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The SeTe-ALCOTRA project to study the feasibility and the beneficial effects of Managed Aquifer Recharge (MAR) in the Cuneo plain

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The use of Managed Aquifer Recharge (MAR) has been increasing in recent years as a climate change adaptation measure to increase water availability in dry seasons, reduce the impact of subsidence, contrast the seawater intrusion, etc.

The SeTe project, funded by the EU programme Interreg ALCOTRA, involves the feasibility study and demonstration of MAR in the Cuneo plain, a large shallow alluvial aquifer at the south-western edge of the Po Plain. In this area, the availability of water for irrigation during summer has dramatically diminished in recent years, such as in 2017, 2021, and 2022, and these droughts have sparked the initiative for testing MAR as a low-cost countermeasure.

The three project pilot sites identified in the project - Beinette, Tetti Pesio-Morozzo and Tarantasca-Centallo - are characterized by the presence of "*fontanili*", i.e. drainage trenches dug since the Middle Ages to reclaim marshy land by lowering the groundwater level, sometimes integrated by shallow free-flowing wells called "*Calandra pipes*". The water extracted, with flow rates ranging from a few tens of L/s to values exceeding 1000 L/s, is channelled and used in fields located further downstream. Unlike wells, where the flow is determined by the activation of a pump, the flow rate of the springs depends on nearby groundwater levels and, during the aforementioned summer droughts, the groundwater level decline led to a substantial reduction or even the cessation of spring flows.

The project, started in October 2023, will last for three years to study MAR solutions to increase spring flow during the irrigation season.

Historical meteorological, geological, and hydrogeological data have been collected to reconstruct the climate impacts on water resources, to characterize the aquifer and understand the correlations between climatic variables and spring yields.

A groundwater level monitoring network has then been developed exploiting existing wells, the *fontanili* wells known as *Calandra pipes*, and nine newly drilled monitoring wells (three per site).

Three infiltration structures are now being designed and installed, testing two configurations (shallow trench and vadose zone well) to infiltrate water available in channels out of the irrigation season. To this purpose, core sampling and shallow excavations were performed, collecting samples to study the shallow stratigraphy and characterize the hydraulic conductivity of the shallow subsurface through Lefranc tests and grain size distribution analyses. As these structures will be built, the project will proceed with the monitoring and modelling of infiltration in the three sites, also from the point of view of water quality, and results will be analysed to assess the large-scale applicability of MAR in the Cuneo plain.