

Title: Recycling electronic waste with microorganisms

Welcome to Earth Matters - field notes on the geology of New Mexico's Enchanting Landscapes. Celebrating Earth Science Week, I'm Mackenzie Best.

Do you know what happens to your old phone or laptop when you're done with it?

Phones, laptops, and other discarded electronics are collectively referred to as electronic waste (or e-waste for short). E-waste is actually the fastest growing waste stream with an estimated 53.6 million metric tons produced in 2019. This is projected to grow to 74.7 million metric tons by 2030 according to a recent UN report. The US is the second largest producer of e-waste in the world, and every country on the planet now contributes to this growing problem. We need new ways to recycle e-waste. Why recycle it? Because electronics contain valuable metals! Metals like copper, lead, lithium in the batteries, and smaller amounts of extremely valuable metals like silver, gold, palladium, and platinum. But recycling these old electronics isn't easy. You can't put it in with your regular paper or metal recycling bins but instead you have to take it to a designated recycling drop off location. Many electronics stores in the US now offer these services free of charge. However, recycling e-waste is incredibly labor intensive and while metal recovery is pretty good, it could be improved. Additionally, because profit margins are so razor thin with these operations, a huge amount of e-waste is never recycled and goes into landfills where it can contaminate nearby soil and water.

Part of my research is focused on using acid-loving microorganisms to help break down these metals. Acid-loving bacteria are found naturally in any acidic environment so think of hot springs and acid mine drainage. Many of them are specially adapted to handle high heavy metal concentrations which makes them perfect for the job. I'm working on using microbial communities to increase metal breakdown from e-waste to enhance metal recovery and make it cheaper to recycle this material, thereby making it more profitable for companies to recycle.

Celebrating Earth Science Week, I'm Mackenzie Best with the Department of Earth and Environmental Sciences at New Mexico Tech.