You’ve read in the Soil Burn Severity news release about how wildfires change soils that can increase flood risk and the read the term, hydrophobicity or water repellent soils caused by fires—how in the world does a fire create soils that are hydrophobic, what does it look like and what is the “so what” of hydrophobic soils? Let’s take a look and see...

Healthy, unburned soil contains many air spaces. When it rains, the air pockets fill with water—a healthy soil acts like a sponge.

During a fire, burning plants and debris on the forest floor (pine needles, woody debris etc) release gas that is forced down into the soil. The longer the duration of the heat and the hotter the fire, the deeper the gasses are pushed down into the soil.

After a fire, the gas cools and forms a wax like layer surrounding the soil particles below the soil surface. This wax like layer plugs air pockets in the soil, thus not allowing water to soak into the soil. The soil now acts more like a roof rather than a sponge.

This wax-like surface creates a condition known as hydrophobicity. The hotter the fire, the deeper the hydrophobic layer that convert normally porous and sponge-like forest soils into hardened roof-like forest soils that readily shed water.

BAER Team soil scientist and hydrologist look for this during the soil burn severity validation phase to more accurately model runoff and possible debris flows from fire damaged soils that can affect National Forest resources. They share this information with our cooperating agencies so they can better prepare for potential post fire flooding.