

WEEKS 13-16: THE BIOSPHERE

INTRODUCTION

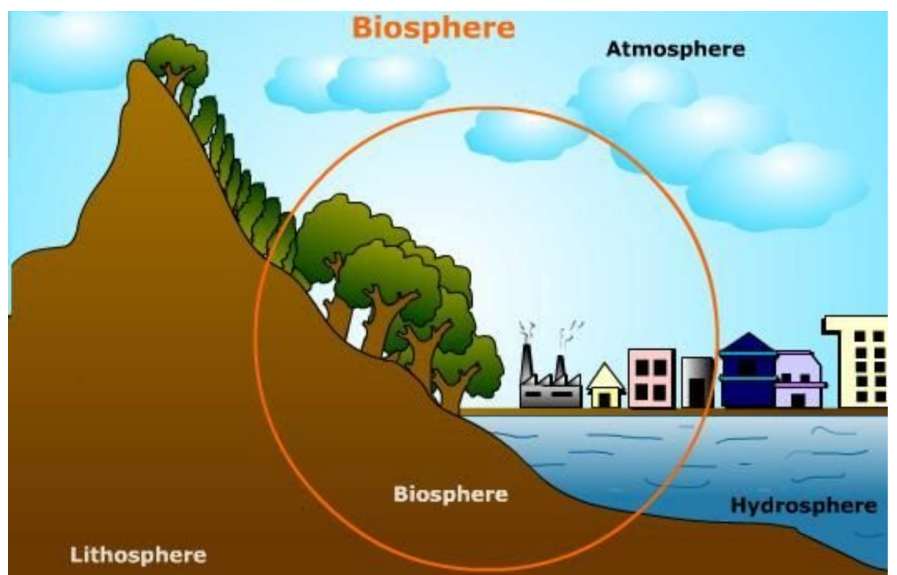
National City's 16 Weeks of STEAM is designed to offer families enrichment opportunities that focus on science, technology, engineering, art, and math with a special emphasis on conservation. As a city, we have partnered with organizations to provide a variety of resources, activities, and fun challenges that provide families with an awareness of our city's natural resources and ways to preserve them for future generations.

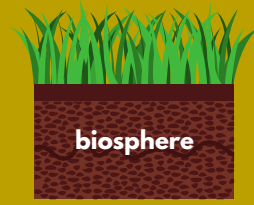
GRADE LEVELS

This program is designed for the whole family to get involved. We have made every effort to provide extensions and activities for children of all ages in grades K through 8th. Note that some children may need support to complete certain activities.

BIOSPHERE BASICS

The biosphere includes the regions of the surface of the Earth and includes the Atmosphere, Lithosphere (Land), and Hydrosphere occupied by living organisms. The Biosphere is also referred to as the Ecosphere.





San Diego's 10 Ecosystems

In San Diego County there are 10 major ecosystem types. In this unit, we are going to explore 3 and discuss how we can all help with protecting them.

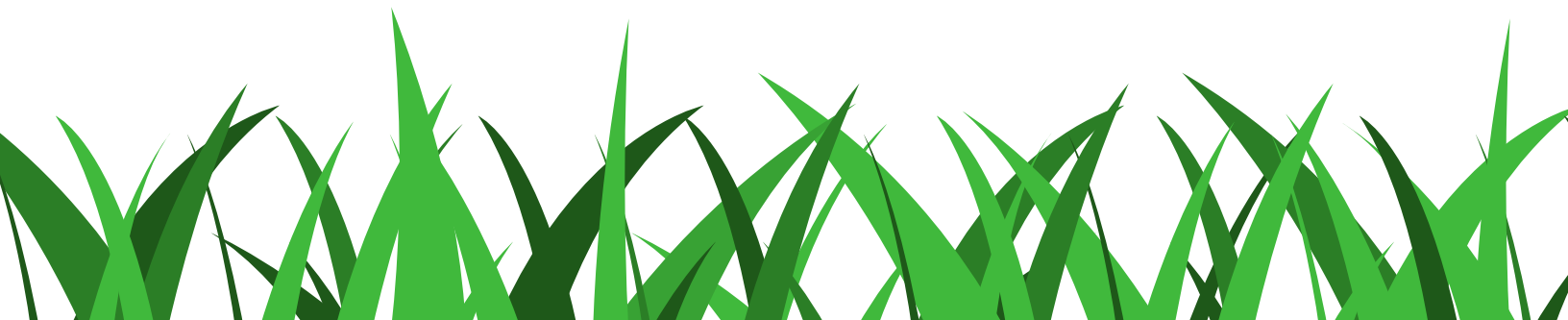
Our goal is to have your family have fun with experiments, crafts, music, and more while understanding how the Earth is a unique and special place.

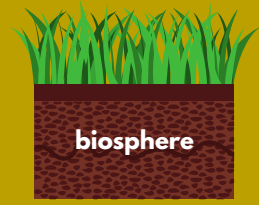
Learn more about San Diego's Habitats with this video [HERE](#). You might even want to arrange a visit to the Mission Trail Regional Park where you can see 5 habitats in one short walk!

	Area (mi ²)	% Protected
Chaparral	1498.3	58.9%
Urban	783.0	2.4%
Coastal Scrub	546.8	16.4%
Grassland/Meadow	413.4	8.9%
Oak/Hardwood Forest	243.6	6.1%
Agriculture	156.1	0.7%
Riparian Forest	71.2	2.0%
Coniferous Forest	47.6	2.4%
Wetland	37.6	1.9%
Barren	20.7	0.4%

VOCABULARY

- **Urban:** The characteristics of a town or city.
- **Urban Ecosystem:** The community of plants, animals, and humans that inhabit the urban environment. It is an area physically dominated by built structures like buildings, roads, sewers, and power lines.
- **Biosphere:** The regions of the surface, atmosphere, and hydrosphere of the Earth (or other planet) occupied by life.
- **Atmosphere:** The envelope of gasses surrounding the Earth (or other planets).

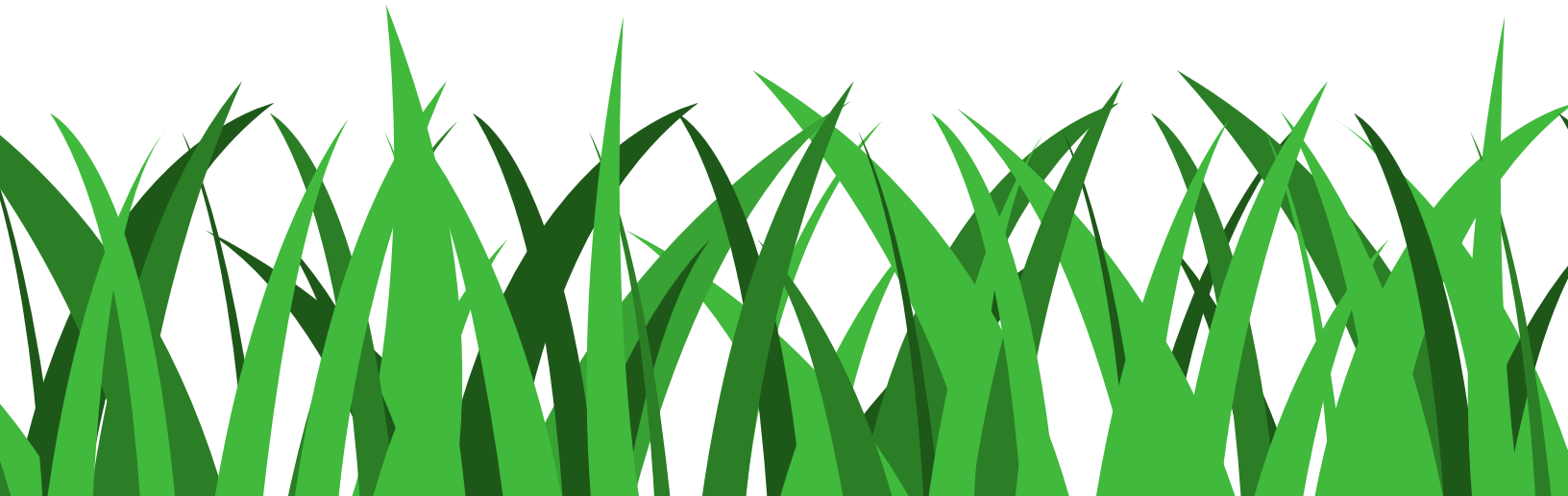




- **Lithosphere:** The rigid outer part of the Earth, consisting of the crust and upper mantle.
- **Hydrosphere:** All the waters on the Earth's surface.
- **Ecosystem:** A biological community of interacting organisms and their physical environment.
- **Organism:** An individual animal, plant, or single-celled life form.
- **Biome:** A large naturally occurring community of flora and fauna occupying a major habitat.
- **Preening:** To straighten or clean its feathers with its beak.
- **Adaptation:** A change or the process of change by which an organism or species becomes better suited to its environment.
- **Coastal Erosion:** the process of gradual destruction by wind, water, or other natural agents.
- **Conservation:** Prevention of wasteful use of a resource.
- **Environment:** The surroundings or conditions in which a plant, animal or human lives and operates in.

CONNECTIONS TO NGSS

- K: Earth Systems
- 1: Earth's Place in the Universe
- 2-5: Earth's Systems
- 6-8: Matter and Its Interactions; Earth's Systems





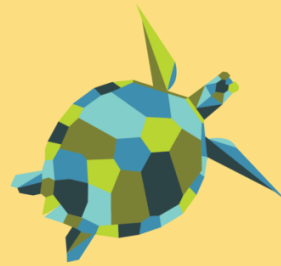
VISIT & INTERVIEW

Visit the *National City 16 Weeks of STEAM* website for related field trips and interviews with project partners.

DIGITAL RESOURCES

To access all the digital resources shared in the next four weeks, visit the *National City 16 Weeks of STEAM* website or scan this QR code.

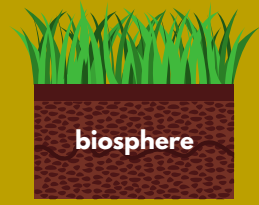
FEATURED PARTNERS



**OCEAN
CONNECTORS**

SAN DIEGO ZOO KIDS





WEEK 13 URBAN ECOSYSTEM

Introduction

An **urban ecosystem** is the community of plants, animals, and humans that live in an urban environment. The word “urban” refers to a town or city. You will notice that in an urban area, like National City, you will see many structures (buildings, houses, schools, stores), roads, and power lines. You will also notice parks, greenways, streams, and trees.

Many times we don’t notice all the plants and animals that also live in an urban area. Think about it for a moment. Name a couple of plants, insects, and animals that you have recently noticed.

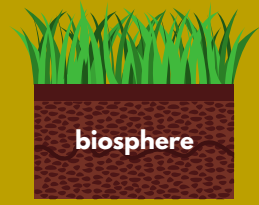
During this week, we are going to go on a treasure hunt to see what we can notice about our area.



WONDER

What plants, animals, and insects live in your nearby area? How do they survive?





HOME LEARNING ACTIVITY URBAN ECOSYSTEM SCAVENGER HUNT



Watch this video!

- Grades K-8: [San Diego Zoo Insect House](#)



Take these action steps to learn!

- Gather materials
- Determine the best location (parks and open spaces will likely provide more opportunity to find plants, animals, and insects)
- Determine if you would like to do the activity individually or as teams
 - If you would like to do this as a team, divide your family members and determine a time limit.
 - You might want to have each team take pictures of or draw their findings with photos!
- Begin the scavenger hunt by trying to find as many things you can.
- Remember you are finding things with your “eyes” and to not disturb anything.
- Winners get to celebrate their nature knowledge! (*Caregivers -- Feel free to reward teams appropriately!)

Materials:

- [Nature Scavenger Hunt Downloadable](#) (copy for each person or 1 copy per team)
- Pen or Pencil
- Optional: binoculars, magnifying glass



HOME LEARNING EXTENSIONS



EXPLORE

Take photos of your findings and then conduct the scavenger hunt again the next month. How have things changed?



INVESTIGATE

Discuss what each team/person found and where?



WONDER

Does nature stay the same or will it change with seasons? Why?

VISUAL & PERFORMING ARTS ACTIVITY NATURE COLLAGE

Capture your scavenger hunt and create a collage representing your hunt. Choose how you would like to represent your collage. It can be completely digital or you can print out the photos and design a poster -- either on paper or digitally.

Materials:

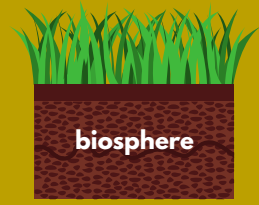
- Phone Camera or Digital Camera
- Items of nature
- Optional: Printer, Free Photo Software
- Optional: Glue, Poster Paper, markers



Time to Build

- Either collect the artifacts or print, cut, and glue them on poster paper.
 - Label and color the photos
- OR
- Choose a free photo software/phone app to create your own digital poster using your photos. (NOTE: This is ideal for an older student or something that an adult can help with -- Recommended Free Apps: [Canva](#), [Adobe Spark](#))





WEEK 14 CHAPARRAL ECOSYSTEM

Introduction

The **chaparral ecosystem** is found all over the world. In the United States, the west coast has large areas of chaparral. Chaparral is one of the most widespread vegetation communities in San Diego County.

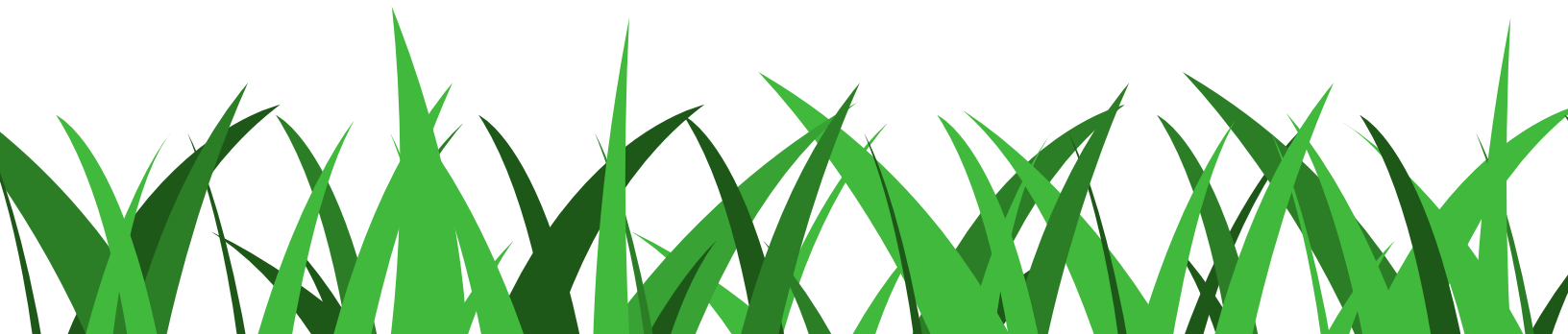
What is chaparral? **Chaparral** is an ecosystem of hard stemmed, leathery leaved shrubs. You may even see native cacti in some areas. There are many plants and animals that live in this area. A cool fact is that they all must be able to survive with very little water during hot dry summers. Many animals have adaptations to help them survive. For example, some may only be awake at night when it is cooler.

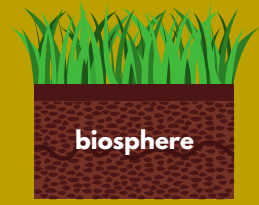
In this activity, we will focus on birds and how they adapt to their environments.



WONDER

How do birds adapt to the harsh conditions of the chaparral? What kind of adaptations do they have to allow them to survive?





HOME LEARNING ACTIVITY CHIRP...CHIRP - CHAPARRAL BIRDS

Many animals adapt to their environment. Birds are very interesting to study because while they may live in the same ecosystem they can have vastly different beaks, coloring, and body types. Why do you think that is? What do you think birds use their beaks for?

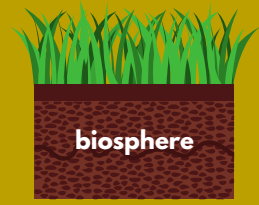
The number one thing birds will use their beak for is to capture food! They also use it for defending themselves, building their nests, drinking, feeding their young, and preening (cleaning their feathers). In the chaparral, we know it is very hot in the summer and there is very little water. We also know there is a variety of insects.



Materials:

- Bird Guides - See links below
 - [California Chaparral Birds](#)
 - [San Diego Field Guide](#)
- Chopsticks
- Fork
- Spoon
- A bowl of Snacks: Anything to experiment with like: cereal, dry beans, popcorn, nuts, dried fruit - any snack that is small and has different shapes
- Two pieces of paper
- Timer
- Pencil





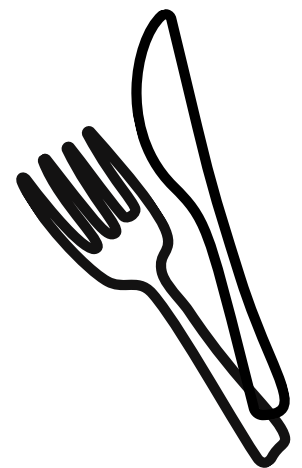
Watch this videos!

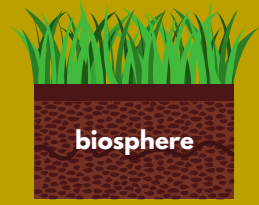
- K-3rd: [What the Chaparral Biome Looks Like](#)
- 4-8th Grade: [A Visit to the Chaparral](#)



Take these action steps to learn!

- Gather materials
- Start by looking at the bird guide books to see what you notice about the shapes of different bird beaks. Bird beaks come in all shapes and sizes!
 - By looking at the bird guide can you determine what the bird eats?
 - How might the shape of their beak be important for catching their food?
- Set up materials on a table so you can work on a flat surface
- Pour snacks on to the white paper
- Grab one of your utensils (fork, chopsticks, spoon). The utensils are going to represent different types of bird beaks!
- Set a timer for 10 seconds
- Using the first utensil (i.e. spoon) pick up as many snacks as possible and place them in a pile off the paper. The snacks will represent they type of food a bird might eat.
- When the timer stops, count how many items you were able to grab. Write it down on the second piece of paper. Write the name of the utensil you used and the number of items underneath.
- Conduct the test again with the remaining utensils. Write down the name of the utensil and the number of snacks collected
- Which utensil worked best? Were there certain shapes that one utensil was better at picking up?





HOME LEARNING EXTENSIONS



EXPLORE

Can you identify what type of beaks are best for:

- Cracking seeds?
- Catching insects?
- Drilling holes?



INVESTIGATE

Take a few moments to look out your window or spend some time in your backyard to check out the local birds in your world!



WONDER

What is the most interesting bird beak you can find? Be sure to check out the Pelican!

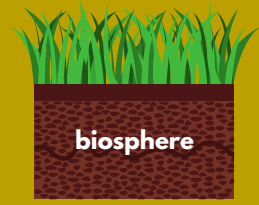
VISUAL & PERFORMING ARTS ACTIVITY CHAPARRAL MEMORY GAME

Create a fun game for the whole family to play using plants and animals from the chaparral ecosystem! We have created some blank cards for you to draw and create your own memory game.



Materials:

- [Blank Playing Cards](#)
- Printer
- Pens, Crayons, or Colored Pencils



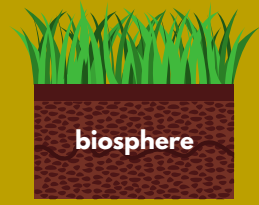
Time to Build

- Print out the Blank Playing Cards
- Decorate and/or color the playing cards using this list of local chaparral creatures (NOTE: You might want to do **an image search** online to be inspired!)
 - Bobcat
 - Brush Rabbit
 - California Buckwheat
 - California Harvester Ant
 - California Sage Bush
 - Earthworm
 - Fungi
 - Gopher Snake
 - Big-Eared Wood Rat
 - Great Horned Owl
 - Greater Roadrunner
 - Mission Manzanita
 - Mountain Lion
 - Mule Deer
 - Orb Weaver Spider
 - Red Diamond Rattlesnake
 - Red-Tailed Hawk
 - Western Scrub-Jay
 - Coast Scrub Oak
 - Western Spade Toad
 - Toyon
 - Western Fence Lizard
- Get your family members together to play the game

Chaparral Memory Game Rules

- Lay all the cards face down
- Each player takes a turn to flip over two cards to see if there is a match
- If no match, flip the cards back, face down
- It is the next player's turn
- Play until all the cards are matched
- The player with the most matched cards wins!





WEEK 15 COASTAL ECOSYSTEM

Introduction

San Diego's coastal biosphere is beautiful! Did you know each coastal ecosystem is different? San Diego has a **Mediterranean-type ecosystem**, which is characterized by dry summers. It has some of the most amazing plants and animals in the world! It also is the home to many humans. This can be a challenge for the plants and animals that need to live in this specialized place.

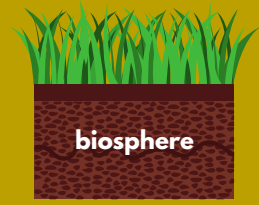
One issue that is a challenge is **coastal erosion**. Coastal erosion is the process by which local sea levels rise and there are strong wave action and coastal flooding that can wear down the coast. There is a lot that goes into this process, but the focus of this activity is on combating erosion.



WONDER

What is coastal erosion? How can it impact our coastal areas? What can be done to help protect areas, structures, and other areas from erosion?





HOME LEARNING ACTIVITY SANDCASTLES BUILT TO LAST!

Think about building a sandcastle. You work all day to build the perfect sandcastle. The next morning you go outside to check on it. It's gone! The tide has washed it away. What can you do differently next time to make your sandcastle stronger?



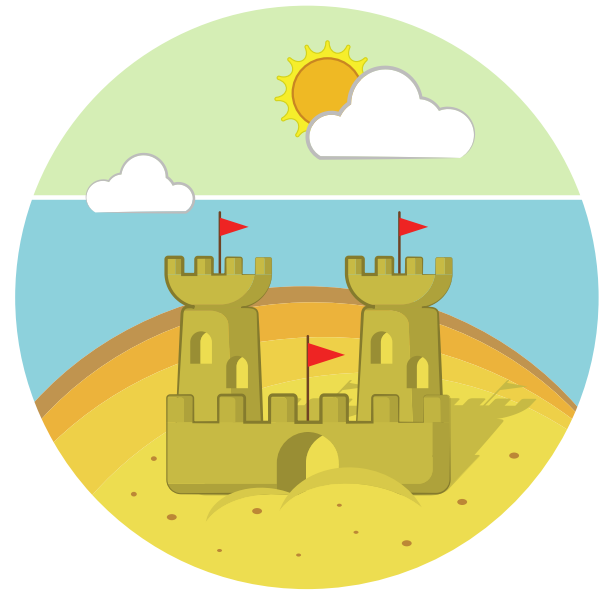
Watch this videos!

- K-8: [What is Coastal Erosion?](#)



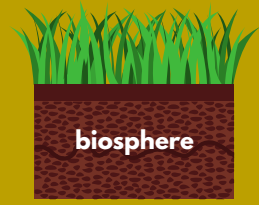
Take these action steps to learn!

- Think about materials that might help your sandcastle be stronger and protect it from the tides. Consider sticks, pebbles, and rocks.
- Design your plan by sketching it out.
- Put a cup of damp sand in the foil pan
- Build the support for your sandcastle by adding your planned materials.



Materials:

- Cup of Sand
- Foil Pan
- Water
- Materials for supporting the sandcastle: look for sticks, popsicle sticks, rocks, pebbles, and anything else that will help protect the castle from water.
- Container to pour water



- Now get ready to test your plan.
- Fill your water container with water (this will act as the ocean)
- Fill the foil pan with water.
- Then slosh the pan back and forth gently (10x) to have the water act like waves.

**Did your solution work? Is the castle still standing?
If not, try again!**

HOME LEARNING EXTENSIONS



EXPLORE

What if you built your castle out of another type of material (not sand)? Would it be able to perform better? Try it out!



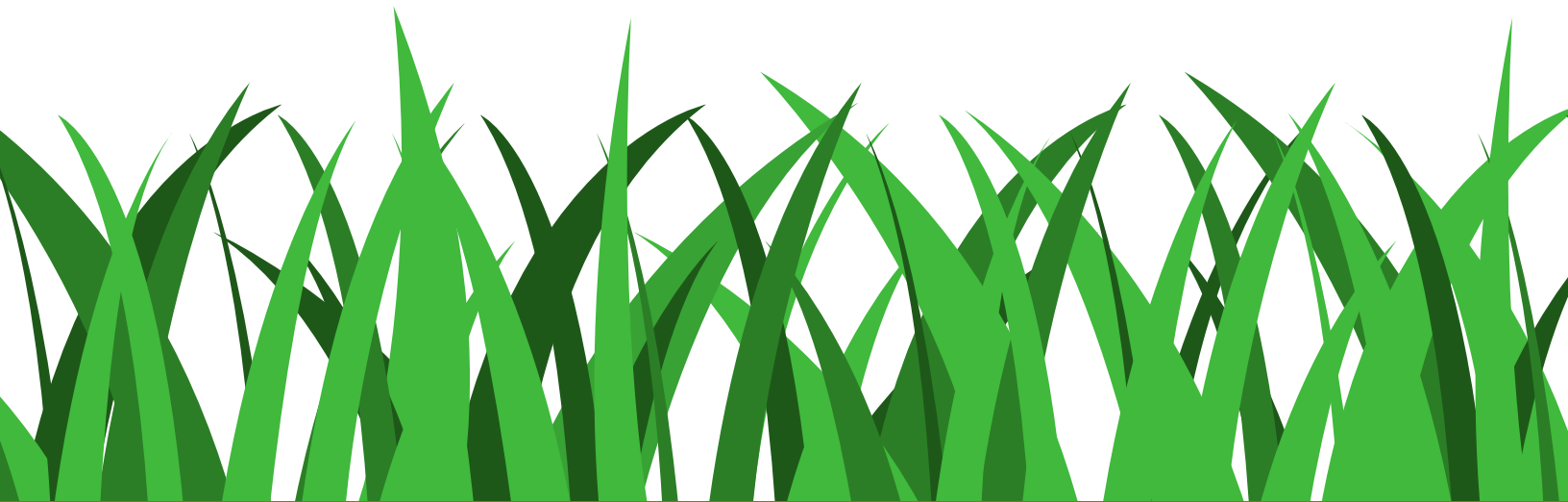
INVESTIGATE

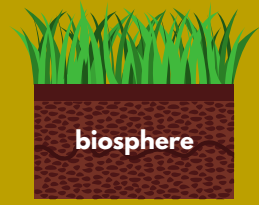
What are some of the ways you can think of that might help protect our beaches?



WONDER

Are there better ways to protect the coast? Why might some areas do better than others against water erosion?

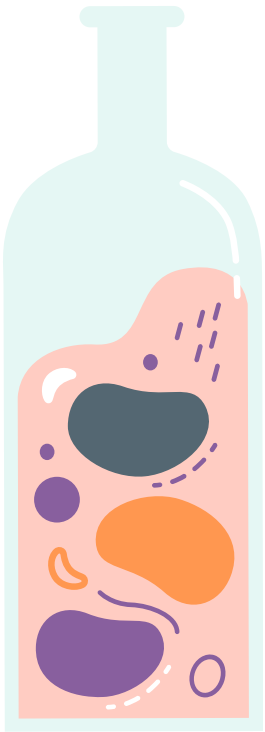




VISUAL & PERFORMING ARTS ACTIVITY

SAND IN A BOTTLE

We know that erosion can take away our beautiful beaches so in this activity we want to make a beautiful reminder that we must protect our beaches so that they are there for future generations. We will be making a “Sand in a Bottle” reminder to help protect our Earth!

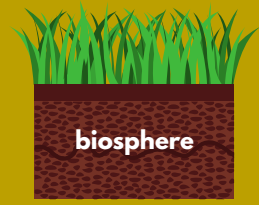


Time to Build

- Gather all the supplies
- Determine how many colors you would like.
- Using one bag for each desired color, add the desired amount of salt to a large zip lock bag.
- Add several drops of one food coloring color to each bag and seal them.
- Shake, squish, and mix each bag together until all the salt crystals are the desired color.
- Once the salt is fully saturated in the color, open the bags and let the salt dry(Make sure the salt is dry or the color will get on your hands).
- Grab your jar and slowly add colors in layers until the jar is full to create your “Sand in a Bottle” memory jar.

Materials:

- Epsom Salt
- Food Coloring
- Large zip-lock bags
- Mason Jar or clear jar



WEEK 16 CONSERVATION MATTERS

Introduction

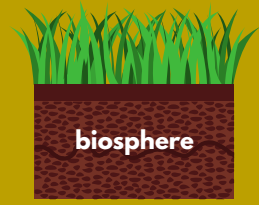
Conservation is the act of protecting precious resources. Every one one of us can help and it doesn't have to be hard. We have learned throughout the past 16 weeks how important, and special, our neighborhoods, city, and world are.

Being a conservation hero starts with you! Making a decision to protect your environment impacts all the ecosystems you live near. It can be through simple actions that you can do daily and get your whole family involved!

WONDER

How can I make a positive impact on my environment? What are some simple ways that I can get involved to save my planet?





HOME LEARNING ACTIVITY CONSERVATION HERO BINGO



Watch this videos!

- K-3: [Water Conservation](#)
- 4-8: [Conserving the Earth's Resources](#)
- 4-8: [What Can You Do Right Now to Save the Earth?](#)
- K-8: [8 Ways Kids Can Help Save the Environment](#)



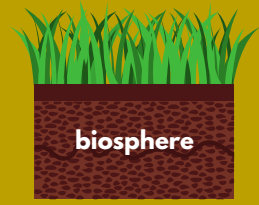
Take these action steps to learn!

- Print out the ***Family Conservation Hero Bingo*** board
- You can play on one board with your family or divide into teams
- Determine what conservation activities you will do to make a Bingo
 - Bingo can be a line right to left, up to down, or diagonal
 - You could also play blackout if you are up for a big challenge. This is where you mark off every square!
- If you are already doing the task you can mark it off.
- If you haven't done one, talk with your family and caregiver about what you can do.



Materials:

- [Family Conservation Hero Bingo Board](#)
- Crayons or Pens to mark off squares
- Materials to complete the tasks



HOME LEARNING EXTENSIONS



EXPLORE

Consider sharing what you have learned and what activities might have an impact in your neighborhood (for example a neighborhood trash pickup).



INVESTIGATE

What other ideas do you have for conservation?



WONDER

How might you get your friends and family involved?

VISUAL & PERFORMING ARTS ACTIVITY CONSERVATION HERO DESIGN CHALLENGE

Design a Conservation Hero to represent how all people can get involved and help the planet. Consider what would best represent this hero. Do they have a cape, special tools, wings, or other elements? What powers would they have?

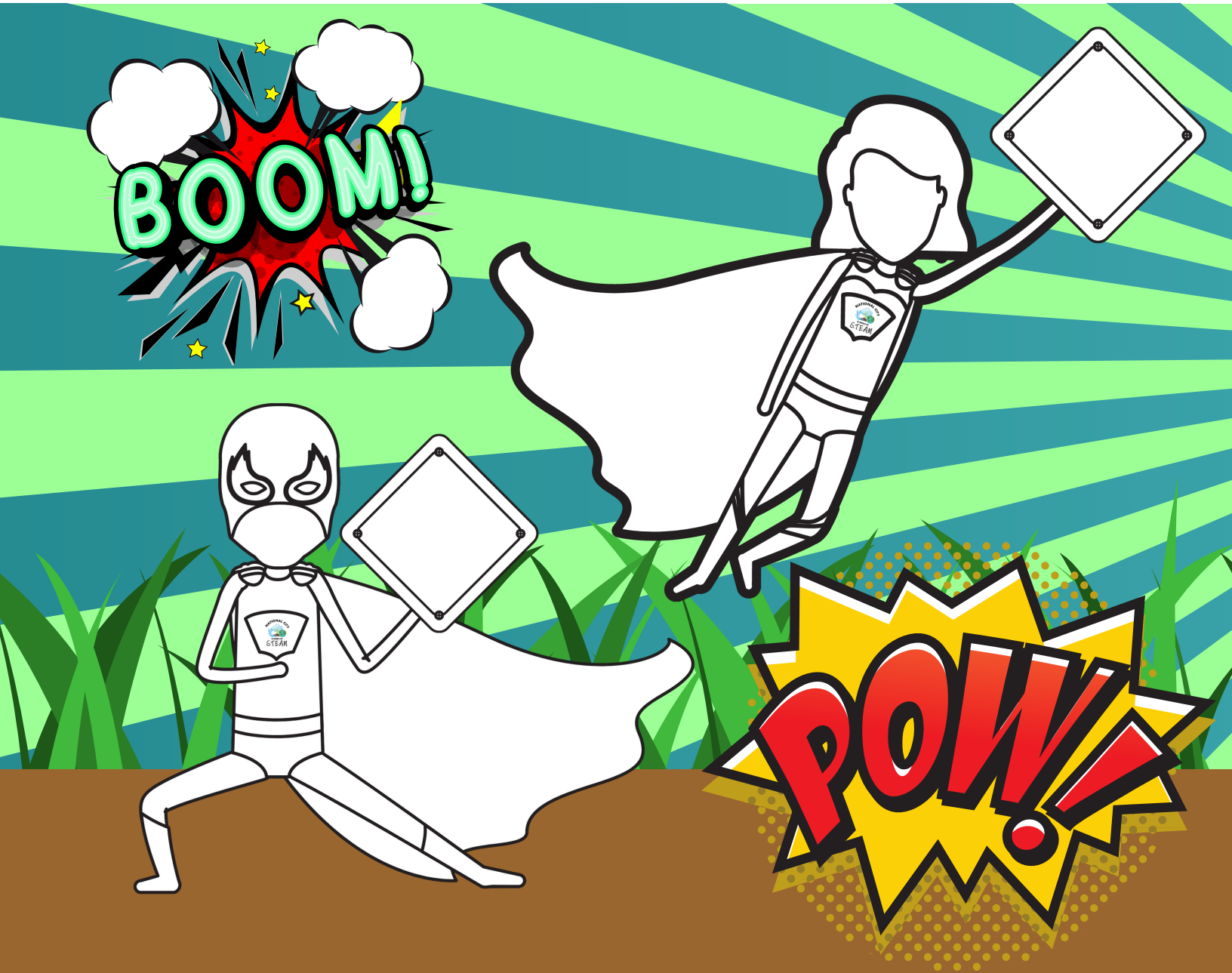
Materials:

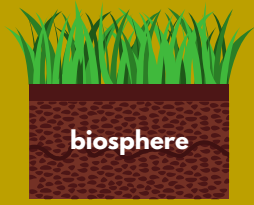
- Copy of [Conservation Superhero Figure](#)
- Paper
- Crayons
- Pencils
- Other art materials



Time to Design

- Gather all your supplies
- Color and design your Conservation Superhero
- Design your Conservation Superhero. Include any special conservation powers, tools, or tricks on the cape and outfit. Make sure to design a Conservation Symbol and draw it on the sign in your superhero's hand.
- Share with friends and family

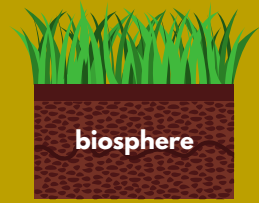




PARTNER RESOURCES

This project isn't possible without the ongoing support of our community partners. Explore the related resources below and level up your learning & curiosity!





RECOMMENDED BOOKS

This book list is designed to pair with the Biosphere 4-week unit. We have curated books for grades K-8th. Reading at home is critical to developing interest and knowledge. You can find these books and similar books like these at the Public Library and online.

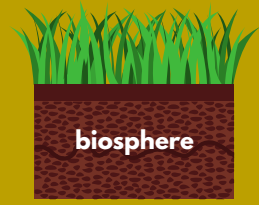
TIPS

- If you don't find these titles, ask/search for titles on the Biosphere
- Set aside a daily time to read to, with, or have your child read independently
- Help your child explore new types of books (it is okay for older children to read picture books!)
- Have older siblings read to younger children
- Discuss the stories and information together

Picture Books (All Ages - Picture Books are Great for the ENTIRE Family)

- **The Tree Lady** by H. Joseph Hopkins & Jill McElmurry (Illustrator) -- Unearth the true story of green-thumbed pioneer and activist Kate Sessions, who helped San Diego grow from a dry desert town into a lush, leafy city known for its gorgeous parks and gardens.
- **The Tide is Coming In** by Calee Lee -- Children spend their afternoon at the beach building a sand castle, jumping over waves and chasing sea gulls. In this sweet and lyrical text, a brother a sister must confront the power of the tides and they seek to save their sand castle from ruin.





- **How Does the Food Chain Work?** By Baby Professor -- Nature is sometimes cruel. The big animal eats the small animal and the chain goes on. If an animal is vulnerable, it becomes food. But did you know that humans are the key beneficiaries of the food chain? Learn about the food chain - what it is and how it works

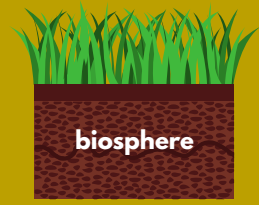
Non-Fiction

- **The Wondrous Workings of Planet Earth** by Rachel Ignotofsky -- An illustrated tour of the planet exploring ecosystems large and small, from reefs, deserts, and rainforests to a single drop of water—from the New York Times bestselling author of Women in Science.
- **California Seashore Life** -- This beautifully illustrated guide highlights over 140 familiar and unique species of birds, marine mammals, nearshore fishes, seashore creatures, seashells and plants. It also includes a tidal zone map that shows at what tidal depth the species occur.
- **Finding Birds in San Diego County** by Henry Detwiler -- A guide to birding in San Diego County, California. Descriptions and directions to favorite locations to find California specialties
- **STEM: Starters for Kids Science Activities** by Sam Hutchinson -- Little scientists will love the BIG ideas in this full-color activity book. It uses games, mazes, quizzes, and word searches to teach about electricity, sound waves, magnets, and more.

Fiction

- **Exploring Ecosystems with Max Axiom** by Agnieszka Biskup, Tod Smith (Illustrator) -- Discover the science behind ECOSYSTEMS in this action-packed graphic novel! Follow along with Max Axiom, Super Scientist, as he treks through the rainforest, squirms among the worms, and more!





SUGGESTED MUSIC PLAYLIST

This music playlist is designed to pair with the Biosphere 4-week unit. We have curated ambient songs, soundscapes, popular music tracks, and instructional songs for grades K-8th. Listening to music deepens emotional connections to the learning and can create a mood for exploration.

We have linked to all these songs inside Spotify or you can search for them on YouTube.

TIPS

- Set aside a daily time to listen to the music & sounds with your child or have him/her listen independently.
- Help your child explore new types of sounds at different times of the day & during different activities.
- Discuss the sounds and lyrics together as a family -- How do they make you feel? How do they connect to the learning theme and topics?

AMBIENT TRACKS

- [Biosphere, Nature Sounds](#)
- [Waves and Sea Spray](#)

INSTRUCTIONAL TRACKS/VIDEOS

- [Conservation Song](#)
- [Erosion Song](#)
- [Weathering, Erosion, and Deposition Song](#)
- [The Biodiversity Song](#)

