



Shift Our Sand: A Beach Erosion Challenge

Background:

After having reviewed information on past and present beach erosion along our Crystal Coast, you can see that our beaches face an ongoing threat. Human impact combined with global warming can speed up an otherwise natural process. Sand naturally shifts, but we need your help in slowing and redirecting our shifting sands.

Your group represents a team of engineers. Your team has been asked to design a way to slow erosion and provide shoreline protection during storms and hurricanes. Take in consideration all of the stakeholders your class has discussed!

Your team of engineers will be competing with other teams to present the best plan to slow local beach erosion. A Community Meeting will be held to present all the solutions. When you design your solutions, again keep in mind all of the beach stakeholders because representatives of each will be present at the meeting.

Challenge Question: How could you slow the erosion of our beaches caused by ocean waves and storms with a design that works for the majority of stakeholders?

Materials available for use in your design:

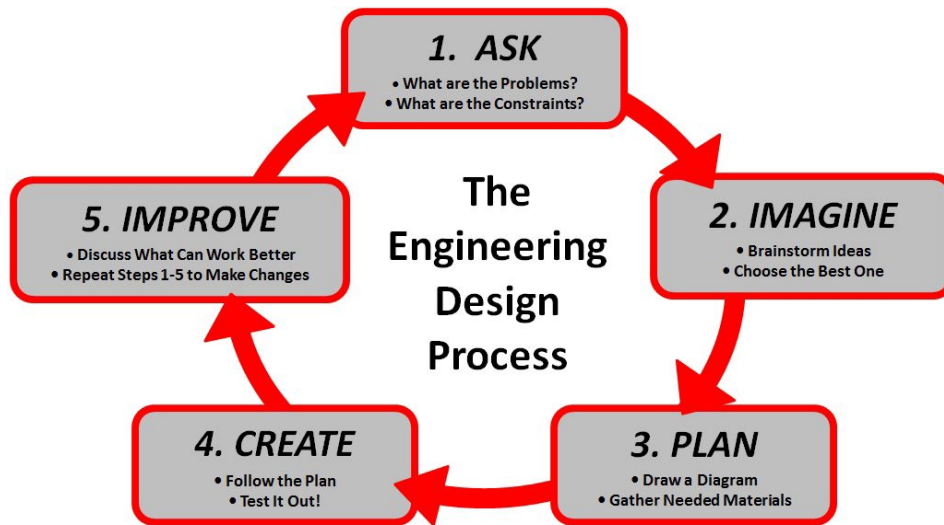
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| <ul style="list-style-type: none"> • Plastic tote • Sand • Water • Gravel • Oyster shells • Wall (ceramic tile) • Turtle eggs (white beads, tic-tacs) | <ul style="list-style-type: none"> • Plastic Egg cartons, other plastics • Houses (blocks, egg carton, etc.) • High-rise condos (Pringles can, aluminum can, etc.) • Sand bags (sock, permeable bags, etc.) • Fences/Trees (straws) • Beach umbrellas (drink umbrellas) |
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Activity Details: As a whole group, you will first observe a simulation of beach erosion in our aquarium to show the shifting of sand from gentle waves to hurricane waves. You will then work within your team of engineers to address the problem of slowing our beach erosion. As a team, use the engineering process on the next page to help devise your plan and model. When you have the details of your plan worked out, you can proceed to the "warehouse" to pick up your supplies and begin building your model.

Test Process: You will be setting up your test area using a plastic tote, sand, and water. Create your beach and shoreline with the sand and add water to create your tide zone. Add beachfront property and landscape to create your coastal community. Measure and record sand depth of specific landscape areas. You are now ready to carry out your design plan. Build your erosion-slowing model. Measure and record sand depth for 3 scenarios: gentle waves, tropical storm, hurricane.

Post-test Process: After testing your team's design process, ready for your presentation to The Community Meeting. On a large Post-It note, include the following information: team name, team members, challenge questions, stakeholders targeted, plan, materials, and outcome. Each group will present their design at the meeting, with a short question and answer period after each presentation. The class will be divided into groups of stakeholders to provide feedback and ask questions from different the different perspectives.

Engineering Design Cycle



Ask: What is your challenge? How will your design be tested?

Imagine: What ideas does your team have for reaching your goal?

Plan: Draw a diagram of your design below. Label the materials you will use.

Create: Carry out your plan and test your design. Take measurements in centimeters.

Landscape Type	Pre-test	Gentle waves	Tropical Storm	Hurricane

Improve: What was good about your design? What can you make better?