Can the Design of Natural Aquifers Be Used to Filter Run-off on the Roads in Communities and Wetlands?

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The purpose of this experiment was to test and to examine how the design of a natural aquifer can be effective in filtering run off from roads in order to make it less harmful to the ecosystems and the environment. If water filtration models are constructed like aquifers then, the model with the least turbid water filtered in the shortest time interval will be the safest. Also, if the depths of the various layers in the model are modified, then the model with the thinnest layers will be most time and cost efficient. Over three rounds of construction and optimization, 13 models of natural filtration devices were made in which various amounts of materials were used including: sand, pebbles, gravel, charcoal, sphagnum moss, and others. Each of these models were tested both using clean water and water with 10 cubic centimeters of sediment and organic matter. The most efficient model was identified and modified in order to make it more efficient. These models were tested with a sediment solution. The water was timed as it passed throughout the aquifer as it was collected. This experiment will demonstrate how a natural aquifer can be constructed and used as a natural filtration mechanism. An aquifer with a 1:1 layered combination of pebbles and sand, sandwiched between two coffee filters was the most efficient design. Ultimately, these designs could be used on the sides of roads instead of drains and grates in order to be more efficient and safer for the environment. The models could be developed on a larger scale for roads near wetlands and fragile ecosystems.

Awards Won: