2-ESS2-1. Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.			
PE Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.*[Clarification Statement: Examples of solutions could include different designs of dikes and windbreaks to hold back wind and water, and different designs for using shrubs, grass, and trees to hold back the land.]	DCI • Wind and water can change the shape of the land. • Because there is always more than one possible solution to a problem, it is useful to compare and test designs. (secondary)	CCC • Stability and Change – Things may change slowly or rapidly. Developing and using technology has impacts on the natural world. Scientists study the natural and material world.	Practices Constructing Explanations and Designing Solutions – *Constructing explanations and designing solutions in K-2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.* Compare multiple solutions to a problem.
Activity Whole Class: Watch a short video showing problems caused by erosion. Show students the shoebox-sized sandboxes they will be working with and ask them how we can measure the amount of soil that runs off.	Question How can we measure soil run-off?	Objectives / *Next Steps* • There are several methods which we could use to measure soil run-off, including two based on volume. *Now that we can measure run-off, what types of natural and artificial structures can we use to reduce erosion?*	Notes The two methods include the volume of sand accumulating in the run-off cup and the ratio of sand to water in the run-off cup. Ultimately, it may be easiest to use relative measurements where experiments are rated “more sand,” “less sand,” or “the same amount.”
Whole Class: Have students brainstorm ways that run-off / erosion can be controlled. Likely candidates include embankments, growing plants (such as grass and deeper-rooted plants), piping / irrigation systems, and various methods of transforming the landscape.	What methods can we use to ensure soil stays in place rather than being carried away by water?	• There are many methods of maintaining the soil. *Which erosion prevention method works best?*	Embankments and other structures can be built using Popsicle/craft sticks. Grass can be simulated using green scouring pads, since grass has a very shallow root system. Deeper-rooted plants can be simulated using pads from a hair brush. Piping and irrigation systems can be simulated using straws, including some that have been punctured.
Whole Class: Discuss the importance of changing only one variable while controlling the rest.	How would scientists approach this experiment?	• Experiments must be carefully controlled in order to ensure accurate results.	Encourage multiple trials. If possible, assign two or more teams to investigate each method.

Small Groups: Conduct an experiment to determine how effective your method(s) are.	Which erosion prevention method works best?	• Experiments must be carefully controlled in order to ensure accurate results.	Variables to control include how water is applied (from what height and at what relative flow rate). Outcomes to measure include how the terrain is affected and how much sand erodes.
Whole Class: Compare and discuss which methods best prevented erosion. (Optional) Discuss which methods might have reduced weathering as well as erosion.	Which erosion prevention method works best? [Continued]	• In order to keep soil in place, we need to slow water down and prevent the water from directly making contact with soil. Embankments and plants can be effective, but they must be installed with the goal of slowing water and preventing its contact with sand. • (Optional) Any method covering the ground (such as grasses and deep-rooted plants) reduce the gravitational force of water and therefore reduce the breakdown of soil and rock.	