Sampling sediment from Stinking Creek
Saturday, October 22, 2022

Key terms:
Sediment = broken-down fragments of rock in different sizes from pebbles (64-4 mm) to sand (2-0.125 mm) to silt and clay, the smallest sizes.

Watershed = the entire surface area that drains to a single point in the river stream.

Turbidity = a measure of how cloudy the water is due to suspended sediment, algae, organic matter, or anything else floating in the water.

Upstream = the direction opposite of the water flow, which moves downstream.

We will use a large spoon to scoop the uppermost layer of sediment in the rivers to help us understand how the watershed is changing and identify the source of the sediments. This work has important importance for water quality, especially turbidity in the surface water.

1. Find a safe space to pull over in your vehicle and approach the edge of the river. Don't pick a spot that is too steep or unstable for you to stand. Choose a spot that is not at the bottom of a steep slope, where other soils are more likely to wash into the river.

2. Along the edge of the river where the water meets the land, choose a spot that is as muddy as possible. Having rinsed the spoon, scoop this material into a separate jar. Do not scoop deeper than 1 inch. Label both jars accordingly with the sample site at least twice on each jar.

3. Wade into the river as deep as you can comfortably go (no more than thigh deep wearing waders) and scoop the sediments where you can safely reach. It will take several spoonsful of sediment, so take samples from different spots to avoid digging a hole. Take samples upstream of where you walked to avoid collecting sediment that you have disturbed in the river. Fill the jar (about 8 ounces) and drain the water before closing the jar.

4. Mark the sampling site called a 'waypoint' on the GPS device, or on a free smartphone app like *onX Hunt*
5. Place your samples in a secure larger container for transport to the laboratory.

Lab tests and analyses for Stinking Creek sediment

We want to conduct multiple tests to find out what's going on today with the Stinking Creek watershed.

- Dissolve organic matter: we are not interested in the organic matter, which are things like leaf litter and remains of things that were once alive. We use hydrogen peroxide to dissolve organic matter, and then let the sand dry at room temperature. It's the same acid you use to treat wounds at home, but it's much more concentrated.

- Grain size analysis: if we take a fistful of sediment, what percent of it is sand, silt, and clay? This tells us about how quickly the sediments break down as they get transported from the exposed rocks to the Cumberland River. We use an X-ray technique to calculate this information.

- Separate the sediment by size: we use a mesh called a "sieve;" think of the screen on your windows. The small grains (silts and clays) go through, but the sand and pebbles don't go through the mesh. It's like panning for gold.

- Mineral composition: we glue all the sand grains together in epoxy, cut a thin slice of this "rock", and shine light through the grains on a microscope to identify 300-500 grains. This tells us about which rocks provide most of the river sediment and the rock formations that are more likely to break down. This is important for potential property damage in the present and future.

- Chemical elements: we melt each silt + clay sample into a glass disc, which is then hit with X-rays in a machine so we can determine how much calcium, iron, magnesium, manganese, and other elements on the periodic table are present in each sample.

- Microplastics: we use a microscope to look for tiny pieces of plastic fibers or fragments that can tells us about the health of the river.

- Animal shell fragments: the number of shell fragments can tell us about the health of the river water by showing us a general population of shelled animals living in the river or crustaceans like crayfish in the river.