



Environmental Stewardship

Lesson 8: Build a Model of a Landfill

Grade Level 9-12

Time Required 50 minutes for planning and construction. Models will be observed on a weekly basis for a month. The ideal plan is to construct the landfill model several weeks before doing the unit. Then the full investigation can be done within the schedule for the unit.

Background

Landfills may leak over time and the leachate released can affect the composition of groundwater. This lab models the production of leachate over several weeks.

Objectives

The purpose of this lesson is to give students a visual model of leachate production. They will construct a model of a landfill using a pop bottle and various materials. Observation of the model will be carried out for an extended period to watch for changes and the formation of leachate in their model.

Engineering Connections: Environmental Engineering, Chemical Engineering, Civil Engineering

I Can:

- o **Define and correctly use related functional vocabulary: groundwater**
- o **Construct a model of landfill.**
- o **Record observations over an extended period,**
- o **Understand how leakage of leachate can contaminate groundwater.**

HS-LS2-7 Ecosystems: Interactions, Energy, and Dynamics

Design, evaluate, and refine a solution for reducing the impacts of human activities on the environment and biodiversity.*

HS-ESS3-4 Earth and Human Activity

Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*

HS-ETS1-1 Engineering Design

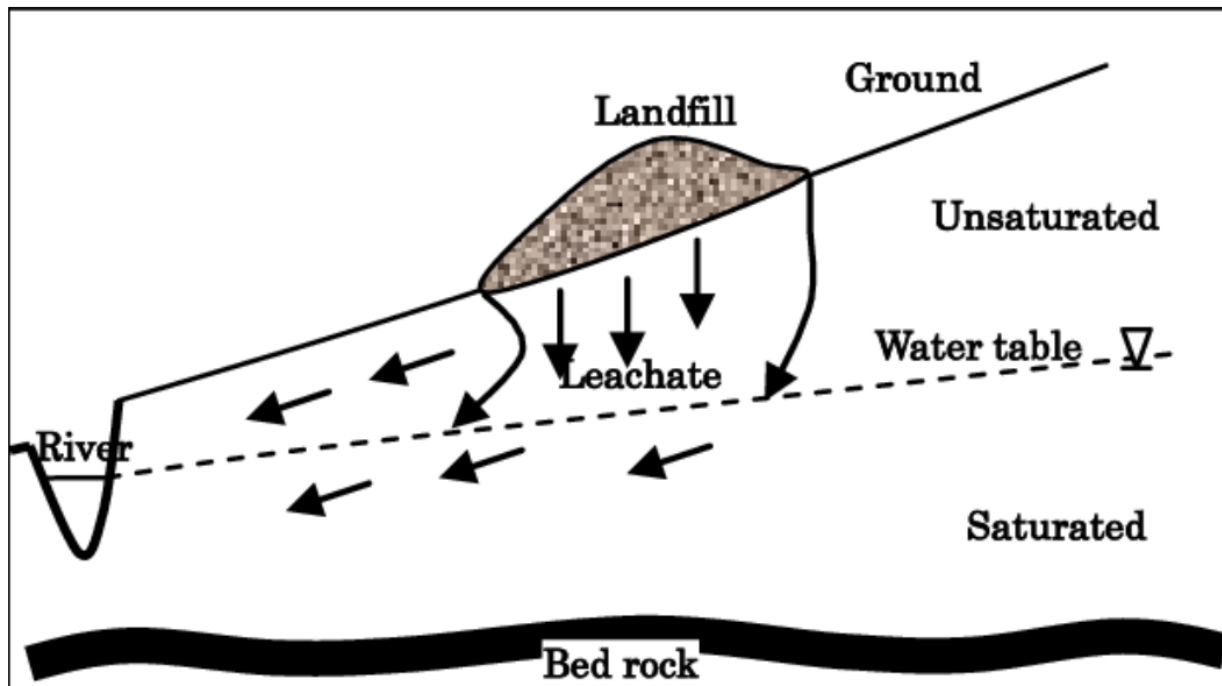
Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Keywords

landfill, leachate, groundwater, contamination, aquifer, permeable

Pre-Lab: Complete required vocabulary: Using the resource preferred by your teacher, complete the following table with the correct scientific definition.

Term	Definition
landfill	
leachate	
groundwater	
contamination	
aquifer	
permeable	



Schematic diagram of groundwater contamination by landfill leachate

https://www.researchgate.net/figure/Schematic-diagram-of-groundwater-contamination-by-landfill-leachate_fig1_261288075

Lab – Constructing a model of a Landfill

1. Student models of landfills should be built several weeks prior to the unit. Observations can be made each week for several weeks, then during the unit, the discussion and assessment can take place.
2. Students should take pictures during construction and also during each observation period as those pictures will be used in the assessment.
3. Prior to building, some basic background research should be done by students to familiarize them with how landfills are built.
4. There are numerous existing lessons that can be used for this activity depending on teacher preference and time.

https://assets.speakcdn.com/assets/2332/oef_landfillbottle.pdf

https://www.teachengineering.org/activities/view/cub_enveng_lesson05_activity2

5. Assessment: Students will construct a digital representation of the process and explain how leachate was produced in their landfill, describing the changes they noticed over several weeks. Digital format is at the discretion of the teacher, but some possible formats are Prezi, FlipGrid, Keynote, Google Slides, etc.

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