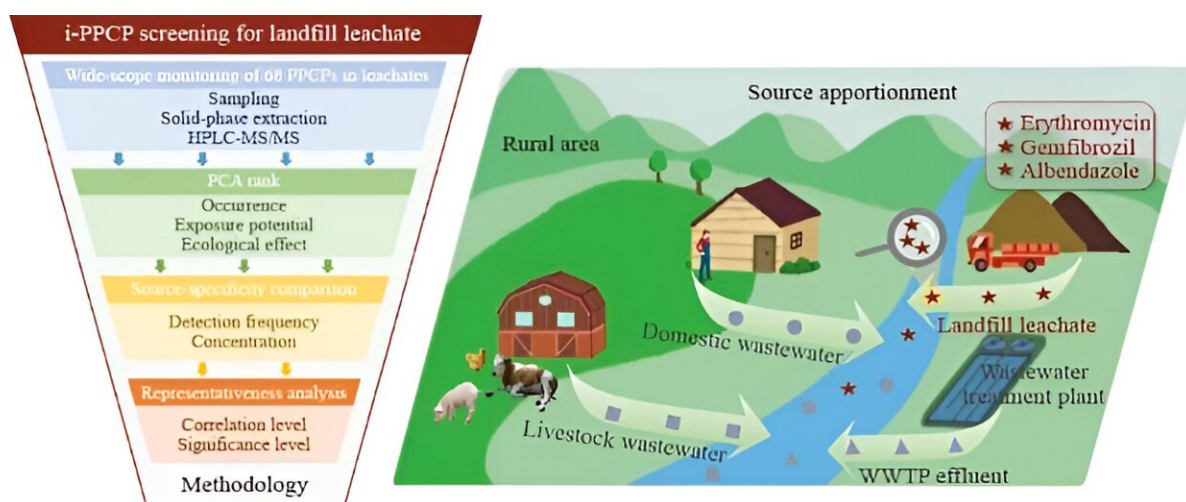


A framework for screening pharmaceuticals and personal care products in landfill leachates

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Credit: *Frontiers of Environmental Science & Engineering* (2023). DOI: 10.1007/s11783-023-1716-y

The prevalence of pharmaceuticals and personal care products (PPCPs) in the environment has generated increasing concern due to the potential threats they pose to the ecosystem and human health. Landfill leachate is an important source of PPCPs in water; however, it has rarely been involved in source apportionment due to the lack of indicator-PPCPs (i-PPCPs) in landfill leachates.

A team of researchers from East China University of Science and Technology provides the first systematic framework for identifying i-PPCPs for landfill leachates based on the wide-scope target monitoring of PPCPs. The number of target PPCPs increased from less than 20 in previous studies to 68. Their analysis was published in the journal *Frontiers of Environmental Science & Engineering* on September 20, 2023.

PPCPs consist of different classes of compounds, including antibiotics, adrenergic agents, anthelmintics, anticoagulants, antidepressants, hypoglycemic agents, and lipid regulators, etc. They are continuously discharged from various emission sources. Because of this, PPCP source identification is indispensable for effective control of PPCP discharge, to reduce the risks to aquatic environments.

Numerous approaches have been developed to track PPCPs, and indicator-based methods have been applied widely for source identification. To date, there have been a few studies on screening indicators, the majority of which have been based on several criteria: concentration, detection frequency, and detection ratio (defined as measured concentration divided by the limit of quantification). In most cases, compounds chosen as indicators due to their higher concentrations and higher detection frequency were not investigated to verify their source-specificity.

Recently, investigations on PPCP occurrence and characteristics in [municipal solid waste](#) (MSW) landfills have indicated that landfill leachates are an underrecognized source of PPCPs. Landfill leachate discharge reaching surrounding aquatic environments unintentionally could result in high environmental risks.

Notably, in most cases, landfill leachate is not the only source of PPCPs in the adjacent region. Rural areas, where MSW landfills are usually

located, can also be contaminated by domestic wastewater, livestock waste water and other potential PPCP sources.

Source apportionment, therefore, is an effective approach to identify where PPCPs in the surface water and groundwater originated from. Unfortunately, while there are many studies on the indicators for other emission sources that can be used for source apportionment, indicators for landfill leachate are limited. The work of Professor Xia Yu's team fills this gap.

In this study, the research team developed a systematic framework for the identification of indicator-PPCPs (i-PPCPs) in raw landfill leachate samples. A total of 68 PPCPs were simultaneously analyzed in the leachate samples collected from an MSW [landfill](#) in Shanghai, China.

Principal component analysis (PCA) was conducted to identify PPCPs of high concern according to the occurrence, exposure potential, and ecological effect, to ensure the practicality of using the proposed indicators in the aquatic environment.

Finally, the source-specificity and representativeness of i-PPCPs were verified by comparison to other emission sources. By applying the screening framework with [statistical analysis](#), researchers can use the results to implement source apportionment in the vicinity of landfills.

More information: Xiping Kan et al, Screening of indicator pharmaceuticals and personal care products in landfill leachates: a case study in Shanghai, China, *Frontiers of Environmental Science & Engineering* (2023). [DOI: 10.1007/s11783-023-1716-y](https://doi.org/10.1007/s11783-023-1716-y)

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