



Darkness Matters Home School Edition

Did you know many animals need darkness to survive? In this fun activity students are introduced to the concept of light pollution and learn how artificial light at night affects wildlife.

Introduction

Just as food, water, shelter and space are essential for animal survival, darkness also matters. Animals may need darkness to hunt or safely forage. Breeding and nesting must be done in the dark for some species. And a surprising amount of animals, especially birds, utilize the stars to help them migrate.

Almost all of life on Earth is adapted to a day and night cycle. Millions of years of dark skies have led animals to utilize darkness for migration, reproduction, foraging and safety. Only recently humans have lit up the night. In the last century we have significantly altered the nighttime environment with electrical outdoor lighting— called artificial light at night. Unfortunately, this can confuse animals and jeopardize their survival.

GBO suggestion— This is a fun simple activity that siblings of different ages can do together. Perhaps let the older sibling lead the activity, or have siblings take turns leading.

Complement this activity with *Engineering a World Without Light Pollution* to understand the choices we can all make to preserve dark skies where we live.

Next Generation Science Standards

- K-LS1-1 Use observations to describe patterns of what plants and animals (including humans) need to survive.
- 3-LS4-3 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-LS1-1 Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.
- 3-LS4-4 Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.

Utah Science Standards

- 1.4.2 Living things change and depend upon their environment to satisfy their basic needs.
- 2.4.2 Identify basic needs of living things (plants and animals) and their abilities to meet their needs.
- 3.2.2 Describe the interactions between living and nonliving things in a small environment.

Materials

- 3 large bowls or pots
- 3 images to place under the bowls/pots when they are placed upside down— you can print these from the PDF file, or simply draw your own. You need 1 that represents stars/ a dark night sky and 2 that represent cities/ artificial light at night.

In this activity you will use three animals to demonstrate different ways animals are adversely affected by light pollution. Students will learn the importance of darkness for reproduction, migration, and hunting.

Background information on animals:

- 1) Sea turtles live in the ocean but hatch at night on the beach. Hatchlings find the sea by detecting the bright horizon over the ocean. Artificial lights draw them away from the ocean. They can only stay on land for about 4 hours during the night but once the sun comes up they have a much greater chance of dying. If they follow the wrong light they quickly overheat from the sun or can be caught by predators like birds and crabs. Millions of hatchlings die this way every year.
- 2) Many birds migrate or hunt at night and navigate by moonlight and starlight. Artificial light at night can cause birds to wander off course. Birds often die by colliding with needlessly illuminated buildings and towers. Birds also get stuck and confused in city lights, using energy resources wandering around aimlessly. Migratory birds also depend on cues from properly timed seasonal schedules. Artificial light at night can cause birds to migrate too early or too late and miss ideal climate conditions for nesting, foraging and other behaviors.
- 3) Predators such as mountain lion are primarily nocturnal and hunt under the cover of night. They have an advantage by seeing over a greater area, and their prey must seek darkness and spend time hiding. Lighting changes the predator/prey relationship. The prey has less time to use for normal activities, while the predator has a smaller range to hunt in, avoiding the bright lights of the city.

Directions

- Decide on a large open space for the activity. Outside or a living room works well.
- The general instructions for this activity/ game is that you will place 3 upside down large bowls on the floor, each will have 1 picture under it-1 of the stars and 2 of cities. You will be shuffling these pictures at the start of each game while the student/s shuts their eyes. The goal is for the student/s to act like the animal and choose the right bowl (the one with the stars).
- You will play the game three times. In each scenario only 1 of the 3 bowls will hide the dark sky symbolizing the darkness which helps the animal survive.
- Scenario #1 (Light pollution with baby sea turtles): You're taking a long trip over to Florida. Florida has lots of big cities but it also has lots of beautiful beaches for sea turtles to lay their eggs. Add in as much additional information about sea turtles that you like. There are videos available on the video tab.
- Now is the fun part! Pretend to be a baby sea turtle. Pretend to be a hatchling from an egg.
- Standing at a distance from the overturned bowls— now you must make it safely to the ocean. There are cities nearby with lots of bright lights. Crawl your way to one of the bowls.
- Reveal the images underneath the bowls. Ask what each image means? (The sea turtles that followed the city lights got confused and did not make it to the ocean before the sun came up. What might happen to them now? Those who reached the picture with the stars made it safely to the ocean.) Discuss the consequences of each destination.
- Send the student/s back to the starting point. Have them close their eyes while you shift the pictures under the bowls.
- Scenario #2 (Light pollution with mountain lions): Tell the students you're taking another trip not too far from your home town. You're in Great Basin National Park. This time you are a mountain lion. You have special eyes that let you see in the dark. You prey on animals by using the dark to hide in until it's time to attack. If there were many lights around you, how would you get the food you need to survive?

- The student/s may want to practice being a mountain lion. What do they look like when they stalk and kill their prey? How well do they see at night?
- It's time to find some dinner. YUM! Have them leave their habitat in search of food. Let them again choose a bowl.
- Reveal the images underneath. Ask what each image means. (The mountain lions which found the city lights got scared and went home without dinner. Those which chose the stars had a better chance of successfully stalking their prey and eating their dinner for the night. They are grateful for the darkness.) Discuss the consequences of each destination.
- Send the student/s back to the starting point.
- Scenario #3 (Light pollution with birds): You're in the Great Basin. This time you are a bird. You can be one of the 238 species of birds that spends part of it's life in Great Basin National Park. Which would you like to be?
- Its becoming winter and getting cold. What do cold birds look like? It's much warmer in South America. You decide to fly down there where there are more bugs to eat and much less snow.
- Once again move the pictures under the bowls while the student/s are closing their eyes.
- Have the student fly to their new winter habitat, reveal the images underneath. Ask the students what each image means. (The "migrators" that followed the city lights got "lost" and could not survive in the city. What issues might they have living in the city? Those who reached the stars arrived safely at their destinations.) Discuss the consequences of each destination.
- A great way to end this activity is to watch the "What you can do" video on the video tab.

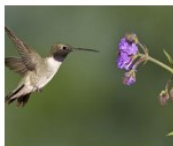


Above: A mountain lion captured on a wildlife camera at Great Basin National Park

Below: Some common bird species in Great Basin National Park



Black-capped
Chickadee



Black-chinned
Hummingbird



Black-headed
Grosbeak



Black-throated Gray
Warbler



Black-throated
Sparrow



Blue Grosbeak



Blue-gray
Gnatcatcher