

Water Education For All

Lesson: Animal Adaptations

Elementary School

Time: 3 hours

Objectives:

- Define the term adaptation
- Describe how adaptations help an organism function better in its habitat
- Name at least 3 aquatic ecosystems in San Diego
- Design an organism adapted to live in a San Diego ecosystem

Summary: The purpose of this lesson is to discover ways animals change over time. Students will learn about these adaptations by creating an animal of their own. This animal will be created to live in an aquatic ecosystem within San Diego to better understand which adaptations may be necessary in the student's particular habitat.

Standards alignment:

NGSS Standards: Primary School (K-2)

Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live. K-ESS3-1

LS3.A: Inheritance of Traits. Young organisms are very much, but not exactly, like their parents and also resemble other organisms of the same kind.

LS4.C: Adaptation. Living things can survive only where their needs are met. If some places are too hot or too cold or have too little water or food, plants and animals may not be able to live there.

LS4.D: Biodiversity and Humans. A range of different organisms lives in different places.

NGSS Standards: Elementary School (3-5)

Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. 3-LS4-3

Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. 4-LS1-1

LS3.A: Inheritance of Traits. Different organisms vary in how they look and function because they have different inherited information; the environment also affects the traits that an organism develops.

LS4.B: Natural Selection. Differences in characteristics between individuals of the same species provide advantages in surviving and reproducing

LS4.C: Adaptation. Particular organisms can only survive in particular environments. Populations of organisms live in a variety of habitats. Change in those habitats affects the organisms living there.

Science Words:

adaptation	ecosystem	prey
aquatic	habitat	structural adaptation
behavioral adaptation	organism	species
	predator	

Materials:

- Coloring materials
- Adaptation “Around the World” flashcards, printed and cut (available at end of the lesson)
- Design an Animal worksheet (1 per student, available at end of the lesson)
- Poster paper
- Access to the Internet or library for research

Background for the teacher:

Adaptation is “the adjustment of organisms to their environment in order to improve their chances at survival in that environment” (National Geographic, 2019). Examples of adaptations include a leopard’s spots, a desert hare’s large ears, and the shape of a finch’s beak.

Adaptations come in many forms. Structural adaptations alter the physical features of an organism’s body, like their fur or beak (NHPBS, 2020). Behavioral adaptations involve changes in an organism’s behavior, like when gray whales migrate to the warm waters of Mexico to mate and give birth (National Geographic, 2011). Adaptations can serve many purposes, but they all make organisms better suited for living in their environments. Some of the most common purposes in animals are obtaining food, escaping predators, regulating body temperature, and attracting a mate. Through natural selection, these helpful traits can be passed down over generations and give individuals the advantage of surviving and reproducing (National Geographic, 2019).

An organism’s habitat defines its adaptations. Because each habitat has unique characteristics, adaptations vary widely across ecosystems. An adaptation that is helpful in one habitat may be harmful in another. For example, the warm blubber of a harp seal would be ill suited for the warm waters of the tropical coral reef. Because of the incredible biodiversity of San Diego, our animals have a wide variety of adaptations. Although this lesson focuses on animals, plants have adaptations too! Many plants that are native to San Diego have developed adaptations to our warm, dry weather.

Students may confuse what is and isn’t an adaptation. The word is used widely in a variety of contexts, which can lead to misconceptions about its definition. To be considered an adaptation in the Darwinian sense, the trait must be:

- heritable- genetically coded so it can be passed on to new generations
- functional- fulfills a specific purpose
- adaptive- increase the organism's chances of survival (Wormald, 2017)

Colloquially, “adaptation” may be used to refer to other situations, such as when someone’s behavior changes in response to their environment. Refer back to this checklist if you want to clarify that something is truly a biological adaptation.

ENGAGE

Activity: Class Discussion

Directions:

1. Ask students to think-pair-share using the question: What is an adaptation?
 - a. THINK: What is an adaptation? Where have you heard this word before? Take a moment to think to yourself about what this means.
 - b. PAIR: Partner with the person next to you. Discuss what you think an adaptation is. Are your ideas the same or different?
 - c. SHARE: Share your or your partner’s ideas with the class. What do you think an adaptation is? Have your ideas changed since talking to your partner?
2. Tell students the definition: An adaptation is when an organism adjusts to its environment to improve their chances of survival. Adaptations can be changes in an organism’s body or behavior. These changes help the organism to survive and reproduce. They solve problems that the organisms might encounter in their environment.
3. Ask: What do organisms need to survive? (*Food, water, shelter, avoiding predators, etc.*) How could adaptations help with those things?
4. Do you think adaptations are the same in every habitat? Would an animal that lives in the desert have the same adaptations as an animal that lives in the Arctic? Why?
 - a. Habitats have different characteristics, so some adaptations will work better in different places. Would having a thick coat work better in a cold, snowy habitat or a hot, dry one? Why?
5. San Diego has a lot of different habitats! Some of our aquatic habitats include:
 - Salt marsh
 - Rocky intertidal
 - Creeks
 - Mud flats
 - Kelp forest
 - Sandy bottom
 - Bay
 - Eelgrass beds
 - Open ocean
6. Share with students information on some of the most common aquatic habitats in San Diego. Work together to identify characteristics of these habitats-- what is it like there? What challenges might an organism need to address to live there? Record these characteristics.
 - a. **Kelp forests** are completely underwater, so animals that live there need to be able to breathe underwater or hold their breath for a while. Kelp usually likes to grow in colder water, so animals need a way to stay warm. Lots of different

animals live there, so there's many kinds of food and potential predators to your animal! Some animals like to stand out with bright colors that warn others not to eat them. Other animals like to blend in with the rocks or kelp and hide from predators or lie in wait to catch their food.

- b. **Wetlands** are areas of land that are partially flooded. Often wetlands are the place where rivers drain into the ocean. Most wetlands have a mix of saltwater and freshwater. There are short, grass-like plants to hide in and shallow water. A lot of birds like to eat the small animals that live here. Wetland animals might live in the shallow water, on land, or both. Some animals will burrow down in the mud of the wetland for protection from the sun, cold, or predators.
- c. **Tide pools** are sometimes wet and sometimes dry. Animals that live here often need to be able to hold on to slippery rocks, even when waves are crashing. Lots of animals need to be able to live both in the water and on land, in both hot and cold temperatures. Tide pool animals may need shells to protect themselves from drying out, or they may need to move around to find shelter from the heat or cold.

Optional Extension: Take your class on a virtual tour of an underwater habitat! Show your students the [underwater tour of Matlahuayl State Marine Reserve in La Jolla](#) from California State University Monterey Bay.

EXPLORE

Activity: Animal Adaptation Research

Directions:

1. Students will research a real animal that lives in a San Diego aquatic habitat. Use the questions below to guide the research process.
 - a. Research Questions:
 - i. Species name
 - ii. What habitat does it live in?
 - iii. Where in San Diego is this habitat found?
 - iv. What are its adaptations, and how do they help it live in this habitat?
 - v. What does the animal eat?
 - vi. How does it protect itself / how does it catch its prey?
 - vii. What challenges affect your animal's survival? (pollution, habitat loss, overfishing, human development, etc)
2. After completing their research, students will share their animal and its adaptations with the rest of the class in a research report. This can take the form of an informational poster, pamphlet, PowerPoint, or another medium of your choosing.

Optional Extension: As a class, watch a video or read a book about one of the habitats in San Diego. What are the defining features of this habitat? What adaptations might an animal need to survive there?

EXPLAIN

Activity: Adaptations “Around the World” Game

Gathering materials:

Before playing this game, gather a list of the animals that your students researched. For each animal, you should have its name, habitat, and 1-2 adaptations. Print and fill out the flashcards (example below; blank template available at the end of the lesson) with this information to facilitate the gameplay.

Directions:

Play an “Around the World” style game to test students’ understanding of local animal adaptations.

1. Pick 2 students to start the game. Student A will stand behind Student B’s chair.
2. Read the information on the animal adaptation card. Students will guess which animal is being described. Make sure that students other than the 2 contestants know not to answer.
3. The first person to answer correctly will move on to stand behind the next student’s chair. If Student B (who was sitting) answers more quickly than Student A (who was standing), then they will move on to the next chair and Student A will sit at their desk.
4. The goal of the game is for the standing student to make it as far as they can around the classroom without sitting. If they complete a full rotation, they have made it “around the world.”

Example flashcard:

<p>Animal: <u>California Sea Lion</u></p> <p>I live in the <u>Kelp forest</u> habitat</p> <p>I use my <u>thick layer of blubber</u> physical adaptation</p> <p>to help me <u>stay warm in the cold water</u> purpose of adaptation</p> <p>Who am I?</p>

ELABORATE

Activity: Design an Animal!

In this activity, students will design an imaginary animal that lives in an aquatic habitat in San Diego (see list below). First, students will choose their habitat and identify the characteristics that an organism needs to survive there. Next, they will draw their animal in its habitat using the worksheet at the end of the lesson. Then, they will label their animal's adaptations and write how the adaptations help it to function in its habitat.

Students will consider questions like:

- How will it get food?
- How will it stay safe from predators (defense mechanisms like schooling, spines, camouflage)?
- How does it move (fins, legs, etc)?
- How does it communicate (sounds, colors, etc)?
- How will it keep its body at the right temperature (warm coat, blubber, cooling mechanisms, etc)?

After drawing their animal, students will share their ideas with the class. You can ask the class: Were there any adaptations that came up several times? Why might some students have come up with similar adaptations for the same habitat?

EVALUATE

Students will be assessed based on completion of their research reports and animal design activity. Students should identify the characteristics of the habitat, the adaptations of their animal, and how the adaptations help the animal survive in the habitat.

Around the World Flashcards

<p>Animal: _____</p> <p>I live in the _____(habitat).</p> <p>I use my _____</p> <p>_____ (physical adaptation)</p> <p>to help me _____</p> <p>_____</p> <p>_____ (purpose of adaptation).</p> <p>Who am I?</p>	<p>Animal: _____</p> <p>I live in the _____(habitat).</p> <p>I use my _____</p> <p>_____ (physical adaptation)</p> <p>to help me _____</p> <p>_____</p> <p>_____ (purpose of adaptation).</p> <p>Who am I?</p>
<p>Animal: _____</p> <p>I live in the _____(habitat).</p> <p>I use my _____</p> <p>_____ (physical adaptation)</p> <p>to help me _____</p> <p>_____</p> <p>_____ (purpose of adaptation).</p> <p>Who am I?</p>	<p>Animal: _____</p> <p>I live in the _____(habitat).</p> <p>I use my _____</p> <p>_____ (physical adaptation)</p> <p>to help me _____</p> <p>_____</p> <p>_____ (purpose of adaptation).</p> <p>Who am I?</p>

Name: _____ Teacher: _____ Date: _____

Animal Adaptations: Design an Animal Worksheet

When designing your animal, think about the **adaptations** it will need to survive. Remember: The adaptations should match the challenges of that habitat!

My animal lives in the _____ habitat.

In 2-3 sentences, describe the characteristics of this environment. Is it cold or hot? Underwater, on land, or partially in the water (like a wetland or tide pool)? What other plants or animals might it interact with? Are there places to hide or take shelter?

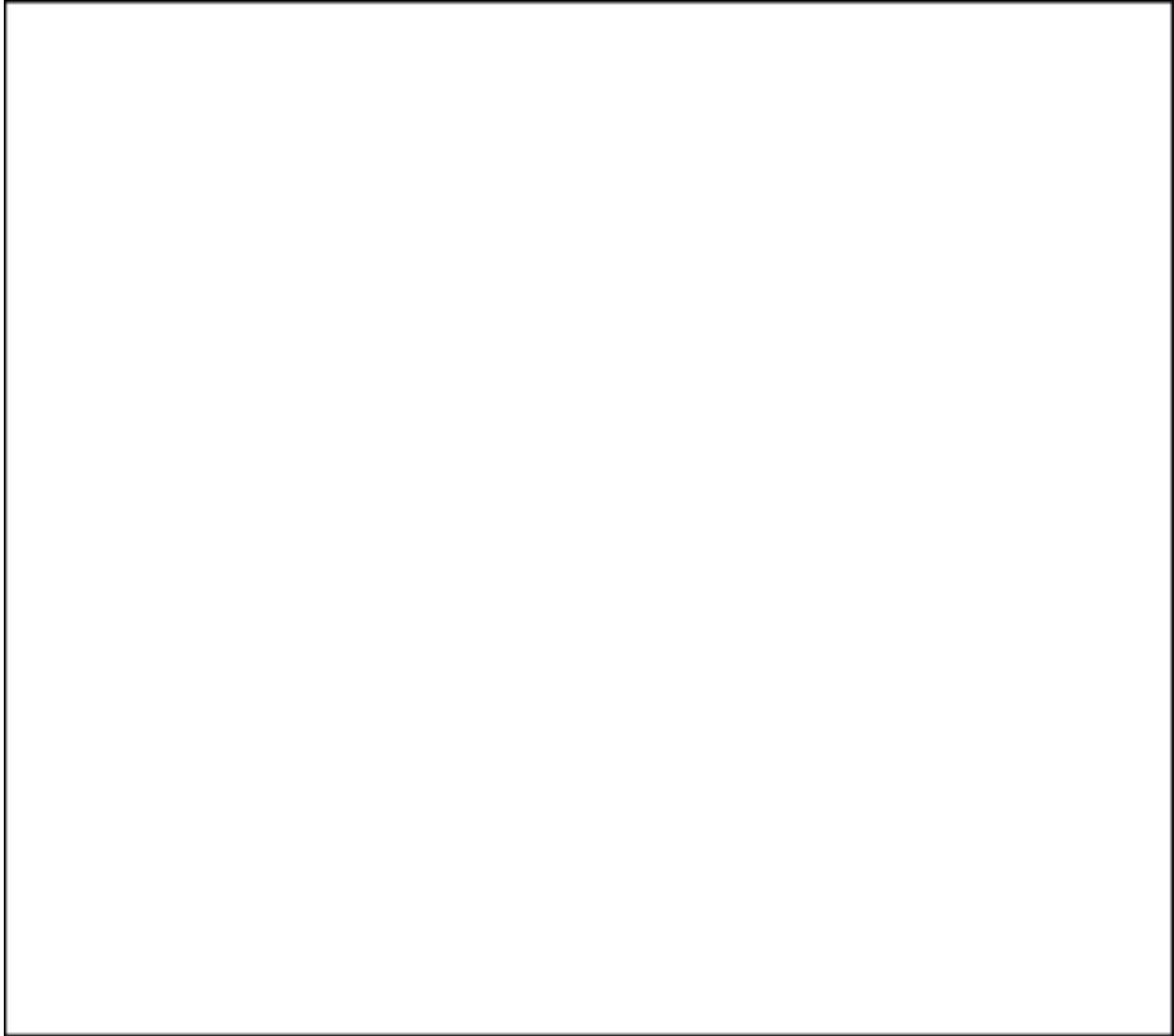
Your animal should have at least 1 adaptation in each category below.

Eating	This animal catches food using
Movement	This animal moves with
Communication	This animal communicates with others by
Protection	This animal protects itself from predators by
Temperature	This animal stays warm/cool and dry/wet by

Name: _____ Teacher: _____ Date: _____

Animal Adaptations: Design an Animal Worksheet

Draw your animal here!



Species Name: _____

Habitat: _____

What is your favorite adaptation? How does this adaptation help your animal survive in its habitat? _____

References

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