STORMWATER – IMPERVIOUS SURFACE INVESTIGATION

Purpose:

To gain an understanding of **stormwater** runoff and **impervious surfaces** (surfaces that do not allow water to pass through them into the ground, like roads and parking lots), and how they impact the environment.

While you are conducting this investigation ask the questions:

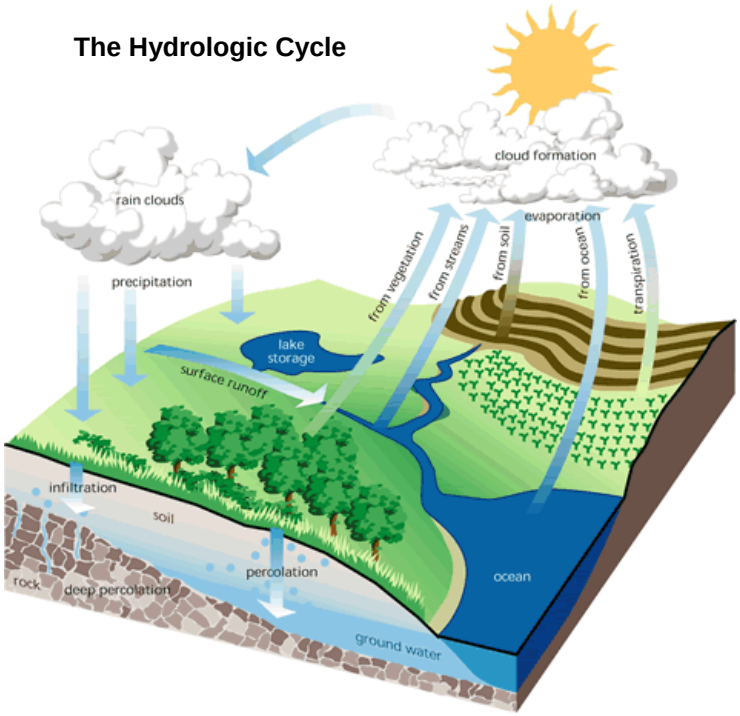
Where does all the stormwater runoff go?

What can be done to reduce the amount of runoff?

Background

Let's review the hydrologic cycle and determine how water is transported in the environment. Where does the water go when it rains or when snow melts? Does all the rain water penetrate the ground surface?

The Hydrologic Cycle



Buildings, rooftops, sidewalks, roads, and parking lots are missing from the picture above. All of these structures are covered by impenetrable materials such as asphalt, concrete, brick, and stone. They are called impervious surfaces. So, when it rains the water that falls on these impervious surfaces cannot be absorbed into the ground and the water "runs off" of the surface and into storm drains. This water is called stormwater.

Stormwater runoff can be a major environmental problem and can have many harmful effects on plants, fish, animals and people. Why? Stormwater can pick up debris, chemicals, dirt, and other pollutants and then flow into a storm sewer system or directly to a lake, stream, river, wetland, or coastal water. Some effects of this pollution are listed in the next section.

The Effects of Specific Pollutants in Stormwater:

- **Sediment** (such as dirt, sand, & rocks) can cloud the water and make it difficult or impossible for aquatic plants to grow. Also sediment often carries with it excess nutrients or contaminants.
- **Excess nutrients** (such as lawn fertilizer, which is rich in nitrogen and/or phosphorus) can cause algae blooms. When algae die, they sink to the bottom of a **waterbody** and decompose, which removes oxygen from the water, killing off fish and other aquatic organisms. This process is called **eutrophication**.
- **Bacteria, viruses, and other pathogens** can wash into swimming areas and create health hazards.
- **Debris** - plastic bags, six-pack rings, bottles, and cigarette butts washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- **Household hazardous wastes** like pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick from eating diseased fish and shellfish or ingesting polluted water.

Procedures:

1. Identify an impervious surface

2. Measure the impervious surface area and record measurements on the back of this sheet

3. Calculate the area of the impervious surface
   Length x Width = Area

4. Assuming a 1 inch rain event, calculate the volume of water that would run off the impervious surface you just measured.
   Area x 0.083 = Volume

5. Convert the volume of water (cubic feet) into gallons.
   Volume x 7.48 = Gallons

6. Total the number of gallons of runoff from a 1 inch rain event from all impervious surfaces measured.

7. Compare total number of gallons with the amount of gallons it takes to fill one average (13,500 gallon) backyard swimming pool.

Additional Resources:

www.epa.gov/weatherchannel/stormwater.html
www.lojic.org/ - maps

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www.louisvillewater.com http://cfpub.epa.gov/npdes/stormwatermonth.cfm

Location	Length ('L' measured in ft)	Width ('W' measured in ft)	Area ('A' measured in square ft, or sqft)	Volume ('V' in cubic ft)	Gallons
	L	*W*	*L x W = A*	*A x 0.083 = V*	*V x 7.48 = Gallons*
example lot	*20*	*20*	*400*	*33*	*248*
Total					

Formulas to remember:

Length x Width = Area

Length x Width x Height = Volume

1 inch = 0.083 ft

1 cubic ft = 7. 48 gallons

Interesting Information:

- There are over 85 parking lots on U of L's Belknap Campus
- There are over 110 buildings on U of L's Belknap Campus
- Most downspouts on these buildings are connected to the sewer system

How many times could we fill an average backyard swimming pool (holds 13,500 gallons of water) from the stormwater runoff of a 1 inch rain event?

Where does all of the stormwater runoff go when it cannot be absorbed into the ground because of these impervious surfaces?

How could we divert the stormwater runoff so that it could be useful? How could we use the rainwater that runs off of these impervious surfaces?

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