



7<sup>TH</sup> GRADE  
STEAM & SOCIAL STUDIES





# S U S T A I N A B L Y S O U N D

## Driving Question:

How can we build houses to make them both eco-friendly and tornado safe?

## Materials Needed:

Science journal, sketchbook, graph paper, writing utensil, away to simulate natural disasters, prototype building materials such as baling wire, glue, balsa wood or plaster

## In this lesson, students will:

- identify the damage caused by catastrophic events and design structures to better withstand the increase in natural disasters.

## TEKS:

Science: 7.8(A)  
Social Studies: 7.23(A)(B)  
Art MS 1: 1(A)(B)(C); 2(A)(B); 3(A)(B); 4(A)



## SPINNING THE COCOON

Ask students if they have ever been in a natural disaster or seen one in the news. Examples of recent catastrophic events include Hurricane Harvey along the Texas Gulf Coast or the tornadoes that struck Rockwall, TX. Write the list of natural disasters on the board and begin to discuss the effects they have. For each disaster type, ask students what effects it had on abiotic and biotic factors such as the water quality, air quality, biodiversity and food availability. To see to what extent these events affect an ecosystem, look at images or videos such as these satellite [images](#) and discuss what the students see.

Next, watch a video about the rebirth of an ecosystem after a disaster such as this [one](#) about Mount Saint Helens. After the video, talk with students about how nature has a way of repairing itself, even slowly, and list the steps it takes such as formation of soil, initial producers coming in, followed by primary consumers who eat those producers, and so on.

Talk about how natural disasters are a part of living on this planet, and may even be increasing in frequency. Even though nature has a way of repairing itself, ask students what happens to displaced organisms and what can we do to help organisms such as humans withstand disasters? Is it possible to create homes and business that can withstand things like tornadoes and floods while also making them greener?

Examine building techniques such as partially submerged ferrocement houses and discuss how they save energy, while also acting as a storm shelter from natural disasters such as

tornadoes. What other designs could help with other catastrophic events such as flooding, while incorporating green components? Have the class watch this short [video](#) on creating a green storm-shelter at a school.

### KERNEL OF KNOWLEDGE

The Texas Health and Human Services Commission has spent more than \$1.1 billion on Hurricane Harvey relief, most of which came from the United States Department of Agriculture's (USDA) food assistance program, according to state budget officials.



# METAMORPHOSIS

Student groups will choose a natural disaster that would affect their area such as a hurricane or tornado. With the effects of their chosen event in mind, students will begin to design and then prototype a building or structure meant to withstand the major elements of the disaster. Students may choose to include features such as wind resistant architecture or water storage and elimination systems for their structure. While incorporating these disaster resistant features, students should also keep in mind green components such as the amount of energy saved by using ground temperature or rainwater reclamation tanks during non-disaster periods. For a cool way to test tornado resistance, watch this [video](#) on building a tornado simulator. Students will build and test their prototype until they are satisfied with their design, then present the design with its disaster-resistant and green features to the class.

## THROUGH THE LENS



Have students answer the question in Upcycle through a Flipgrid video. This can become more than one video, so the class can debate and come up with ideas to help aid the clean-up effort. As part of their research for the video, students could interview representatives of businesses to find out how they would help in a disaster and/or if they are developing products that would reduce waste. For example, Budweiser uses one of its facilities to can drinking water for emergency distribution, Tide employees operate portable laundromats in disaster recovery areas, and Tetra Pak has developed water containers that will reduce waste.

## UPCYCLE

Explain to students that after natural disasters, the Federal Emergency Management Agency (FEMA), a government agency, works with the Red Cross to assist with clean-up and rebuilding efforts, and works to build a more sustainable area in case of future disasters. Ask, “How can we come up with solutions to deal with the waste that either was created by Hurricane Harvey or brought in by it?” Have students brainstorm as a class possible solutions and encourage them to write their congressman or senator to share their ideas. This can be at the national or state level, depending on teacher discretion.



## eARTh

Global and cultural issues are two factors that heavily influence many artists and their work. Often, their pieces are used as a way to communicate about or bring awareness to issues facing society. Natural disasters are part of life on Earth, that doesn't, however, take away from the effects that these events have on both the land and the people that live there. These disasters can quickly turn into cultural and political issues that leave a lasting impact on society. There are many ways in which artists create works based on natural disasters, from finding the beauty in a storm to focusing on the pain and suffering caused. Richard Parrish is an artist from Montana who chooses to focus on the beauty that he sees from natural phenomenon. Share with your students this [link](#) and discuss the pieces that he has created to reflect various natural occurrences.

Parrish works in an abstract way to communicate what he sees in these disasters. Form a discussion around the way the artist uses color, line and shape to create his work rather than using traditional and representational images. Ask students, "What does it mean to create a piece of nonrepresentational art? How does this change the way that the viewer experiences the piece? Is it important to know what the work is based on when viewing it? Why or why not?"

Next, ask the students if they, or a family member, have ever been directly affected by a natural disaster. Have them write down some of the words that they think of regarding that experience. If they have not had such an experience, then give them an example and have them imagine how the people that lived in the area affected might have felt or feel.

The students should create nonrepresentational art based on the natural disaster about which they have been writing. Instruct them to think about questions such as, "What colors can best represent the feelings that I want to convey? What types of shape, line and value contrast would work to get my point across?" Be sure to review the principles of design – particularly balance and contrast. The medium is up to you. This could work as a 3D piece or a 2D artwork.

When the students have finished, they should present their work to the class. Instruct them to talk about the emotions that they were hoping to convey through the piece, and how they chose to represent those with color, line, texture, etc.

### Community Garden

- When disaster strikes, people are amazing about coming together to help their fellow man. When you are miles away from those in need, it can seem difficult to help, but there are many organizations that need assistance. With your students, research different organizations that respond to the needs of victims of natural disasters such as the Red Cross, Feeding America and the Salvation Army. Often, they collect care packages to send to victims. Choose an organization to contact, and ask how you and your students can contribute to helping the people in need.



## CAREER CONNECTION

**Architect** - Architects design, redesign and repair buildings and structures. Most architects use computer design software to come up with creative building concepts, as well as visualize renovations. They are responsible for ensuring not only a building's general appearance, but also its safety and longevity. Architects must complete a minimum of a bachelor's degree.

**Urban Planner** - Urban and regional planners develop land-use plans and programs that help create communities, accommodate population growth, and revitalize physical facilities in towns, cities, counties and metropolitan areas. Most urban planners hold a master's degree in one of the following fields: urban or regional planning, environmental planning, urban design or geography.



## CAREER HIGHLIGHT

Building green is nothing new for Ken Yeang, a Malaysian architect famous for integrating ecology into architecture. His sustainable creations and "subscrapers" have earned him great accolades including being named "One of the 50 People Who Could Save the Planet" by *The Guardian*.

