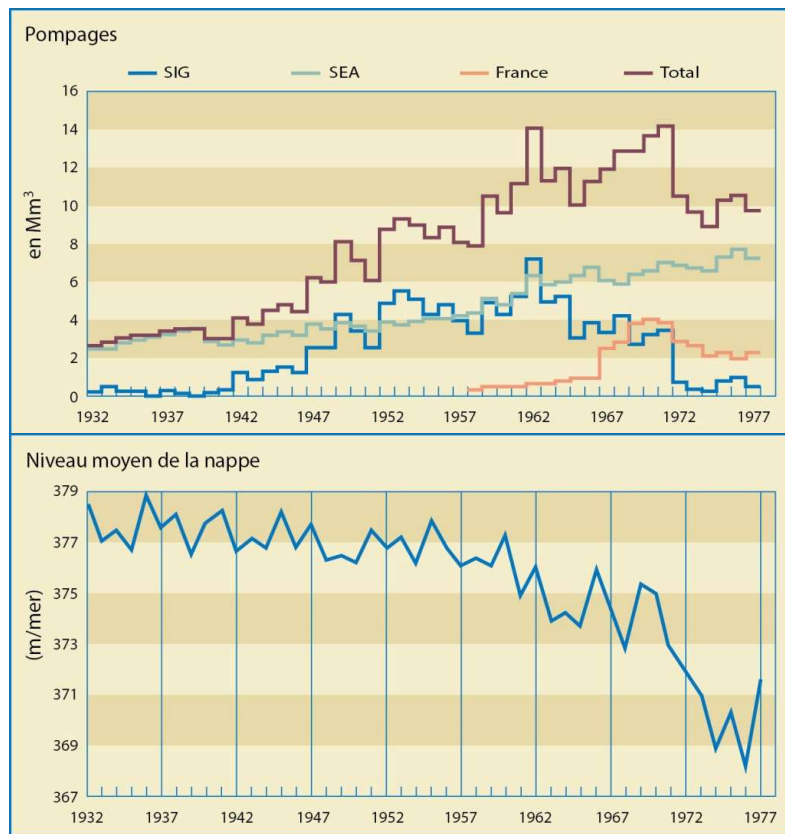
Thickness of saturated gravel: up to 50 m

Darcy's permeability:
 $1-2 \cdot 10^{-3} \text{ m/s}$

Storage coefficient: $\sim 7 \%$



Historical background



Between 1932 and 1960, the groundwater level was slowly decreasing, but without serious effects.

Between 1960 and 1980, the needs increased and pumping led to a first peak in 1962, followed by a second peak in 1971.

The aquifer was overdrafted with withdrawal rates up to $14 \text{ Mm}^3/\text{year}$. This overpumping lowered the groundwater level by more than 7 to 9 m in 20 years. The groundwater was in a state of over-use and appropriate measures had to be taken

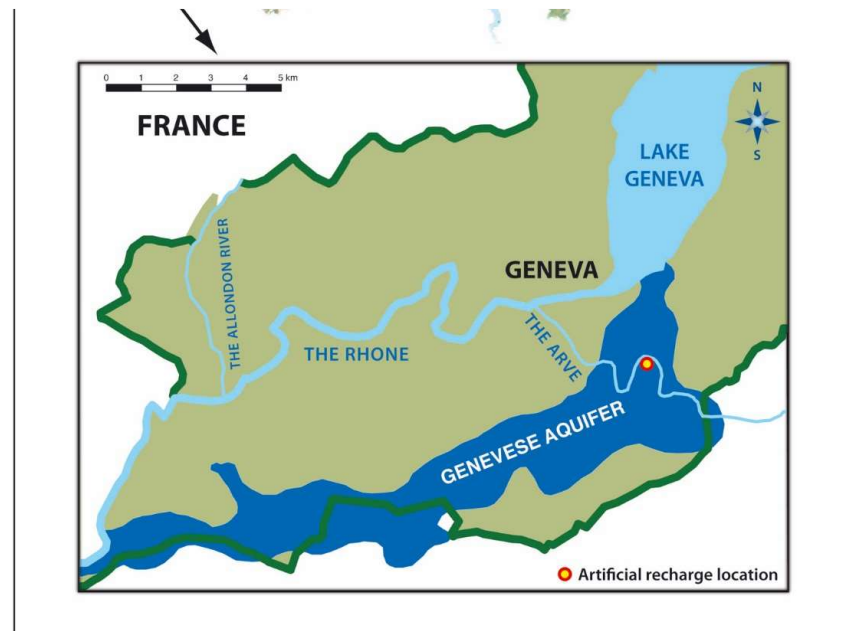
Solution ?

Artificial recharge of the aquifer to enhance the natural recharge of the groundwater

Natural recharge: by bank river recharge (during flood periods in Spring season)

Artificial recharge: by catching artificially water from the Arve river and infiltration in the groundwater

Genevese aquifer is used as a seasonal tank for the drinking water supply management



Geneva MAR concept

1 Water Intake

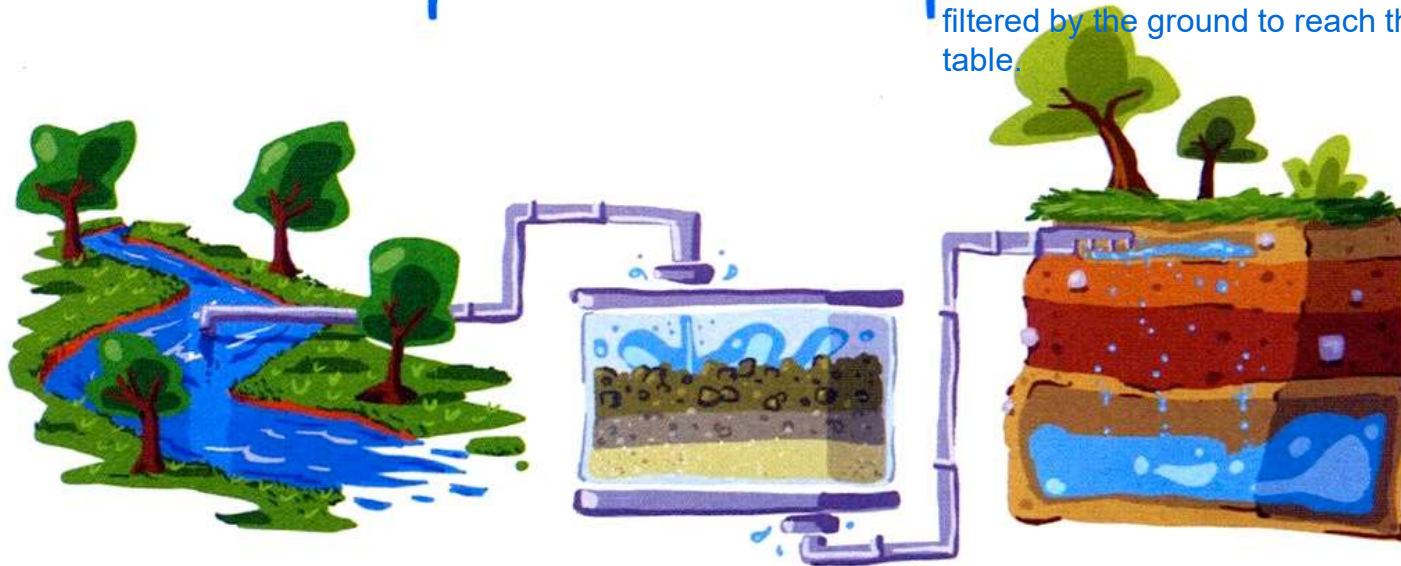
Water is pumped from the Arve River and sent to the water treatment plant

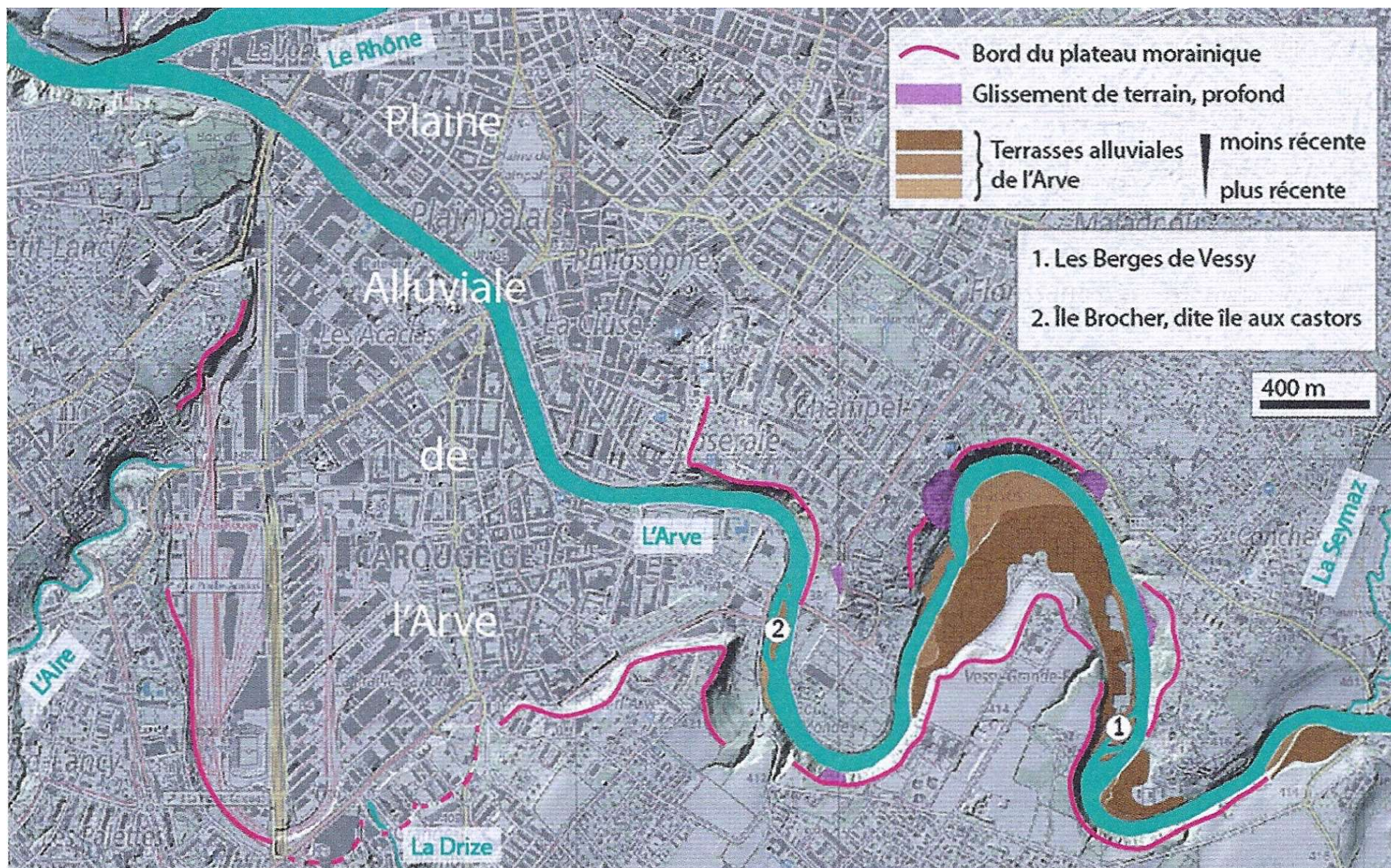
2 Water treatment

Water is filtered out and cleaned through different treatment steps

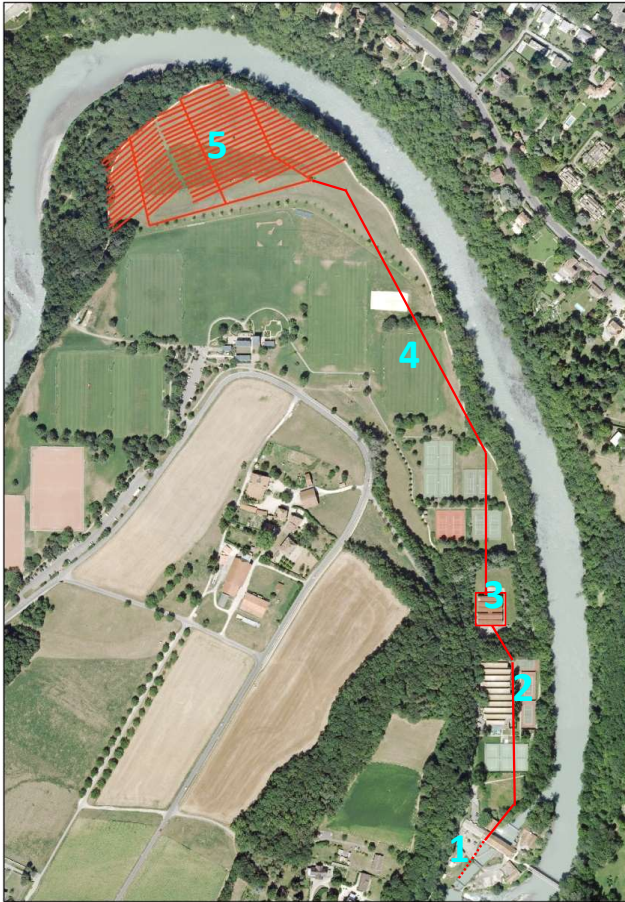
3 Infiltration of water into the underground

Water is injected into the underground by a reverse drainage system. In the aquifer, the water is naturally filtered by the ground to reach the water table.





Description of the artificial recharge system



5 Underground infiltration area
(perforated pipes-length 5000m)

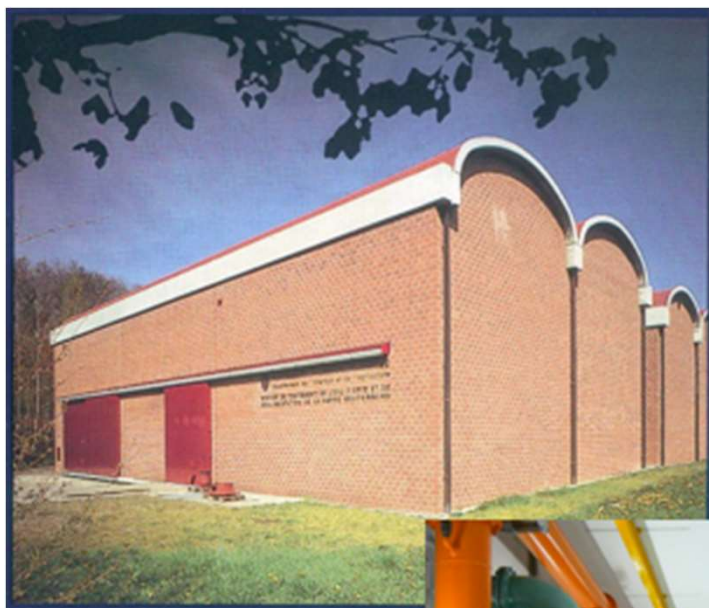
4 Pipe to the infiltration area
(length 700m)

3 Water treatment plant

2 Pipe to the plant (length 340m)

1 Water-intake structure

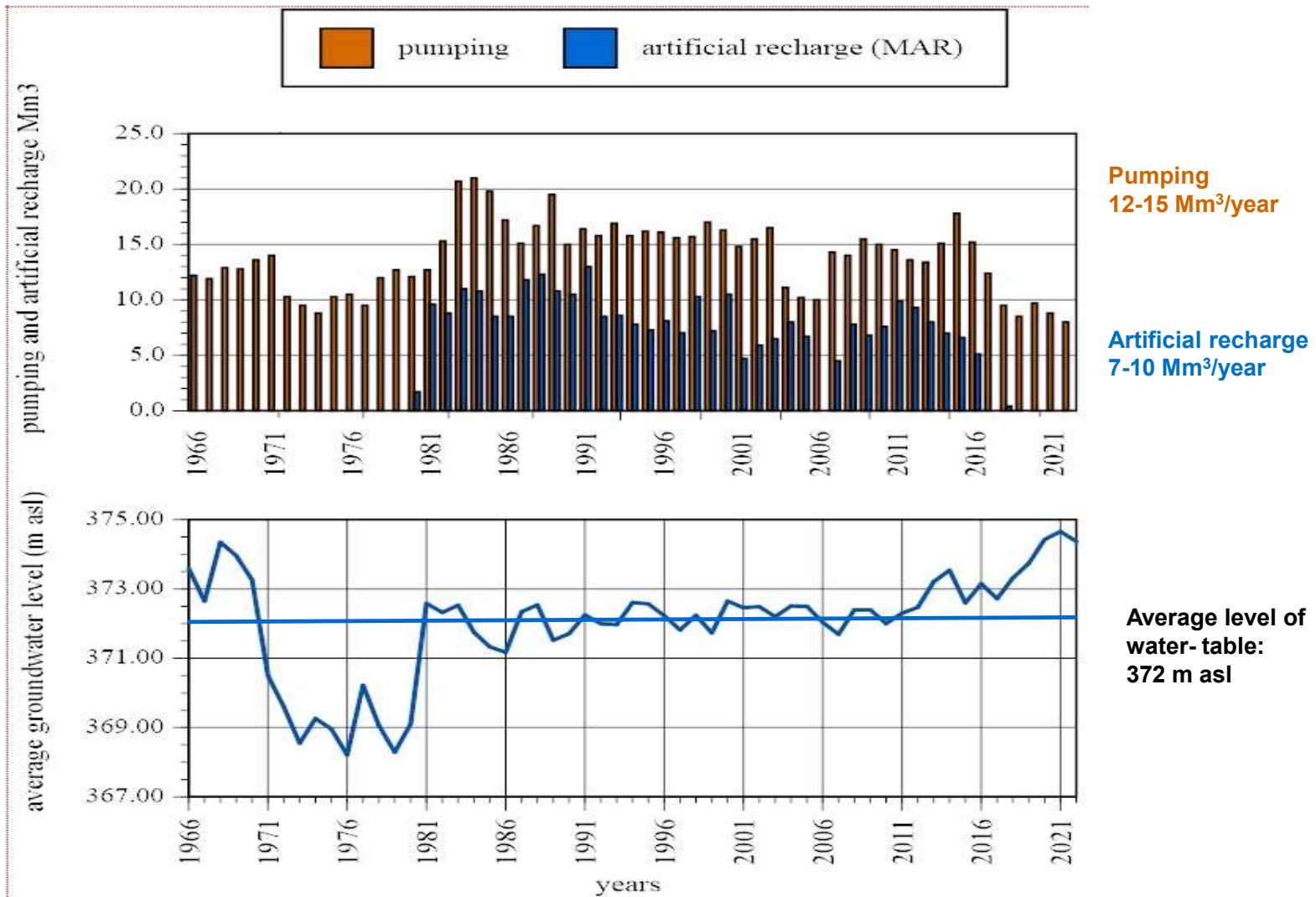








Impact of MAR after 40 years (1980-2022)



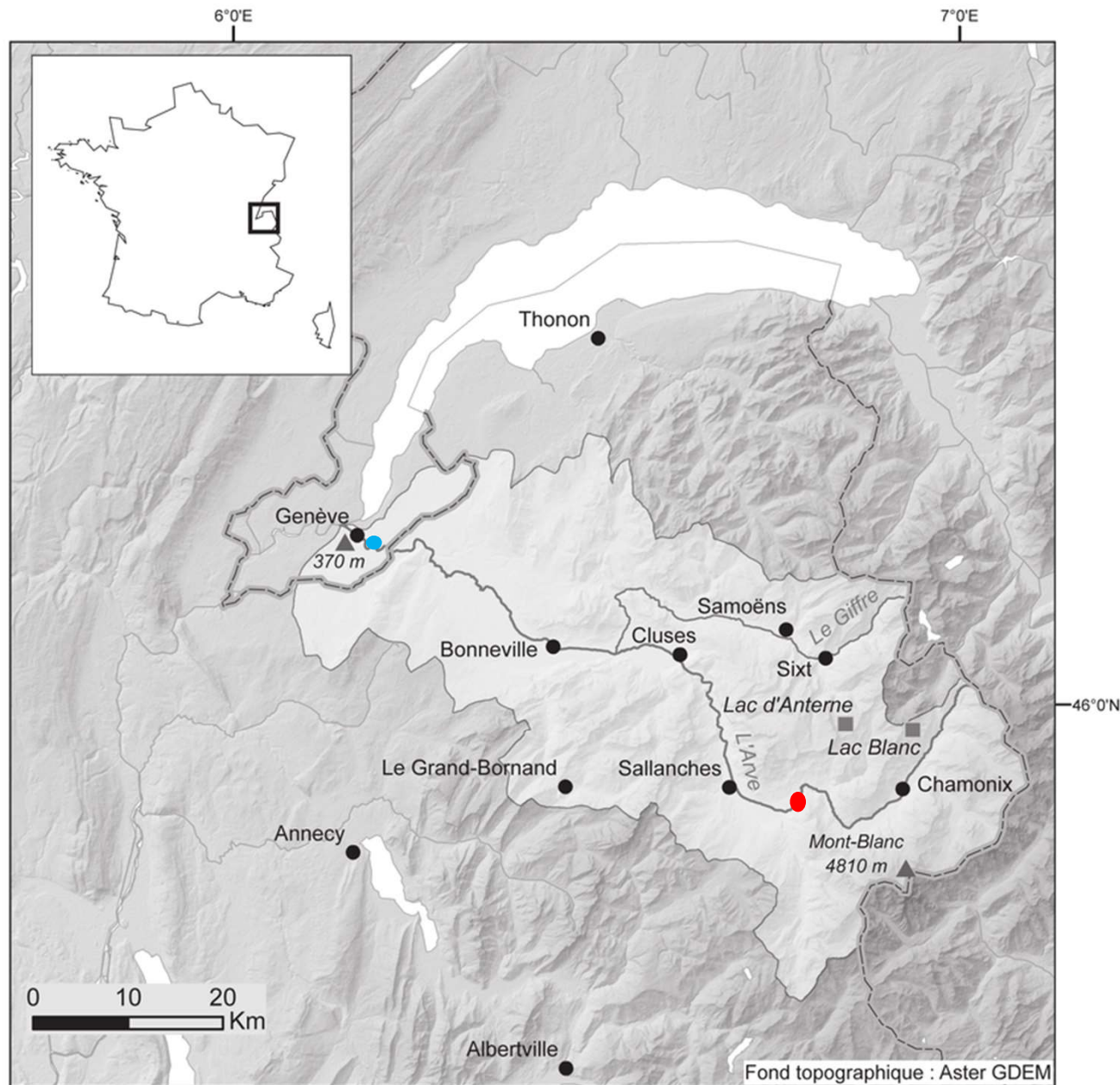
BUT CAME 2017 !

And the need to shut down the MAR plant following the discovery of groundwater contamination

- Discovery of perchlorate pollution resulting from the production of explosives

After investigations with the help of French authorities, a factory situated in the Arve river catchment area has been implicated. The Chedde factory, situated in Passy in Haute-Savoie, less than 60km from Geneva, has been producing chlorates and perchlorates since the late 19th century and has discharged thousands of tonnes of these substances into the River Arve. In 1919, after the First World War, the factory discharged around 5,000 tonnes of surplus perchlorates directly into the River Arve. Impact on the water: This discharge poisoned the river over a long stretch.

- A landfill site that still contains high concentrations of perchlorates is being monitored. Based on the results of river water analyses carried out since this discovery in the groundwater, the concentration does not exceed 2 micrograms per litre.
 - Consensus between France and Switzerland to introduce a limit value for groundwater wells (4 µg/L)
 - Research into decontamination methods
 - Research into water mixtures (lake-groundwater)
-
- Complaint lodged in 2018 with the Grenoble Court (F): still under judicial investigation



● Infiltration area

● Factory site

Photo of the current industrial site and its landfill, on the banks of the River Arve





OTHER CHALLENGES

The impact of climate change on water quality following the melting of glaciers and permafrost (landslides):



OTHER CHALLENGES

The impact of climate change on water quality following the melting of glaciers and permafrost (landslides): review the artificial recharge intervals in line with seasonal conditions (silt-laden water) since 2003, 2022 and 2026 !



Confluence of the Rhône and Arve rivers in Geneva city

OTHER CHALLENGES

Rethinking the management of the MAR plant

- Machinery maintenance
- Modifications to components
- Review of the quality of drains in the infiltration zone

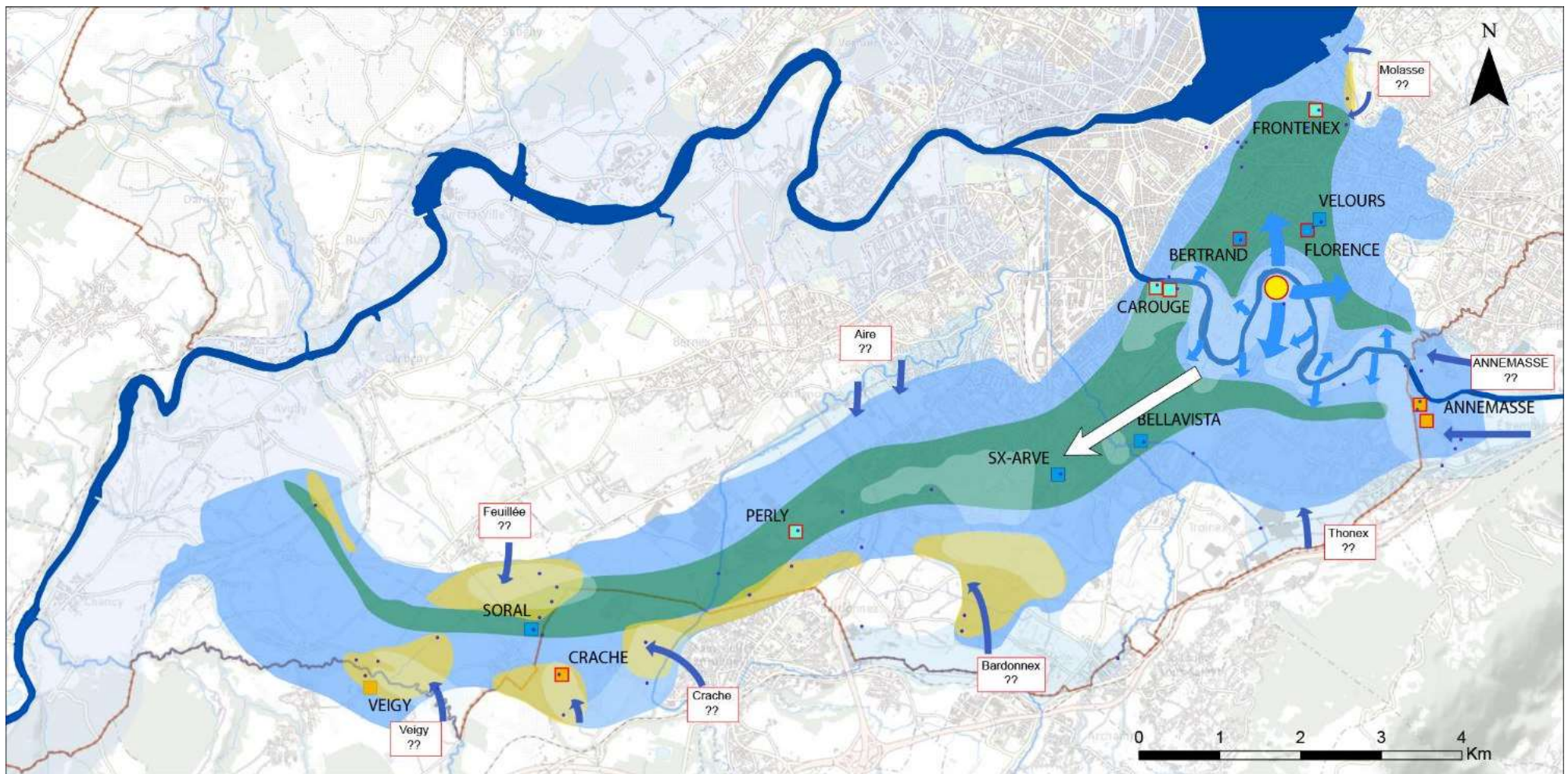
Challenges relating to staff turnover

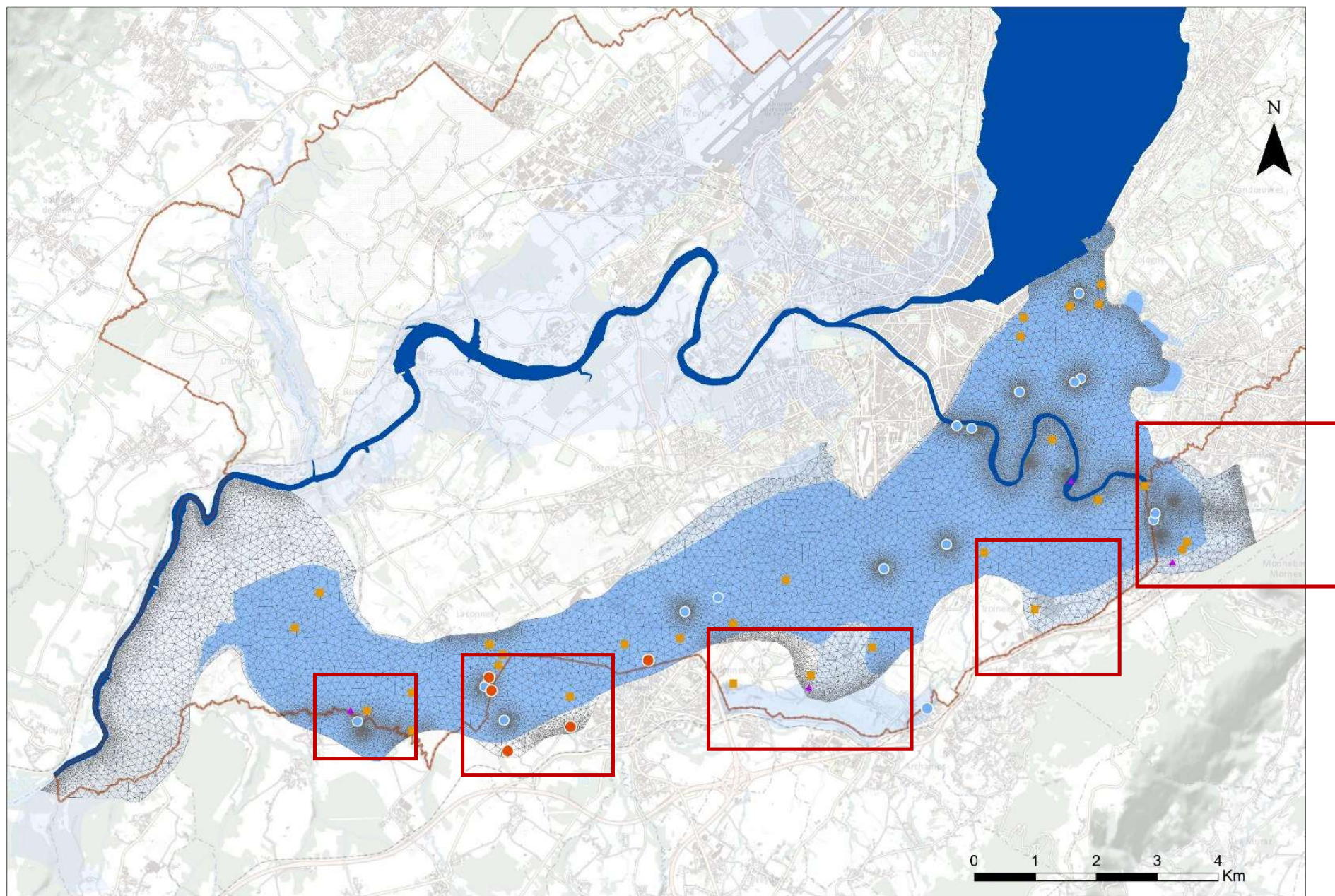
- Engineers who have known the site for several decades are leaving (retirement), resulting in a loss of experience and knowledge of the structures (new staff with no experience of the MAR).
- Management team also undergoing change
- Declining available funding

Challenges linked to population growth in the Greater Geneva area, requiring a guarantee to provide a high-quality and abundant water supply. Development plans show, in parallel with climate change, that the population of Greater Geneva area will increase considerably by 2030-2040, requiring significant medium-term water availability (30% additional water).

Genevese aquifer

Natural infiltration + MAR + lateral water inflows





Conclusions

Since 1980, more than 300 Mm³ of water has been recharged into the aquifer, demonstrating the effective seasonal use of the MAR. The system is expected to be back in operation this autumn

The MAR plant is insurance that allows operators to sustain this resource and to exploit it to cover needs.

The Genevese Aquifer became the fallback source during the heatwave of 2022, even though its use had been reduced since 2017 because of perchlorate pollution and concerns about overfilling. The Genevese aquifer constitutes a common strategic water reserve on both sides of the border.

The MAR system has proven its effectiveness for over 40 years and remains an ideal solution for maintaining a diverse range of water resources in Geneva (lake and groundwater). This approach is strategic.

The stakeholders must understand that the MAR is an extraordinary tool when it operates safely and effectively.

A political commitment must be made to assess pollution risks upstream in the river's catchment area. This helps to guarantee good-quality water for the population of Greater Geneva area.



THANK YOU

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