

From Waste to Wisdom: the hidden power of wastewater

Section: Environment and ecology

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Only a couple of centuries ago, we realized the crucial need to treat wastewater before discharging it, in order to preserve our own water resources. Since then, we have advanced from simple sedimentation processes to chemical and biological treatments, and now to advanced filtration and oxidation technologies capable of producing drinking water of the highest quality. Initially, our focus was on sanitation and public health, but over the years, we have also realized the need to protect the environment and the planet's health.

In southern Europe, where droughts are becoming more frequent, we have turned to wastewater regeneration as a solution. However, it is not just water we can reuse. Energy can be produced from the digestion of biological sludge, nutrients like nitrogen and phosphorus can be recovered as fertilizers, and while not yet economically viable, research shows that heavy metals, cellulose, and many other contaminants diluted in wastewater can also be reclaimed as raw materials within a circular economy and zero-waste framework.

Thanks to advances in analytical chemistry and artificial intelligence, we can now go even further, extracting epidemiological insights from wastewater. During the COVID-19 pandemic, it became clear that wastewater analysis could monitor infection rates. Today, we have the ability to learn

about the health, habits and hidden secrets of citizens each time they use the bathroom. While this knowledge offers great potential for improving public health, it also raises serious ethical concerns: who are we unknowingly sharing our wastewater with, and what will they do with the information they extract? Perhaps we should think twice and accept “all cookies” before flushing, as our private lives might be more exposed than we realize.

[Image from [Ivan Bandura](#) in [Unsplash](#)]