EPI-GW2: Water resources in karst areas

I. Rainfall measurements

→ EPI-GW2A: Rainfall on the *Saint-Clément* hillside

Summary: The impluvium of the Saint-Clément hillside received 31,933,464,200 liters, or almost 32 million cubic meters of rainwater in 2017!

What happened to this huge volume of rainwater that fell on the karst?

II. How to measure the water level in the cave?

→ EPIGW2B: floods in the *Planesselve* cave

Summary: To measure the water level underground, two pressure sensors are used:
- The first is on the surface and measures atmospheric pressure.
- The second one is underwater and measures the absolute pressure which is the sum of the atmospheric pressure and the pressure generated by the water column above the sensor.

To find out the water level, simply subtract the atmospheric pressure from the water pressure.

After a rainfall event, some of the rainwater seeps through the limestone to the water table.

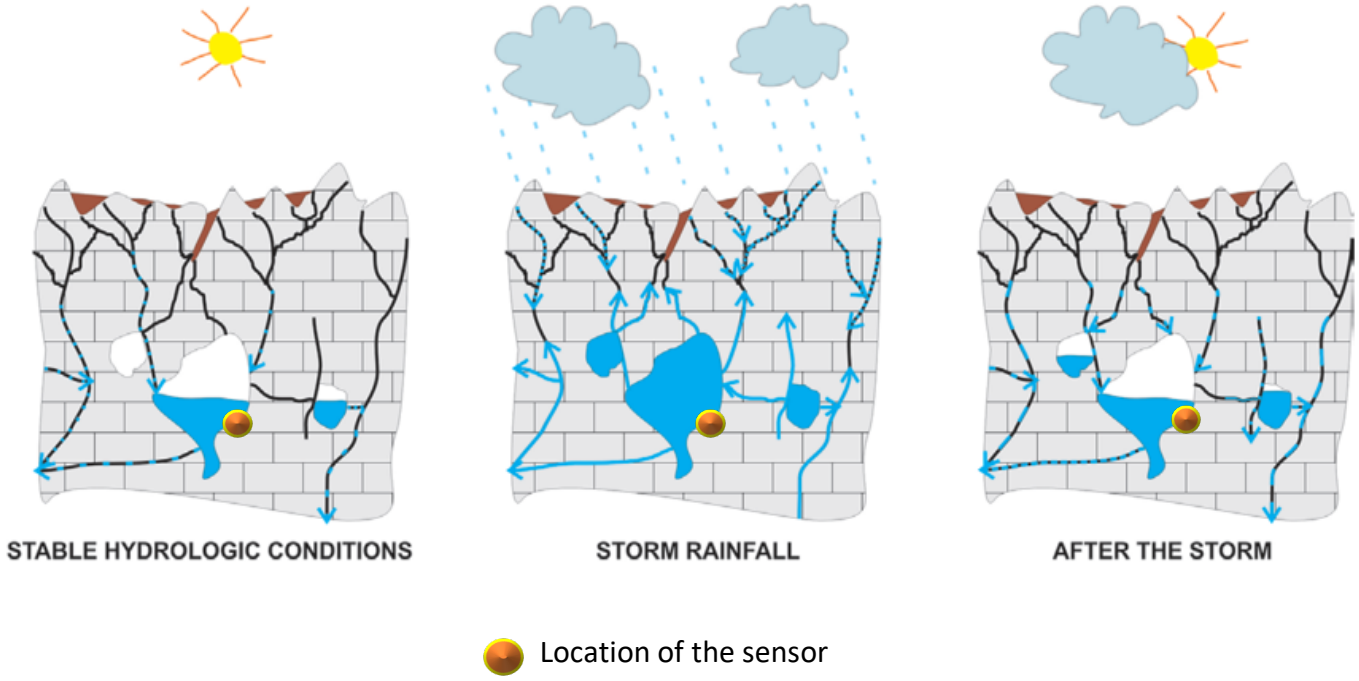

Figure 1: Measurement of rainwater infiltration into the groundwater environment. (Modified from Nataša RavbarAVBAR, 2013).

In the diagram, we see that there are relationships between the groundwater in the caves and the water in the rocks. How is water stored underground in a karst environment?

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III. Limestone is an aquifer

→ EPIGW2C: The water in the karst

Summary: Limestone is an aquifer: a reservoir rock capable of holding water. From a certain depth, all the cavities, cracks and pores of the rock are completely filled with water. This zone is called the saturated zone and constitutes the groundwater reservoir. The surface of the water table is the piezometric surface. Its altitude varies according to the water inflow and the extraction made by humans from the water table. The epiphreatic zone is sometimes flooded and sometimes dry. Water flows into the unsaturated zone but does not accumulate there.

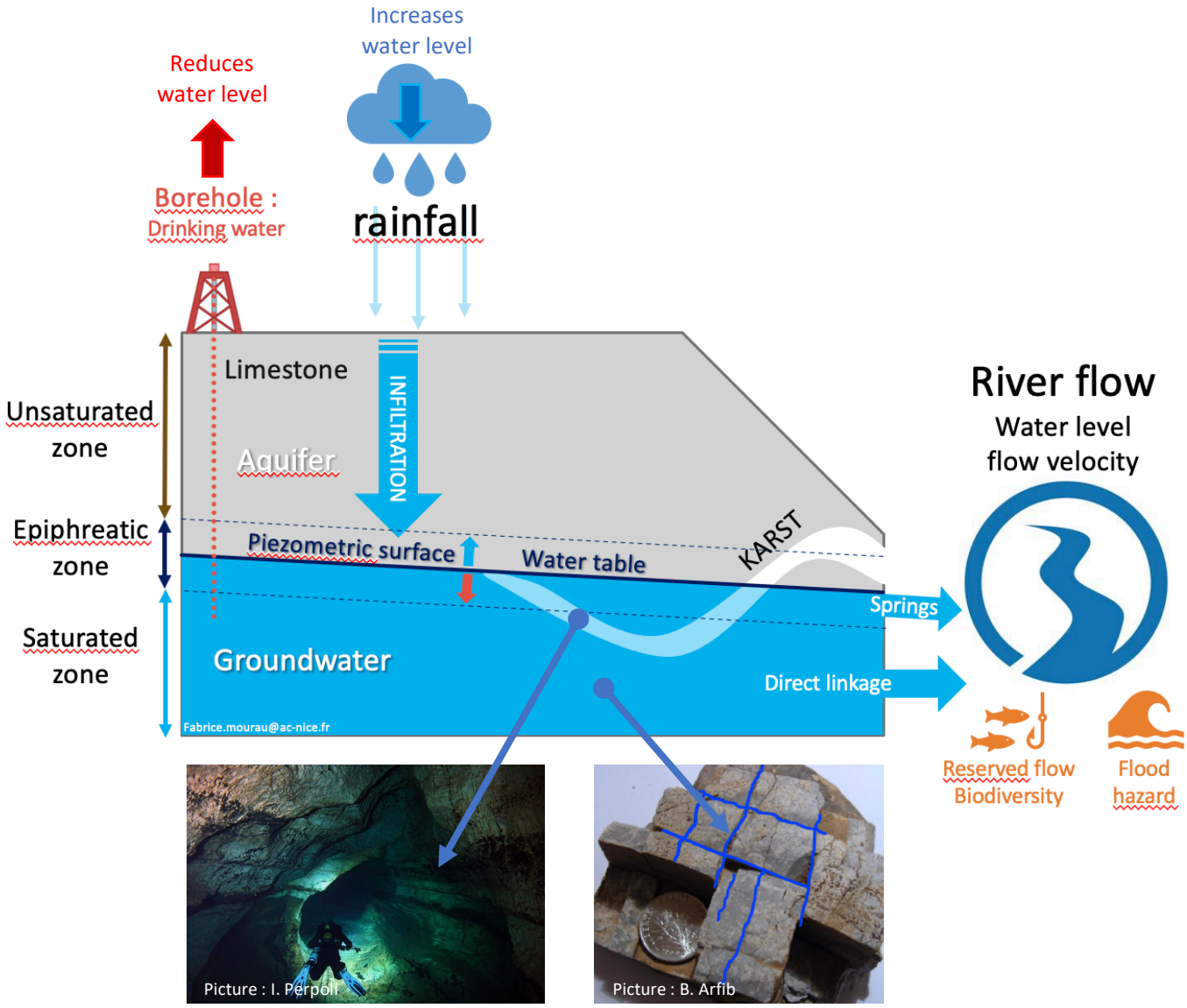

Figure 2: Where is the water in the karst? The depth of the water table varies with rainfall and human water withdrawals. In the saturated zone, all the cavities at all scales are completely filled with water.

IV. Consequences of human action on groundwater

→ EPIGW2D: Effects of lack of rainfall on the water table

Summary: Groundwater levels rise when it rains and fall when it does not rain enough. Humans also consume groundwater and thus contribute to a decrease in groundwater levels. Lack of rainfall due to climate change, as well as over-consumption by individuals or poorly sealed water supply systems, seriously endanger the groundwater resource.

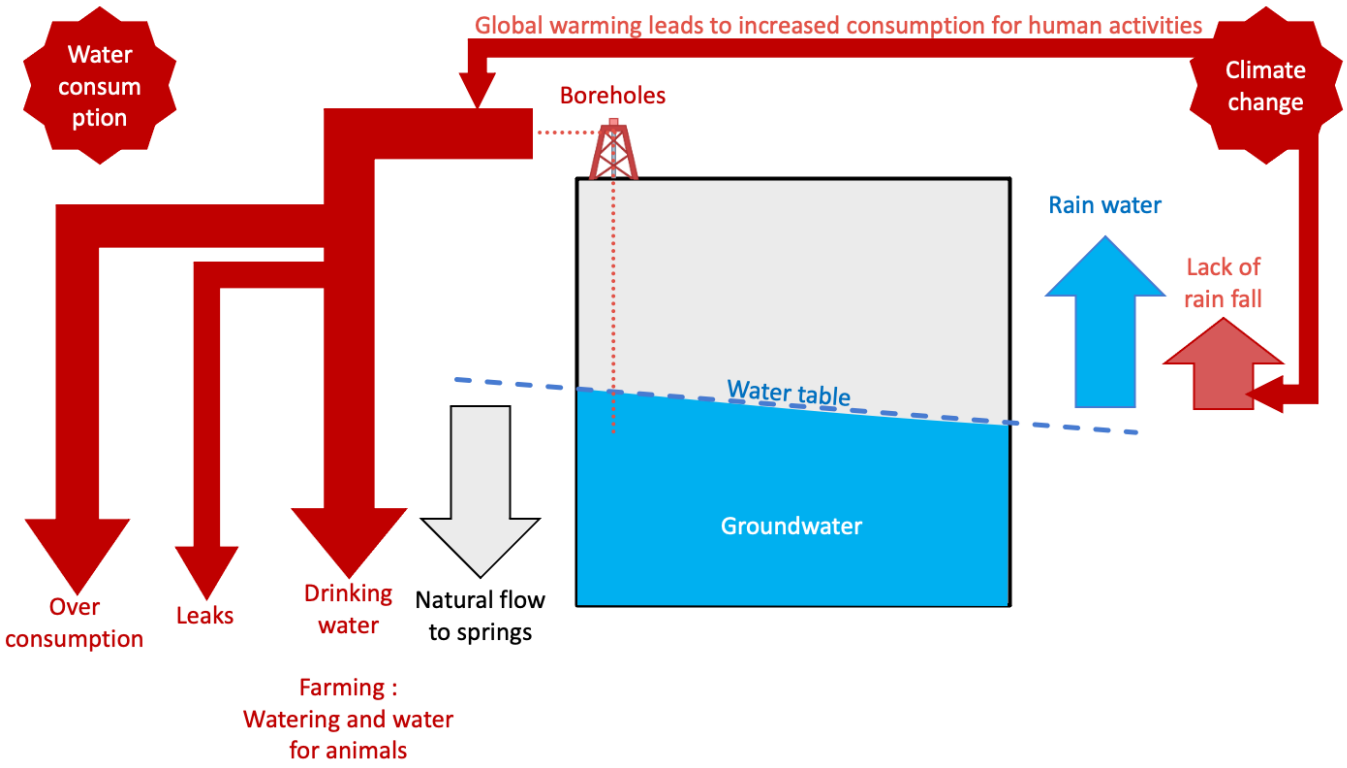

Figure 3: Humans are consuming groundwater and endangering its renewal due to climate change.

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