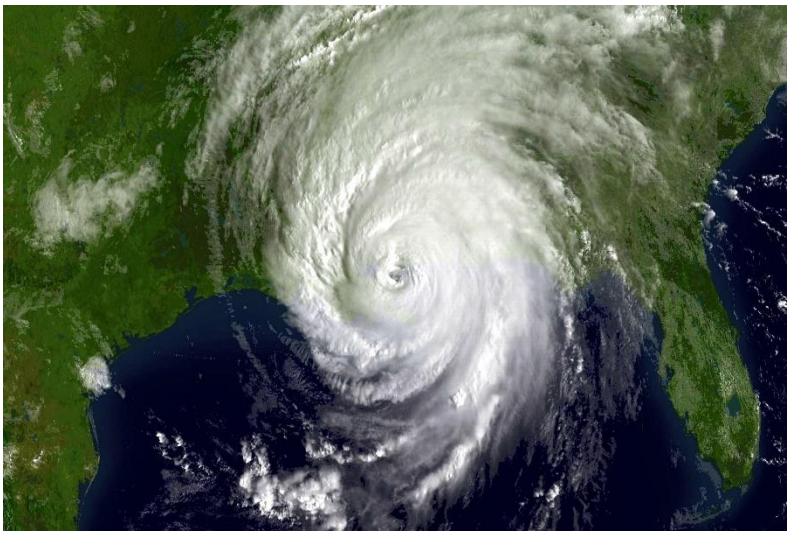

BUILDING LEVEES THAT LAST

Hurricane Katrina was one of the most destructive and expensive natural disasters in US history. It was also labelled an 'unnatural disaster' because the failure of countless levees caused massive flooding and led to the displacement of thousands of Louisiana residents.

A Category 5 hurricane, Katrina made landfall on August 25, 2005. Within a week it had claimed the lives of nearly 1,000 people and inundated 80% of New Orleans.

The majority of the flooding was caused by failed levees. Levees are essentially barriers that contain, control, or divert the flow of water in a waterway, protecting neighboring lands.

Levees are not a new concept. New Orleans has used them to protect the city from floods since the 17th century.

It wasn't until the 1960s, after major Hurricane Betsy flooded almost all of the city, that the U.S. Army Corps of Engineers began building new modern day levees which were supposed to prevent damage from future hurricanes.

But these levees failed. To be precise, 50 of them were shattered under the wrath of Katrina. But why would a method of protection that they had been using for centuries fail?

Let's explore the science behind them and see if we can find out.

Artificial levees require thoughtful engineering. They are usually built by piling and compacting earth on a cleared and level surface. They are broad at the base and taper to a level top and often times their they planted creeping vegetation, like Bermuda grass, to help bind the soil together

The materials used to construct a levee matter. The side facing the water has to be particularly resistant to erosion. The properties of the soil used in construction is critical to it function and can literally make or break it. This experiment is about testing which soils are best at preventing water from coming through on the other side.

WHAT YOU'LL NEED:

Three soil samples: sand, potting soil, and clay
Water
½ measuring cup
Funnel
Filter paper
Tablespoon
Small sponges
Paper
Pencil

WHAT TO DO:

Let's see if we can determine which type of soil has the greatest capacity to keep its structure against water.

Measure out ½ cup of the first soil sample.

Place a piece of filter paper in the funnel and add the first soil on top;

Begin pouring water in, one tablespoon at a time. Keep going until there is leakage and record how many tablespoons it took to reach that point.

Repeat the process with the other two soil samples.

Once you've finished that, repeat the entire test, but this time start with saturated soil samples. Levees have to be able to withstand periods prolonged rainfall and seasonal flooding while still holding the water in check.

Measure out ½ cup of each soil sample and then add enough water to each one until the soil is uniformly wet.

Repeat the funnel tests, adding water one tablespoon at a time until the soil begins to let water through. Record your results.

Repeat with the other two samples.

Compare the results of both tests. Which soils held the most water? Did their retention change when the soils were already wet?

How could research such as this help engineers create more sustainable levees?

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