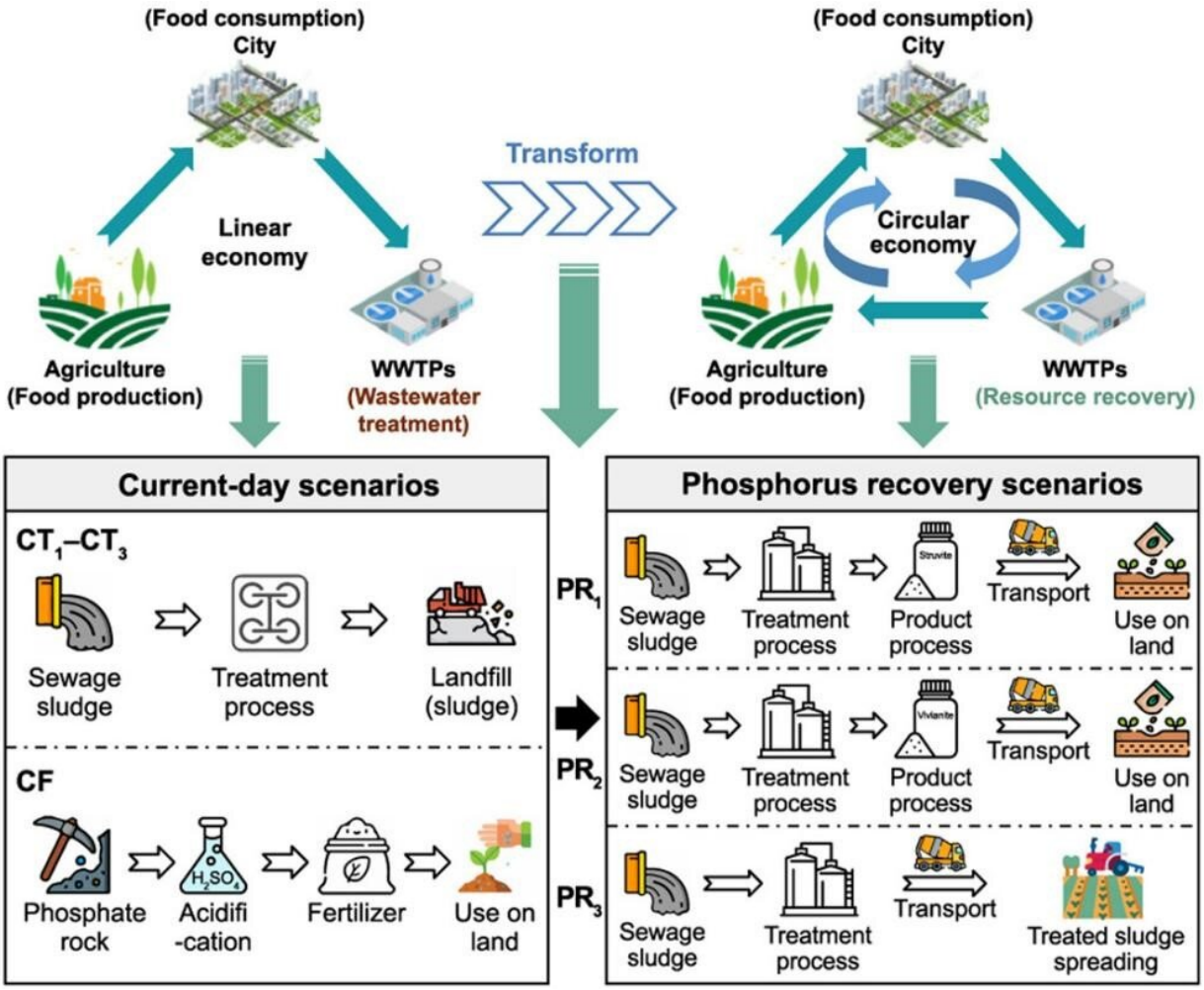
New study explores phosphorus recovery from sewage sludge in China for environmental sustainability and cost analysis

June 5 2023

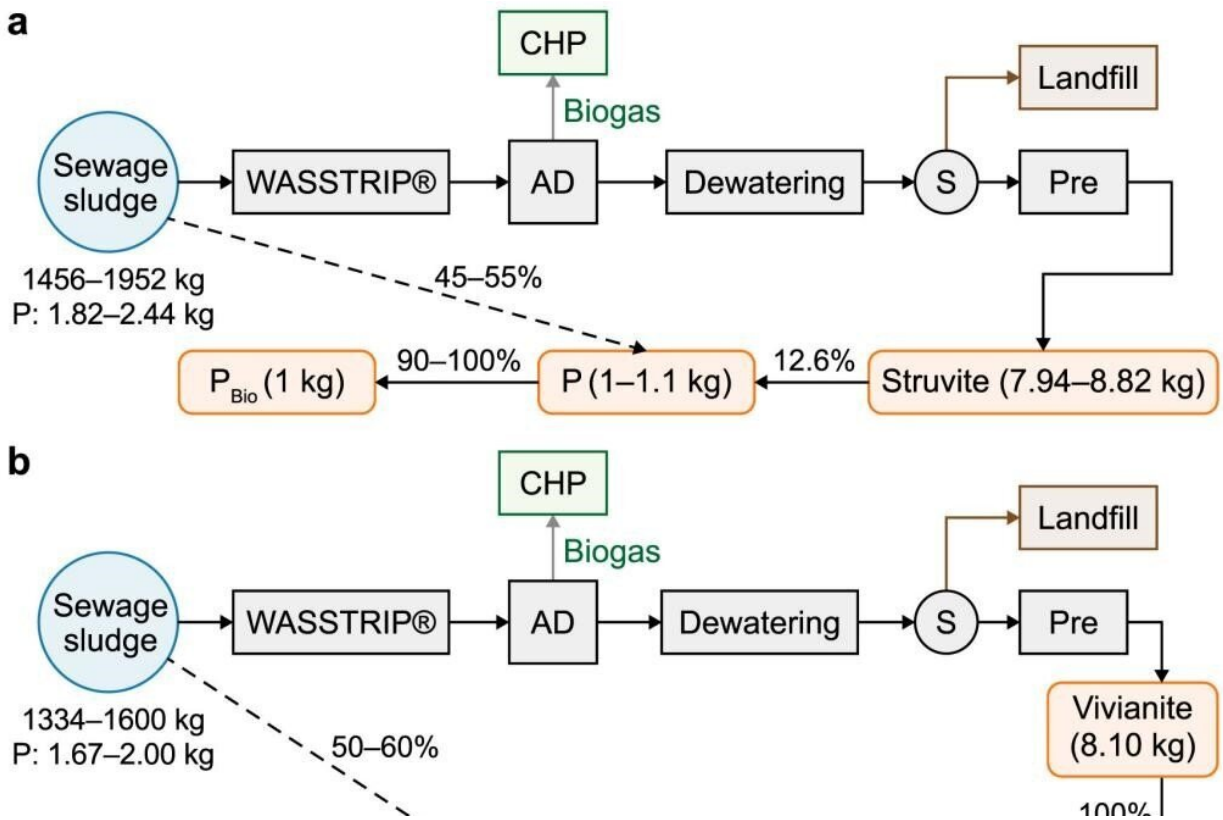


This figure quantifies the environmental impacts and socio-economic costs of P

recovery from sewage sludge for three scenarios (PR1–PR3) by replacing the current-day scenarios, including current-day treatments (CT1–CT3; sludge treatment and landfill) and P chemical fertilizer application (CF). Credit: The authors

In a new study published in the journal *Environmental Science and Ecotechnology*, researchers from Tianjin University evaluate the environmental sustainability and socio-economic costs of recovering phosphorus (P) from sewage sludge by replacing current-day treatments (sludge treatment and landfill) and its use in P chemical fertilizer applications in China.

The study evaluated three P recovery methods: struvite, vivianite, and treated sludge, by assessing their environmental and socio-economic impacts compared to conventional treatments. Struvite and vivianite methods showed smaller environmental footprints, while treated sludge had larger impacts. Although societal costs for P recovery from sewage sludge were initially higher than for P chemical fertilizer, they were comparable or slightly lower when considering the costs of conventional treatments. Struvite recovery emerged as the most societally feasible method among the three scenarios.



Three P recovery pathways were assessed starting from sewage sludge, all of which included assessments of anaerobic digestion (AD), combined heat and power (CHP), dewatering, and solid–liquid separation. Credit: The authors

The study indicates significant benefits of P recovery from sewage sludge in China, contributing to closing the biogeochemical P cycle and reducing environmental burdens. This aligns with several UN Sustainable Development Goals, including "Zero Hunger," "Sustainable Cities and Communities," and "Clean Water and Sanitation." Despite economic and technical hurdles, the societal costs of P recovery scenarios are deemed lower than expected, considering the advantages of substituting conventional treatments.

This research provides valuable insights for improved sewage sludge

management in China, promoting waste conversion into resources and supporting a sustainable phosphorus supply. It highlights the need for innovative solutions like P recovery from sewage sludge to ensure environmental sustainability and socio-economic development.

More information: Jiawen Xie et al, Environmental sustainability opportunity and socio-economic cost analyses of phosphorus recovery from sewage sludge, *Environmental Science and Ecotechnology* (2023). DOI: 10.1016/j.ese.2023.100258

Provided by Chinese Society for Environmental Sciences