

Easy Lesson Plan Template¹

P = Pretest (think essential questions)

O = Objectives (measurable - see Bloom's taxonomy)

C = Catch (hook, anticipatory set, etc... use different senses, not a question)

A = Activity (procedure of what the students should do)

R = Review (how will students go over what they've learned?)

A = Assessment (formative and/or summative)

P = Posttest (same as pretest for comparison purposes)

S = Standards (Wyoming, NGSS, etc...) showcasing crosscutting concepts²

Pretest Questions	see test at bottom of page
Objectives	<ul style="list-style-type: none">● Students will define weathering and erosion● Students will compare and contrast a terrain prior to and after weathering by rainfall● Students will experiment with rain rate and its affect on weathering using NetLogo model● Students will report thier findings on how rain rate affected erosion rate when adjusted.
Catch	<p>Materials:</p> <ul style="list-style-type: none">● shoebox sized plastic bin (whole class) or enough bins to do group work if preferred● sand, soil, or dirt● water● baster or a cup <p>Have a shoebox sized plastic bin filled with dirt, soil, or sand so that one end is at a higher elevation than the other. Have students make predictions about what would happen if water dropped on the soil slowly? Then have students/teacher slowly drip water on the higher elevation until the water starts to trickle to the lower elevation. (Note: make sure you are pouring from approximately the same height each time.) Next ask students what would happen if we poured more water at a time increasing the “rate of flow?” Again, students/teacher pour the water at a trickle this time. Finally, follow the same procedure but have the pour be at a high flow rate.</p>

¹ Please add/attach any handouts for this activity to the end of this template

² <http://ngss.nsta.org/CrosscuttingConceptsFull.aspx>

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Activity	<p>(Prior knowledge of NetLogo is not necessary but would be helpful for students prior to this lesson. Letting them get on either online or on machines with the software and exploring would give students familiarity with how the models and widgets in the program work. It would also be good to show students how to screen capture a window and paste it in a document for assessment and presentation purposes.)</p> <p>Activity length: 1 (hour) class period plus extra for presentations</p> <p>Using the previous activity discuss what happens to the landscape each time the rate of flow increased. (Students should notice that the greater the flow the more soil was moved and the deeper the channel becomes.)</p> <p>Tell them that they just experienced weathering and erosion. Write the two words on the board and have them quickly discuss with a partner/group what the two words might mean in the context of the experiment they did. If needed point out the root words to see if that may help. Have a few groups share out and then solidify a definition for weathering and erosion. (Example: Weathering is the breaking down of materials by natural forces such as: wind, water, and ice. Erosion is the transportation of Earth materials from one place to another.)</p> <p>Ask students: What types of places on Earth may have been created by weathering? (If students do not offer the idea add “Grand Canyon.”)</p> <p>Tell students that they will be running a model in NetLogo that will let them control the rain rate as well as the amount of evaporation at the Grand Canyon to see what happens to the rate of weathering/erosion in the system. Then have students open the model and begin experimenting for about 3-5 minutes.</p> <p>Call class back together and see what things they noticed when running the model. They should notice that as the rate of rainfall increases the rate of erosion increases dramatically but that the erosion rate evens out if the rainfall stops.</p> <p>Let students know that they will need to do a short presentation, with some screen captures, of what happens to the erosion rate as they increase or decrease the flow rate. (Give an appropriate time period)</p>
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<p>Review</p>	<p>Teacher: run the model to get a varied graph. Just show the graph to students and see if students can talk about how the rate of erosion changed and what that may say about the rainfall or evaporation rate.</p>
<p>Assessments</p>	<p>anecdotal through discussion possible grading of presentations</p>
<p>Posttest Questions (same as pretest questions)</p>	<p>see pretest</p>
<p>Standards</p>	<p>4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.</p>
<p>Crosscutting Concepts from NGSS</p>	<p>RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. MP.2 Reason abstractly and quantitatively. MP.4 Model with mathematics. MP.5 Use appropriate tools strategically.</p>

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Pre-test/Post-test

Name: _____


Date: _____

1. What is weathering?

2. What is erosion?

Before rain

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setup go 

rain-rate 10 drops / tick

Click on the map to place
raindrops manually

evaporation-rate 32

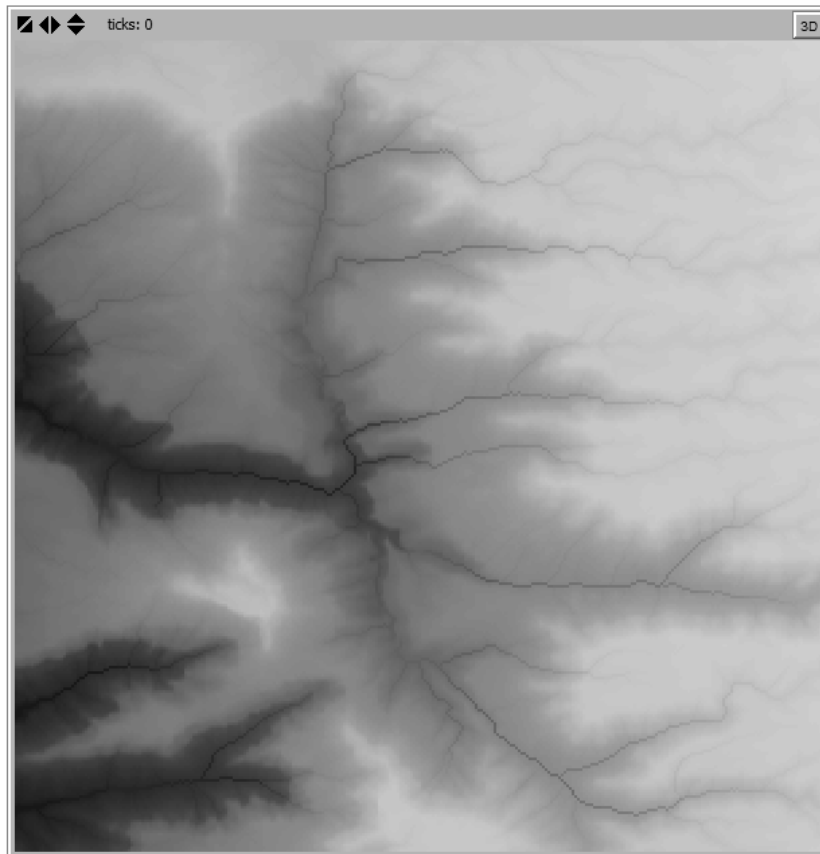
On draw?
 Off

clear drawing

watch random raindrop

watch my raindrop

reset-perspective



After extended period of heavy rain

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setup go

rain-rate 10 drops / tick

Click on the map to place raindrops manually

evaporation-rate 32

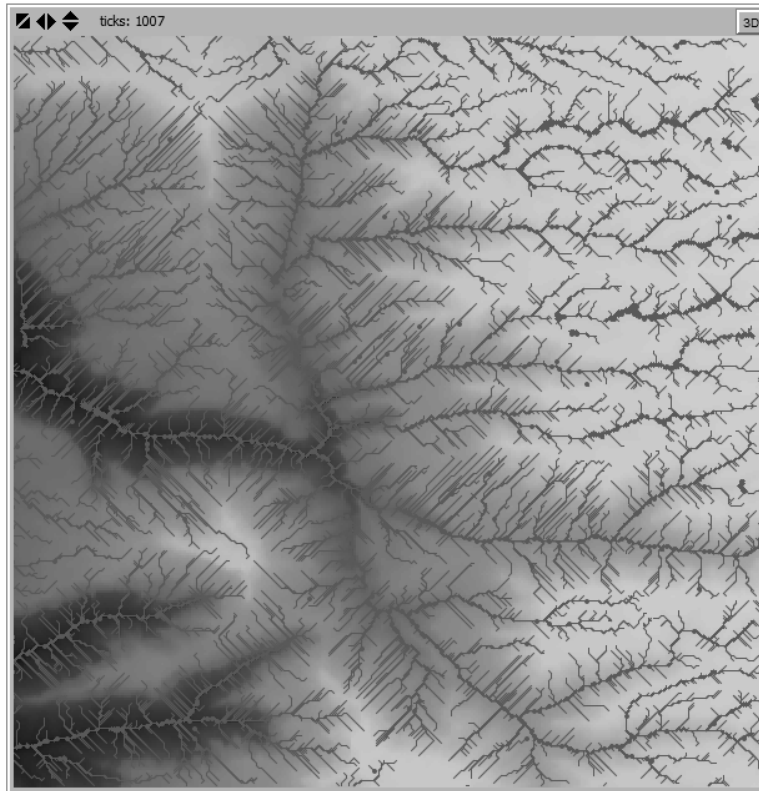
On draw?
Off

clear drawing

watch random raindrop

watch my raindrop

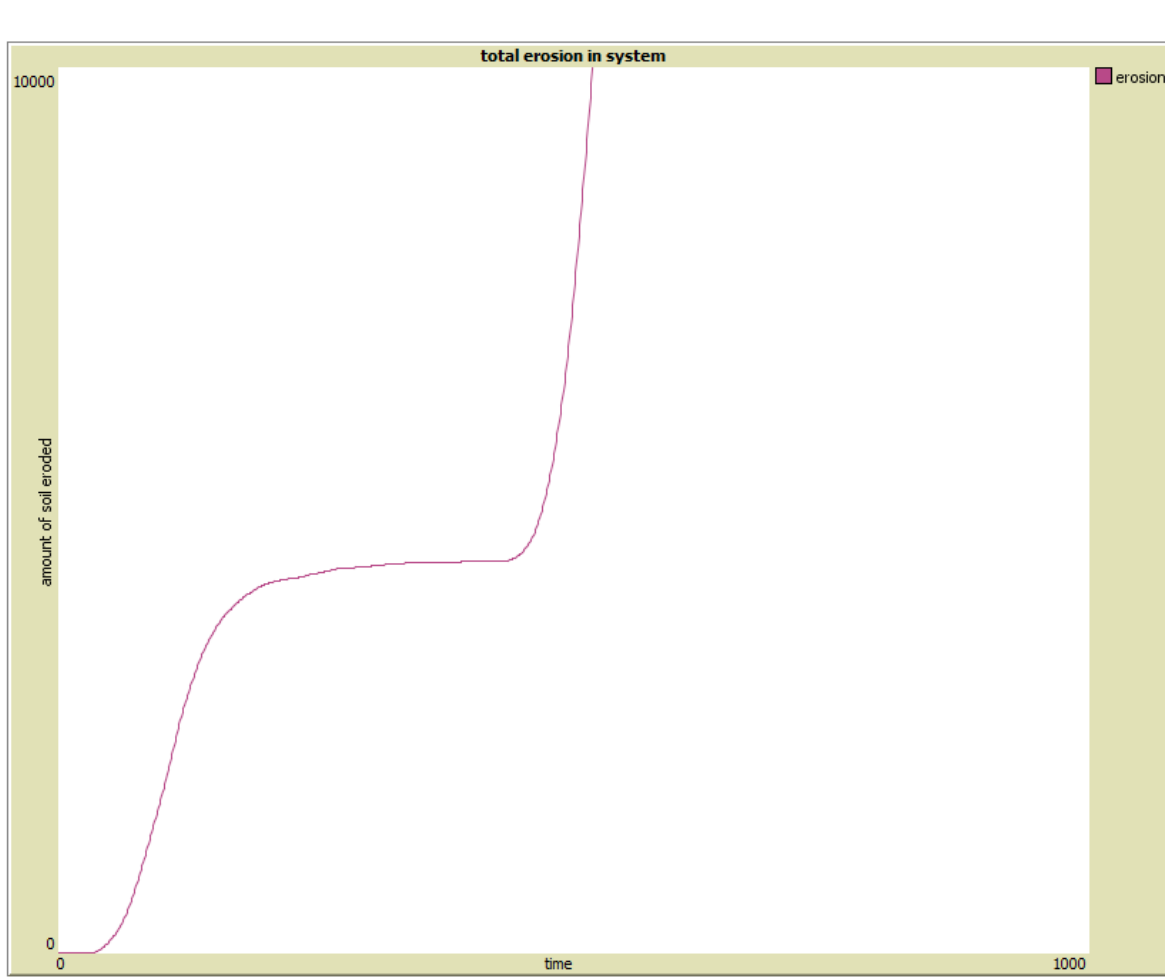
reset-perspective



Look at the screen shots of NetLogo to answer the questions below: (Lighter is higher elevation (aka mountains). The Darker the color, the lower the elevation (darkest gray are canyons). The gray dots are water.

3. What observations do you make about the effects of rain on the landscape?

- 4. What might happen to the first picture if we lower the rain-rate from 10 drops/per second to 3 drops/ per second?



Use the table above to answer the following question:

- 5. This graph was made during the Netlogo erosion model. What does the graph show about the rain rate? (Think about how the amount of rain affects the erosion)

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