



# Enhancing Public Health With Viral Monitoring

This project highlights two complementary approaches to protecting public health: ensuring microbiological safety in water reuse systems and monitoring disease trends through wastewater surveillance. Environmental surveillance of enteric viruses helps identify fecal contamination in surface waters, providing critical insight into microbiological water quality for sources used in recreation or drinking. This work has become increasingly important in regions facing water stress and eutrophication.

Wastewater surveillance, by contrast, analyzes sewage to detect pathogens such as SARS-CoV-2. Rather than addressing direct exposure, this approach generates population-level data that give health officials an early-warning system to track infections circulating in the community. Together, these approaches demonstrate how viral monitoring can reduce direct exposure risks while also informing broader public health responses.

✓ **REDUCE**

✓ **RECOVER**



**CORDOBA, ARGENTINA**



**WASTEWATER**



**DRINKING WATER**



## CHALLENGES FACED

- Bacteriological assessments were insufficient for detecting viral contamination.
- Existing tools couldn't determine whether viruses posed actual health risks.
- Reliance on a single supplier for critical reagents led to setbacks.
- Comparing and interpreting wastewater disease surveillance data across multiple sanitary zones.

## TECHNOLOGIES & SOLUTIONS USED

The research team uses real-time Polymerase Chain Reaction (PCR) to detect and quantify viral genomes in surface water and wastewater, with virus concentration achieved through adsorption-elution. Conventional cell culture is also applied to assess actual health risks. For wastewater, RT-PCR assays targeting SARS-CoV-2 and its variants provided insight into community transmission and complemented clinical reporting. This combined approach offers a more complete view of water quality while supporting public health preparedness.

## IMPACT & INSIGHTS



Monitoring showed that viral markers are reliable for assessing water quality and reuse, while wastewater surveillance served as an early-warning system, often detecting SARS-CoV-2 before clinical cases.

### Key Benefits:

- Provided health authorities with year-round data on contamination and disease trends, strengthening public health protection.
- Supported reuse strategies across reservoirs with varying human impact.
- Informed alignment with international standards, including the World Health Organization, on safe water reuse.

## LESSONS LEARNED



- Supply chain disruptions underscored the need for early access to critical reagents and diversified suppliers—especially for cell culture-based virus detection.
- A multidisciplinary approach, integrating virology, environmental science, and public health, proved essential for effective monitoring and risk assessment.
- Flexibility in protocols and strong collaboration improved adaptability, while integrating surface water and wastewater surveillance showed the value of multiple evidence streams for both direct exposure risks and broader health trends.

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**This project contributes significantly to public health and environmental protection by generating scientific evidence that supports the inclusion of viral indicators in water quality monitoring systems.**

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