



Sedimentation

When we talk about water pollution, there are two broad categories which can cover the whole spectrum of water quality impairments. Those categories are point-source and non-point source pollution. Point source pollution can be traced to a specific facility or single outflow pipe. Non-point source pollution enters our waterways from wide-ranging areas. Today in Pennsylvania, the number one non-point source pollutant in our waterways is sediment.

Sediment pollution clouds water with both large and fine particles of soil. This creates turbidity which can capture heat from the sun and increase water temperatures. Less turbidity results in cooler water. Cold water can hold more oxygen than warm water, allowing it to support more aquatic species.

Turbidity decreases visibility. You can see multiple, large particles of debris as the camera moves through the stream, but you can't see anything else, neither the surface of the water nor the bottom of the channel. Even this branch could not be seen until it was directly in front of the camera.

Turbid water makes it difficult for fish-eating predators to hunt. Animals such as herons, kingfishers, eagles, and ospreys are visual hunters, needing to see fish and other aquatic prey in order to catch them. Most fish species are already camouflaged to blend in with their aquatic habitat during good water conditions. Sediment-clouded waters makes hunting even more difficult for predators.

Fish can suffer too from turbid water conditions. We already mentioned that turbidity can increase water temperatures which in turn decreases oxygen content in the water. But sediment can also affect breathing by clogging gills. For a fish, breathing in turbid waters can be like breathing in a smoke-filled room. Some species are more sensitive to low-oxygen levels and sediment pollution than others. Sediment can also bury eggs and the larval insects which some fish eat. Damselflies and dragonflies are two types of insects which lay eggs in the water and fill an important role in aquatic food chains as both predator and prey.

So how long can sediment cloud water after it has become polluted? In this experiment, we poured soil-laden water into a plastic container and let it sit. We did not stir or shake the container after adding the polluted water. In the first hour we can see some of the sediment starting to sort itself. The heavier particles drift down to the bottom while the lighter particles remain floating near the top. After 24 hours, a layer of sediment covers the bottom of the container, but the rest of the column is still significantly turbid. After three and a half days, the water column is finally starting to clear.

The effects of sediment don't end when the soil has settled, however. We already covered that sediment pollution can bury eggs and larval insects on the bottom of a stream, river, or lakebed. In this container, we can see what that might look like. This water column went through the same experiment as the previous column. Here we can see that the sediment covers not only the top of the gravel, but it also slips down to fill in the nooks and crannies between the pebbles too where larval insects hide.

Our sediment experiments were run in a closed system, a container of still water, but in nature, moving water can carry sediment downstream. Sheltered pools and pockets like this one, away from the main current, received more sediment pollution than fast-moving areas of the stream, allowing for large debris and sandbars to be deposited. Fast-moving water can remove sediment and debris during storms, changing the shape of a stream channel. Deep pockets of fast-moving water, therefore, create better habitat for adult fish. In this pocket, visibility is better even though the water looks dark and turbid from above. The camera can pick up additional branches underwater not seen from the surface.

Sediment pollution can occur naturally. These tree roots were not enough to protect this bank from eroding when high water levels washed the soil out from under them, creating a pollution event. Human activities did not cause this sediment pollution. Man-made sediment pollution sources include construction sites and farm fields. Rain storms can wash away soil not protected by plants or other cover and carry it to our waterways through roadside ditches and storm drains. But developers, contractors, and farmers can do their work in ways which decrease the chances of rainstorms washing away their soil. County Conservation Districts help them to implement best management practices for controlling sediment pollution by reviewing their design plans against state-approved standards and through inspecting construction sites and offering technical assistance to contractors and farmers. Contact your local Conservation District for more information.