



Wastewater Innovation For Water Security

The El Retiro Wastewater Treatment Plant (WWTP) was built in 1986 as a pilot project under the Medellín River Sanitation Plan. Its implementation also aimed to protect the La Fe Reservoir, a strategic source of raw water supply for the Valle de Aburrá aqueduct system, particularly for the La Ayurá water treatment plant, one of the main facilities in the Metropolitan Area of Medellín.

The El Retiro WWTP has a treatment capacity of 40 liters per second and uses a biological treatment system with activated sludge, followed by a disinfection process using ultraviolet (UV) radiation in its final effluent. Since it began operating, it has helped improve water quality in the region and strengthen comprehensive basic sanitation management in rural and suburban areas.



RECOVER



REGENERATE



EL RETIRO, ANTIOQUIA, COLOMBIA



WASTEWATER



CHALLENGES FACED

A major operational challenge is odor control in the early process stages, before treatment begins. The interconnection box, pumping well, and coarse screening channels are key sources of hydrogen sulfide (H_2S). Covers help limit emissions, but buildup can affect air quality and working conditions. The pumping well's location allows gas capture and transfer to biological reactors for oxidation, though effective extraction, regular maintenance, and continuous operation are essential to prevent impacts on nearby areas.

TECHNOLOGIES & SOLUTIONS USED

Wastewater enters the plant through an interconnection box that directs it to treatment, where large solids are removed and flow is regulated. It then undergoes fine screening, grit removal, and grease removal. Secondary treatment uses the A2/O biological process with anaerobic, anoxic, and aerobic zones, followed by clarification, sludge recirculation, and UV disinfection before discharge to the river. The system maximizes removal of organic matter and nutrients, with odorous gases treated in the biological reactor.

IMPACT & INSIGHTS



The project demonstrated the importance of quantifying and communicating both environmental and resource recovery benefits.

Key Benefits:

- The plant treats an average of approximately 40 liters per second, which equates to more than 1 million m^3 of water per year.
- Contributes to the protection of the Pantanillo River, and subsequently La Fe Reservoir and its watershed.
- The process reduces the pollutant load by more than 90%, preventing discharges that would harm public health and ecosystems.

LESSONS LEARNED



Comprehensive life cycle planning is critical, encompassing operational processes, early community engagement, and long-term economic sustainability. When residents understand a plant's purpose and the environmental and social benefits it provides, trust and acceptance increase. Designing flexibility into operations allows the system to adapt to variations in flow rates and pollutant loads, while continuous monitoring programs enable early risk detection and strict effluent quality control.

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In 2024 alone, more than 1.1 million m^3 of high-quality water were returned to the La Fe Reservoir, safeguarding a vital drinking water source for the community.

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