Lesson: “How can you stop a landslide?”

VIDEO TRANSCRIPT

EXPLORATION VIDEO 1

Hi, it's Doug! One summer, not long ago, something strange happened at this place. The place is called Big Sur. It's in the US state of California. It's actually not far from where I live. That's the Pacific Ocean right there and notice the road. Lots of people like to drive to Big Sur because this road runs right along the sides of these hills, so you get these beautiful views overlooking the Pacific Ocean. Now, here's a view looking down at the road from a helicopter. On any normal day, you could see the road there. But imagine one day, you looked down and saw this. Whoa, what happened to the road? Again, here's the road before, and here's the road after. Part of the road just disappears. Can you guess what happened? What is this called?

EXPLORATION VIDEO 2

What happened was a landslide. A landslide is just what it sounds like. Part of the land, in this case, these tall cliffs, started sliding downwards. The land completely covered this part of the road when it did that. Some of the cliffs even slid all the way down to the ocean. Here's a photo that was taken from the side of the road that was left after the landslide happened. You can see just how much land is covering the road. It's buried in about 40 feet of rocks and soil. This was a really big landslide. Some scientists think that this landslide might be one of the biggest

landslides in the history of California. Luckily, no one was hurt. But landslides can be dangerous. Here's another example of a landslide that was actually caught on film as it happened. Again, you're seeing the view from a road on the side of a mountain. And whoa, you see that? An entire forest slides by. If there had been houses there, it would have knocked them over. Let's see it one more time. Here it goes. And all that land goes sliding right down the mountain. I would be terrified if something like this happened while I was on the side of a mountain. Why do landslides happen at all? What do you think?

EXPLORATION VIDEO 3

Last time, you discovered how water can change the shape of the land. Water is the key to understanding landslides. You've seen that water is powerful. It can pick up pieces of land and carry them downstream, creating things like canyons, fans, and landslides. These are all examples of erosion, something changing the shape of the land. Erosion gets especially bad in steep places like mountains, hills, and cliffs. When a steep area gets slick and wet, the soil can just start sliding downhill. So it's not surprising that the landslide in Big Sur happened on a steep hillside. But there's another clue. Not long before the landslide in Big Sur happened, there had been wildfires in that area. Scientists have noticed that landslides and erosion in general always seems to get worse after there's been a wildfire. Why might that be? Well, take a look at this hillside before a wildfire came through there. It's green. It's filled with plants. There are trees, bushes, grasses. But after a wildfire, now look at it. All the plants got burned up. All that's left is ash. Why do you think landslides happen more often after there's been a wildfire?

EXPLORATION VIDEO 4

Why would landslides happen more often after there's been a wildfire? Well, it turns out, plants are really important for stopping erosion caused by rain. For one, the leaves on the trees catch the raindrops, so that when the rain drips off the leaves, it hits the ground more softly than if there were no trees there. That means less land gets picked up and moved by the rain. That's less erosion. But even just the small plants and dead leaves on the ground help because they soak up some of the rainwater. That means less water that washes downhill. Plus, underneath the ground, all of these plants have roots that grow into the soil. That actually helps keep the soil in place. You can see in this close-up picture of plants' roots that there are so many different roots going in every direction. It looks like a tangled mess, but that tangle of roots holds on tight both to each other and to the soil, which keeps the soil from eroding or washing away. So now you can imagine why wildfires make landslides worse. Wildfires burn up all the plants in an area and leave behind only ashes. When there are no plants, erosion happens much more quickly. There are no trees or bushes to protect the hill with their leaves, so raindrops hit the ground much harder. There are no small plants or grass to soak the rainwater up, so water starts rushing down the hill. And there are no roots to hold the soil in place any longer. So after a heavy rain, water loosens up the soil and easily washes the land away. It's a landslide! Landslides are a problem, especially for people who live in steep areas. We don't want landslides to wash people's houses away. And we don't want rocks and soil to slide down onto roads where people are driving. So what can we do? How can we stop landslides from happening? One thing we definitely could do is help plants to grow back after a wildfire, but that will take a long time because plants grow pretty slowly. Is there something we could do right

now to stop erosion? Is there anything that would work like plants do to protect hills from getting washed away? What do you think?

ACTIVITY INTRODUCTION VIDEO

In today's activity, you're going to design a way to stop erosion. You know from the last time, that if you make a cornmeal model of the land, you can cause erosion, like this little landslide. Today, you're going to create something similar again out of cornmeal, but this time, your goal is to see if you can figure out how to stop erosion from happening. First, each person will make a hill out of cornmeal. Then, you'll work with a partner to design a way to stop erosion on one of the hills you made. You'll test how well this first design works, and you'll use what you learned to improve the design on the second hill. I'll show you what you need to get started, step by step.

ACTIVITY STEP 1

If you're in a class, find a partner. If you're at home, you can work alone. When you're done with this step, click the arrow on the right.

ACTIVITY STEP 2

Cover your table with a tablecloth or a newspaper to protect it from spilled water.

ACTIVITY STEP 3

Get your supplies. You'll get more supplies later.

ACTIVITY STEP 4

Put your paper plate on your plastic plate. You'll build your land on top of both.

ACTIVITY STEP 5

Now it's time to build a cornmeal hill. Get your cornmeal. Each of you, scoop up one cup with land and press it down like this. The more you press it, the better it will keep its shape when you dump it out. Remember, even though you and your partner are each making a hill right now, both hills are going to be used by your team.

ACTIVITY STEP 6

Turn each cup over near the edge of the plate. Tap on the bottom and lift the cup up. Do it to both cups. And now, you have two little hills. If you don't like your first try, you can dump it back in the bowl and try again. But don't worry about making a perfect hill. Real hills have plenty of cracks and lumps and bumps.

ACTIVITY STEP 7

Now that you've each built a cornmeal hill. It's time to think about what you can do to prevent erosion from happening when it rains. Get these supplies. You'll get water later. Once you have your supplies, go to the next step.

ACTIVITY STEP 8

How could we stop erosion from happening? Well, first watch what a hill without erosion protection looks like in the rain. Then, discuss ideas with your partner to stop this from happening.

ACTIVITY STEP 9

Work together to try one of your ideas on one of your hills. Only spend about five minutes on this. Are you ready? I'll put a timer on the screen. Okay, five minutes have passed. It's almost time to test your solutions, go to the next slide.

ACTIVITY STEP 10

Do question number one. Draw how you protected your hill and write what you think will happen when it gets rained on.

ACTIVITY STEP 11

Get your supplies.

ACTIVITY STEP 12

Turn over the big cups and put the drip stick on them like this. Then push the land under the arrow on the drip cup so that when you add water, the water will fall on your land.

ACTIVITY STEP 13

All right, you're about to test your ideas. First, though, you'll need to decide which partner will make it rain for the first hill and who will make it rain for the second hill. Fill the drip cup and watch to see what the water does. Does it protect the hill from erosion? By the way, it's okay if all the water doesn't drip out of the cup. When everyone's water stops dripping, go to the next slide.

ACTIVITY STEP 14

How did your land do? Did it erode or did it stay together? Do question number two. Draw and write what happened to your hill after the rain.

ACTIVITY STEP 15

What do you want to do differently for your second hill? Answer question number three before you test, and question number four after you test.

ACTIVITY STEP 16

Discuss these questions. Afterward, be sure to watch the final video.

WRAP-UP VIDEO

How successful were you at stopping landslides on your cornmeal hill? Here's one idea we came up with. We stretched out cotton balls and wrapped them around the hill at different levels. Let's see what happens. Now compare it to what it looked like with no protection. So you can

see the cotton balls really help stop erosion. Here's another idea we came up with. Cover the hillside with paper towel, like a blanket. We also tried putting aluminum foil above the hill, which wasn't quite as good as cotton balls or paper towels, but it still helped. Maybe you had an idea that was completely different from what we did. That's great. There's almost always more than one way to solve a problem. In real life, people have invented many different solutions to stop erosion from happening, like this. Here, people have put plastic blankets over a steep hillside. The idea is to keep the soil in its place, to stop it from sliding down the hill when it rains. Another solution is to cover a hill in concrete like you see here on this highway bridge. This holds the soil in place, and it stops rain from getting in in the first place. But it's often not possible to cover an entire hillside with concrete. It can be expensive, and if the cliff is very steep, it's dangerous for workers to work on it. Besides, sometimes people don't want to look at a hill covered in concrete. Check out this hill. Now, you can't tell there's anything on it, but if you looked closely, you'd see a net. Workers have hammered the ends of the net into the hill. The net keeps soil from washing away until plants can begin to grow and hold the soil in place. Here's another common solution. They're called wattles. These are like long socks filled with straw. They act like little walls. When the soil begins to wash down the hill, it stops at the wattle. By putting down many layers of wattles, we can prevent erosion. People often use wattles, concrete, or nets in combination with planting seeds so that plants grow. People have invented lots of different solutions to the problem of erosion. Next time you're in a car, look out the window and see if you can spot any erosion-stopping solutions along the side of the road. You don't have to live where there are steep cliffs. Any small hill can have erosion. Have fun and stay curious!