

Rainy Day Hike

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, identify challenge areas on the school site, and begin to discuss design solutions. How does water flow? Where does water go? Can we be mindful of how and where we use water given to us by rain and potable water as well?

Activities:

Rainy Day Hike (50 minutes total: 20 minutes inside + 30 minutes outside)



Suggested Activities and Learning Objectives by

Grade Level:

- K:
 - K-ESS3-3 How can people help support the environment?
- 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-ESS2-4 How does water cycle through the Earth’s systems?
 - 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](#) uses the same slides for LID Design Challenge lesson
- [Handout](#)
- Clipboards
- Writing utensil
- Buckets (to collect water and see how much falls in a time period or to simulate rain on different permeable and impermeable surfaces)
- Ponchos for students that don't have rain coats
- Camera to take photos

EG Team Support Needed:

- Custodial/maintenance communications: If there is big construction going to be happening or LID projects to tie into the tour of the campus (for example, noting the permeability of water in the paver areas, any large leaky pipe areas, etc) Know your campus and ask them what they think!

Prep:

This lesson takes place mostly outside! We recommend introducing students to what they will be doing inside first, and then moving on to your tour outside together for the bulk of the lesson. They aren't just walking around as usual... It's about putting on their detective goggles and understanding the world as if they were a raindrop, regardless if it's raining! (Although, right after a rain with puddles existing still or during the rain is best for this one!)

- Walk the campus before touring and starting this lesson so you as an instructor can predetermine what route you will take for the Rainy Day Hike
- 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 for Part 2 and customize the PowerPoint
- 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:

Comment on the fact it rained recently/has been raining today and ask students to show if they still think we're in a drought by giving thumbs up or thumbs down.

- Draw wet/dry spectrum on the whiteboard as it appears on the handout. May be more helpful for students if you have an overhead camera where you can write directly on a copy of the handout and project it up front or on a Smart Board (so students can see where to put answers)

Explore:

Ask students how we can make better use of the stormwater we receive.

- They'll usually offer ways to conserve water, but suggest to them we could enable more stormwater to be captured.



Comprehension Check

- Because after all, what does the sun do to water puddled up on concrete? *It evaporates away.* And what happens to water that goes down the storm drain? *It makes its way to the ocean.* And what does it carry with it? *Pollution.*
- *Why do we want to soak up water? Do you think creeks flow in areas where you can't see water where creeks usually flow? Answer: Yes. It's called groundwater. We need stormwater, or rainwater, to soak into the ground to recharge, or collect and store it for future use. Once we turn it into saltwater... or flush it down the storm drains to the ocean, it's hard to get it back and make use for freshwater quickly. (Some may challenge you and talk about desalinization. That is one strategy... but very expensive and uses lots of energy to filter back wasted water we dump into the ocean)*

Explain:

The handout is the same as what's drawn on the board and that they should follow along by taking notes on their handout.

- Have students name vocabulary associated with when there's too much rain and not enough rain, as well as [negative] impacts-- both for humans and wildlife-- that arise as a result of those conditions (see Appendix for vocabulary and impacts worth mentioning)
- Define the remaining terms on the handout. Tell students they'll be using this terminology over the next several lessons.

Extend:

Tell students they're going to be on the lookout for evidence and examples of areas with too much water and that when they point them out you to quiet down to listen to their classmates share their ideas. Go over general rules and etiquette before heading outside.



**Comprehension
Check**

- Stop and get the class’ attention whenever a student makes a relevant observation. Take a photo of their observation to later use in their designs/presentations. Prompt students if they’re missing challenge areas; look out for puddling, muddy patches, signs of erosion, and gushing gutters. Are there areas with not enough water? Could we channel it? How? Where? Have them think-pair-share next to challenge area or make observation and ask questions.

Evaluation:

After several challenge areas have been pointed out, return to the classroom. Have students work in think-pair-share to recite ‘Slow, Sink, Spread’ solutions to challenge areas they observed.

Write on your graphic organizer:

Regarding stormwater, _____ caused _____. My evidence is _____.

End the class by telling students to hold on to the handout for today’s lesson.

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:

- You may decide to place a bucket or bin of sorts outside your classroom to see how much you can collect on a rainy day - you may be surprised how much can collect! It might end up becoming a weather station or grey water collection system project.
- You can discuss the water cycle and observe components of it (ex. Evaporation, condensation) as a cross cutting concept of pattern recognition.

Design Challenge Continued (two 45 minute sessions)

- Reserve Chromebooks or time in the computer lab for at least one of the sessions
- Encourage students to monitor sun, shade, microclimates, make recommendations for where impermeable surfaces and permeable surfaces would be suitable (they both have their place)

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
- Coordination with principal and facilities will need to happen before any site work can be done
- Students love to prep and ask for donations- it is a part of them learning writing and speaking skills and they gain confidence to advocate and budget time, money, etc. Consider being a mentor for a small group of youth committed to an ecodesign project and make it a year long goal or two to take on a project (you can create a fun name too- like “EcoSquad 2018”).

Tips and Caveats:

Adaptations for K-1 & MS

A lot of the extensions for this can delve into design and construction and have a lot of vocational opportunities for youth to work on or with community partners (upper grades)

Younger people (lower grades) would enjoy monitoring and just getting outside in the rain, right? It's important to regulate their excitement if it is to be educational at all and yet not stifle their love for the outdoors and curiosity.

Invite students to become quiet and close their eyes when it begins to rain and crack open a window or door to hear the rain falling. Have them see if they can be silent for 2 minutes to get them oriented to the rain and calm their bodies in order to get into an observant detective's mindset when they go outside.

- Rain may not be possible and it is hard to plan for in a drought stricken climate. It's important to track water if it does fall or has just fallen. If not, pretend you were a raindrop and maybe bring water in buckets to have student's experiment how/where water flows on different surfaces.
- 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: [Rainy Day Hike](#)