

Just Passing Through

Key Topics: Human Impact, Stormwater, Runoff, Erosion, Rain, Drought Tolerance, Groundwater Recharge, Low Impact Development (LID), Native Habitat, Rain Garden

Grade Levels: K, 2-8

Inside and Outside

Lesson Overview:

In this lesson series, students learn about stormwater runoff and model solutions to retain moisture on-site modeling and discussing examples with their bodies in an interactive physical activity outside.

Activity:

Just Passing Through (50 minutes - 15 minutes for slide show + 35 minutes outside activity)

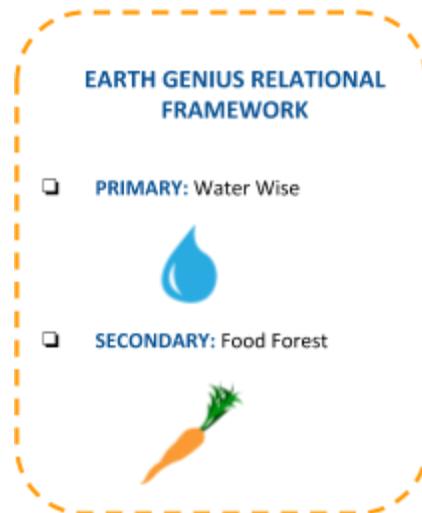
Suggested Activities and Learning Objectives by

Grade Level:

- K:
 - K-ESS3-3 How does water flow across the school campus?
- 2:
 - 2-ESS2-1 What are methods of preventing erosion?
 - 2-ESS2-2 How does water shape the land?
- 3:
 - 3-ESS3-1 How can we reduce erosion?
 - 3-LS4-4 What are ways that we can prevent erosion while increasing habitat?
- 4:
 - 4-ESS2-1 Find examples of how water has caused erosion on campus.
 - 4-ESS3-2 Compare different methods of preventing erosion.
- 5:
 - 5-ESS3-1 How can our campus protect the environment?
- MS:
 - MS-ESS2-2 Design a method to prevent erosion.
 - MS-ESS3-3 Compare different solutions to preventing erosion.

Essential Question(s) that Connect CCCs and SEPs:

- How does this landscape currently work? Is there a problem present? How can I design a system to solve this problem? ([Systems](#); [Asking Questions & Defining Problems](#))
- What is causing the problem? What is the desired effect? What is the evidence that the cause leads to the effect? ([Cause & Effect](#); [Engage in Argument from Evidence](#))
- How can we model how the structure created with the landscape works? ([Structure & Function](#); [Developing & Using Models](#))



- What is the system I am observing or designing? How can I explain why this system changes or remains stable? Have we made the system more stable? Does the system respond to change the way we want it to? ([Stability & Change](#); [Construct Explanations & Design Solutions](#))
- How can I use the patterns learned (ex erosion, flooding, percolation, drought, impermeable surfaces) to tell me if the solution (ex. water wise, capturing stormwater, healthy plants, no erosion or puddling) works? ([Patterns](#); [Construct Explanations & Design Solutions](#))

Materials:

- [Slideshow](#) (with photos compiled from Part 1)
- [Handout](#)
- Yarn
- Poker Chips

EG Team Support Needed:

Prep:

This lesson is to be conducted primarily outside! The slideshow is to review the Rainy Day Hike. You can start inside and then prepare students for the bulk of the lesson outside.

- Walk the campus before touring and starting this lesson so you as an instructor can predetermine what area you will set up the activity for taking students, a hilly part is best
- Take pictures of the areas during rain and during lesson choose who will take photos so it does not become a last minute distraction
- Upload photos from Rainy Day Hike if you have started with this one and customize the PowerPoint to show real images from their campus
- Discuss with teacher what materials they have versus what you need to bring for Part 3
- Review Low Impact Development and use this local resource as a guide for your own professional development: <https://www.centralcoastlidi.org/> and Ocean Friendly Gardens too at: <https://slo.surfrider.org/programs/clean-water/ocean-friendly-gardens/>
- Pre-extension (20 minute video) that may be appropriate for your teachers to share BEFORE you start your lesson: [Cycles of Insanity Video](#)
 - Highly encouraged because the concept of an aquifer is complicated if it is the first time students are hearing about it.
- Play some songs for students while they work inside on design...
 - [Banana Slug String Band's Albums and Select one on Water](#)
 - Not recommended as background music... but for a treat after lessons or as a before bell rings to watch later.... [Mr. Eco](#) gets kids excited! [Save Some for the Fishes](#), [Plastic Surgery](#),

Activity Procedure:

Engage:

Preface lesson by explaining that we're going to take a digital tour of the rainy day hike from last lesson and you want them to think about which 'Slow, Spread, Sink' strategy would be a good solution to each challenge area.

- Review the different 'Slow, Spread, Sink' strategies from previous lesson
 1. Slow - *Rainwater catchment, Plants + interception*
 2. Spread - *Earthworks or swales ('trenches' and 'mounds,' colloquially to students)*

3. Sink - *Permeable pavers, Plant roots*

- Go through photo slideshow of challenge areas from previous lesson. Ask students to point in the direction the water flows (or pools), and have the class call out 'Slow, Spread, Sink' strategy would be appropriate for each picture.

Explore:

Tell students "we are going outside and pretending to be raindrops today". Essentially, the class will simulate the route stormwater takes in a few of the challenge areas on the landscapes. Head outside and go to the challenge areas with the greatest slopes or evidence of erosion/flooding.



Comprehension Check

- Have a student lay out a piece of yarn along the route stormwater takes (as observed in Part 1), and create circles in flat areas, simulating puddles.
- Tell students they're going to act out raindrops. When you say 'thunderstorm' have students move straight downhill from the upper end of the yarn to the lower end and huddle together in the puddle circle. Time them coming down the hill.

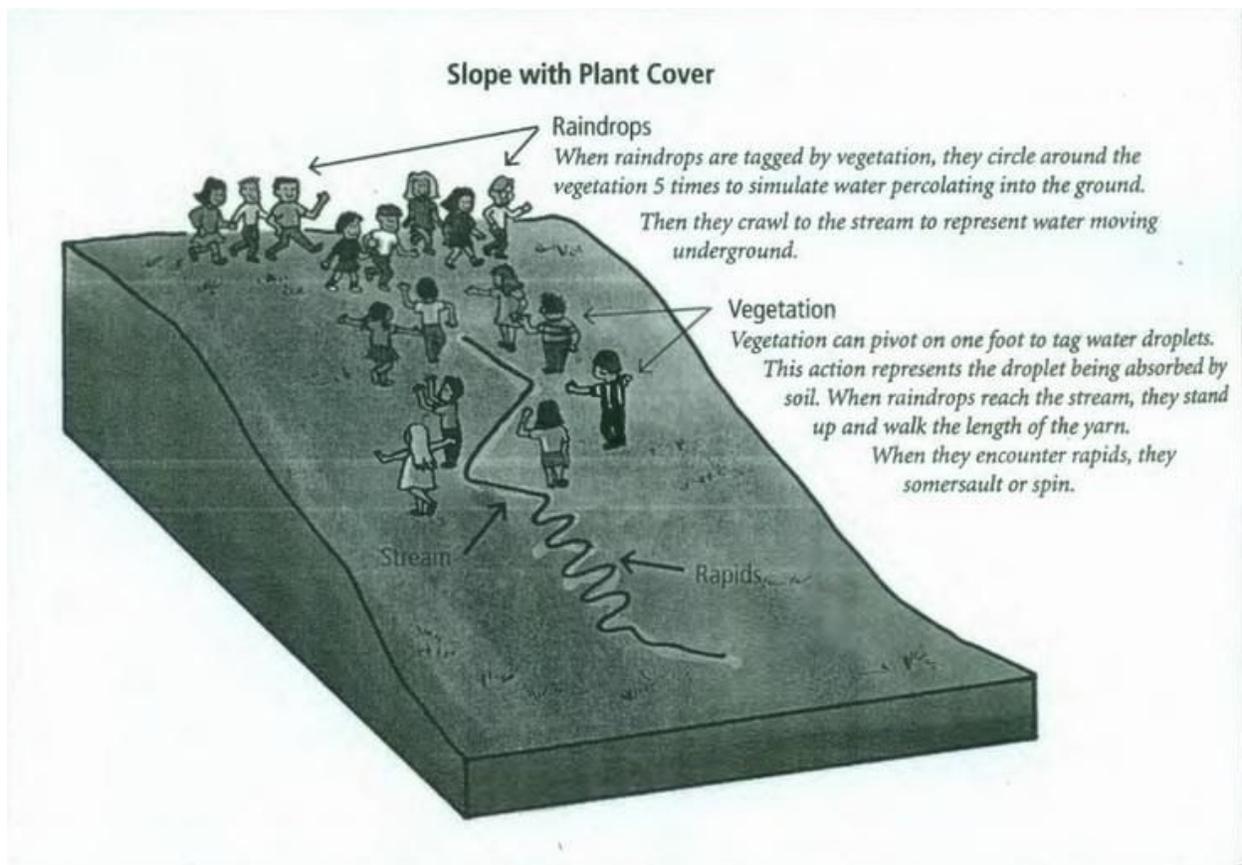


Figure 1. Activity with students

Explain:

- Split the class in half. Half the class will remain raindrops; the other half will be Slow, Spread, Sink, (SSS) strategies. Explain to them that the students who are SSS strategies can reroute the stormwaters path (yarn) in a variety of ways:
 1. **Five SSS can make** a circle by joining hands to simulate a **rainwater catchment** tank. When the rain starts falling, it can capture five of the raindrop students within the circle they've formed. Ask students where this SSS strategy would be appropriate (hint: challenge areas with gutter spouts).
 2. **Two SSS** can lie side by side to simulate a **trench and mound**. When the rain starts falling, any raindrop that is intercepted by the trench and mound has to change direction and continue moving downhill along the route of the trench and mound.
 3. **One SSS** can be a **plant**. When the rain starts falling, the students that have elected to be plants can tag anyone raindrop. When a raindrop is tagged, it sinks down and holds on to the plant's legs (roots).

Elaborate:

- Allow SSS students to arrange themselves along the route. During this time, remind raindrop students that the point of this exercise isn't to avoid being intercepted or tagged, it's an adventure to see what happens to each raindrop.
- Start another thunderstorm and time/count how long it takes/how many raindrops make it to bottom compared to the first storm.
- [OPTIONAL]: depending on the classes behavior and ability to follow directions, spread poker chips throughout challenge areas. Tell students the poker chips are meant to represent dirt/sediment that *erodes* away during the thunderstorm. Instruct raindrops to pick up poker chips as they move downhill. However, if they are intercepted by SSS, they must drop the poker chips they've picked up.-
- Go to the second (or third) challenge area and have the raindrops/SSS students change roles.

Evaluation:

Do a group share out of each group's design. Ask them to include the following in their presentations.

Write on your graphic organizer:

What role did you play in the human model? How did your role affect the other parts?

Also, refer back to the Learning Objectives for your grade level and ensure that they have been met by asking the given learning objective question.

Extension Activities:

After you have completed all 3 lessons for Slow It, Spread It, Sink It Phenomenal Series, you can do the following:

Part 4: Design Challenge Continued (two 45 minute sessions)

- Reserve Chromebooks or time in the computer lab for at least one of the sessions

Part 5: Design Construction (timing can vary)

- Recommend outsourcing difficult logistics (drainage, irrigation, rainwater catchment) to Facilities & Maintenance and leaving menial tasks (digging, moving soil, etc.) and meaningful experiences (planting, mulching, etc.) for students to accomplish.
- Varying infrastructure items and equipment needed to prep/amend the site

- Examples: Signage, Native and Water Wise Plants, Rain Tank, DG, etc

Tips and Caveats:

- Track the weather patterns closely during rain season and come up with a back date in case you get no rain and are too early to schedule. You may also get a day after a hard rain to see the same effects.
- Be prepared and make sure your teacher and students are prepared. You may purchase or use rain ponchos for them. You may also decide to send home a letter with the teachers help and guidance if you should do so to inform them of our outing. Bringing rainy day clothes, umbrellas, and boots is a good idea.
- Guest speakers are a great extension to prepare students for their design challenge and/or people to watch and give feedback during the design challenge share outs. Example of them include: facilities and maintenance leads, landscape architect students, licensed green architects, etc. One Cool Earth is a member of the Central Coast Green Building Council and their Green Schools Committee. This is a great resource. Also, the Cal Poly City & Regional Planning and Architect Departments.
- You may get support from Ocean Friendly Gardens program as well. Greener Environments is a business that supports our work and has helped install rain gardens pro-bono. Ocean View Elementary is one of them.
- Be patient and realize that even if there is no infrastructure change that gets made because of your butterfly/rain/LID garden.... It is a success that students are advocating and learning about them. It sends a message to the district and community that students are critically thinking and yearning to take ownership with project and place based learning.

Cited Curriculum:

- Project WET: [Just Passing Through](#)