**Phenomena**: Let’s pretend I live on the east side of Kennesaw Mountain. After it rains I notice water trickling down nearby rocks. I also notice that where there are a lot of plants and trees, there is not as much run off. What factors would impact surface run off versus infiltration?

A couple of reminders about the language used in our models/investigation:

**Runoff**: Water from precipitation flows over the surface of the ground. It eventually makes its way to a stream or river.

**Infiltration**: When water soaks into the ground. In the ground, this water can be used by plants or stored in an aquifer system.

**Impervious surface**: A surface that does not allow water to soak in or pass through it.

(Resource: <https://www.stlmsd.com/sites/default/files/education/352439.PDF>)



Preparations for Using the Models:

1. Make sure the models are put together as shown in the picture.
2. Measure 350 mL of water with a beaker and pour it into the water can. This will be the water you will pour onto the surface(s). You will also record this amount in the appropriate place on the data table.
3. Make sure a measuring cup is at the base of the model. This will catch any runoff.
4. Assign each group member a role:
   1. **Rain simulator** – measures and pours water onto the box

Pouring water in the box should be done *slowly*. Later you may decide to run another set of investigations where you experiment with how “fast it rains.”

* 1. **Stop watcher #1** – times the “soak in” time

Time to soak in starts as soon as water hits the surface of the box. Stop the timer once the water starts to run out of the box and into the measuring cup.

* 1. **Stop watcher #2** – times the “runoff” time

Runoff time starts when the water first starts to run out of the box and into the measuring cup. Stop the timer when water stops flowing in a steady stream, but is more like a drip in the cup.

1. Once everyone has a clear idea about what they will do, begin the investigation by pouring the water onto the surface of the “bare soil” box and begin timing what happens next.
2. Record the times in the appropriate places in the data table.
3. Measure and record the amount of water that is present in the measuring cup.
4. Determine the amount of soil erosion by examining the water in the measuring cup.
5. Repeat the steps for vegetation and impervious surface.

Data Table:

|  |  |  |  |
| --- | --- | --- | --- |
|  | Type of Land Surface | | |
| Data | Bare Soil | Soil with Vegetation | Impervious Surface |
| Water input (mL) |  |  |  |
| Soak in time (seconds) |  |  |  |
| Runoff time (seconds) |  |  |  |
| Water output (mL) |  |  |  |
| Soil erosion  (none, a little, a lot) |  |  |  |

Analysis: Figure out how much water each of the surfaces held. *(Hint: Compare how much water you put in to how much water came out.)*

|  |  |  |
| --- | --- | --- |
| Bare Soil | Soil with Vegetation | Impervious Surface |
|  |  |  |

1. From your analysis, circle which type of land surface held the most water.
2. Which of these surfaces held the least amount of water? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Are these outcomes consistent with what you expected? Explain your thinking.
4. What does the model and outcomes of your investigation tell you about the initial phenomena. (Reminder of Phenomena: Let’s pretend I live on the east side of Kennesaw Mountain. After it rains I notice water trickling down nearby rocks. I also notice that where there are a lot of plants and trees, there is not as much run off.)

Now calculate the runoff rate (volume of water per second). The runoff rate is the water output divided by the time of runoff. (Units = mL/sec)

|  |  |  |
| --- | --- | --- |
| Bare Soil | Soil with Vegetation | Impervious Surface |
|  |  |  |

5. Which of these surfaces had the fastest runoff rate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

6. Which of the three surfaces had the slowest runoff rate? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

7. What does the model and outcomes of your investigation tell you about the initial phenomena.

8. How do you think the outcomes would have differed had you changed the slope of the tray to be steeper?

9. How do you think the outcomes would have differed had you changed the slope to be less steep?

10. How do you think the outcomes would have differed had you simulated a hard, heavy rain?

Reflections/Connections to Tristate Water Wars

11. How does this model help you understand more about the way earth works that leads to things like our current water war between Florida, Alabama, and Georgia?