Darkness Matters

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.

Time

- 30 minutes

Grades

- 1-3

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.

Next Generation Science Standards

- 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.

Materials

◊ Three traffic cones

◊ 1 copy of the pictures you will use under the traffic cones: 1 milky way, 1 deer, 1 picture of the ocean at night, and 2 small pictures of cities at night

◊ Printed pictures of the sea turtle, bird and mountain lion (they can be used as visuals or 1 can be given to each student as they pretend to be that animal)

Do Ahead

- Gather all materials.
- Choose your location, outside works well.
- Before leaving the classroom remind students what animals need to survive and teach your students about how light pollutions affects animal survival. Discuss each animal you will use in the activity.

⇒ You can lead a discussion using information provided in this lesson plan or

⇒ Use the PowerPoint located on the PowerPoint tab, or

⇒ Use videos located on the Video tab.

⇒ PowerPoint and Videos are located at http://www.greatbasinobservatory.org/lesson-plans/darkness-matters

Background for Teachers

Just as food, water, shelter and space are essential for animal survival, darkness also matters. Some animals need darkness to hunt prey or forage. Breeding and nesting must be done in the dark for some species. And some animals migrate using the stars to guide them and tell them when it is time to travel.

Animals need a day and night cycle for their survival. Hundreds of thousands of years of dark skies have led animals to utilize darkness for migration, reproduction, foraging and safety. Recently humans have lit up the night. In the last century we have significantly altered the nighttime environment with electrical outdoor lighting. Unfortunately, this can confuse animals and sometimes jeopardize their survival.

In this activity you can 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.

Examples:

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

- Prepare a large open space, preferably outside. Place 3 cones, 1 with a picture of the ocean under it, and 2 with pictures of cities underneath, 20 feet away from where students will be starting.
- Remind students that for millions of years species on our planet evolved with the patterns of light and dark. Birds use stars to navigate, baby sea turtles find the sea by detecting the horizon over the ocean, and nocturnal animals use darkness to hide and hunt. What would happen if these animals didn't have darkness?
- Introduce the game to your students. In each scenario they will pretend to be an animal and will move towards one cone. Only 1 of the 3 cones will have what the animal needs to survive. Will they survive? Or will light pollution adversely affect their survival?
- Scenario #1 (Light pollution with baby sea turtles): Tell the students 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.
- Have the students pretend to be a baby sea turtle. Have them practice pretending to be a hatchling from an egg. What do they look like? How do they crawl and swim? What are they scared of?

- Set up the scenario to start the activity. Ask students to pretend you're a baby sea turtle, who has hatched, and must follow light, such as the moon, to make it safely to the ocean. There are cities nearby with lots of bright lights. How do you know which way to go?
- Have students crawl to a cone hoping it is the ocean.
- Reveal the images underneath the cones. Ask the students 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 ocean cone were able to use the light coming from the horizon and made it safely into their ocean.)
- Send the students back to the starting point.

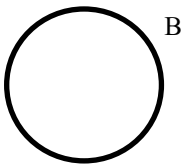
- Scenario #2 (Light pollution with mountain lions): Tell the students you're taking another trip not too far from your home town. You're in Great Basin National Park. This time you are a mountain lion. You have special eyes that let you see in the dark. You prey on animals by using the dark to hide in until it's time to attack. If there were many lights around you, how would you get the food you need to survive?
- Use the 3 cones used in the previous scenario. Trade the picture of the night ocean for a picture of the deer. Mix the 3 cones up so students do not know which is which.
- 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 cone.
- Once all the students have chosen a cone and decided which prey they would like to eat, reveal the images underneath. Ask the students what each image means. (The mountain lions which found the city lights got scared and went home without dinner. Those which chose the deer, successfully stalked their prey, pounced and grabbed their dinner for the night. They are grateful for the darkness.)
- Send the student back to the staring point.

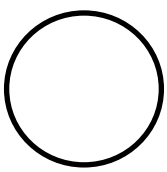
- Scenario #3 (Light pollution with birds): You're in the Great Basin. This time you are a bird. You can be one of the 238 species of birds that spends part of it's life in Great Basin National Park. Which would you like to be?
- Its becoming winter and getting cold. What do cold birds look like? It's much warmer in South America. You decide to fly down there where there are more bugs to eat and much less snow.
- Using the same 3 cones, trade the picture of the deer for a picture of the milky way. Mix the 3 cones up so students do not know which is which.
- Have the birds (students) migrate to whichever cone they choose. Once all the students have chosen a cone and settled into there for 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 milky way cone were able to use the stars and arrived safely at their destinations.)

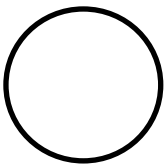
Scenario #1,2,3:Walk/crawl/ fly like a sea turtle/mountain lion/bird from point A to the one of the 3 cones (point B).

Reveal to students if they arrived in a place suitable to survive.

Change picture under cone, shuffle cones, and repeat with next animal scenario.







Cone with the City image under it