California Wildlife

Nature Van Activity

Operation Cat-Drop (Biomagnification)

This is the story of an environmental problem that occurred in Borneo in the 1950s that shows the ripple effect of ***biomagnification*** on natural food chains when bio-hazardous chemicals are used and a critical species is eliminated.

Watch the following video:
https://www.youtube.com/watch?v=17BP9n6g1F0 *(Operation Cat-Drop)*

The story:

Borneo was facing a malaria epidemic, so authorities doused the countryside in DDT (pesticide) to kill off the mosquitoes spreading the malaria. People starting finding that the roofs of their houses were collapsing because caterpillars were eating the thatching, only to discover that the DDT also killed a critical type of wasp that ate these caterpillars!

The DDT also was consumed by many other insects that the Borneo geckos ate, including cockroaches. While the DDT didn't affect the cockroaches, they carried the DDT in their bodies and were eaten by the geckos, which were slowed down by the poison and then eaten by cats. The cats didn't survive the DDT poisoning.

Without the cats, the population of rats on the island dramatically escalated, and the rats began spreading a plague and eating all the grain that the people of Borneo needed to survive!

To solve this problem, the World Health Organization air-dropped cats from planes by parachute into Borneo to eat the rats and stabilize the deteriorating situation!

Activity:

Materials

- Access to large area to move around, such as gym or classroom with desks set aside.
- 10 copies of the grass seeds sheet – 5 on yellow paper and 5 on green (or other two colors) – and cut into squares. Green will represent healthy grass seeds, yellow will represent grass seeds poisoned by DDT (Keep this secret – even if students have played this game before you can just change the colors you use so they do not know which is which.)
- One paper bag for each student.

Warm Up:

With the class, look at the terms *food chain, food web, ecosystem* and *biomagnification*. The students will be acting as mice, snakes and foxes for the activity so if possible use these animals in any example food chains you can show.

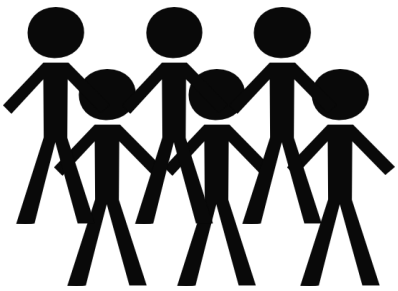
Playing the Game:

1. Scatter the grass seeds (both colors) around the space you are using but **do NOT** tell students what the different colors mean!
2. Divide the class into 3 groups (see below): mice, snakes and foxes - with approximately 3 times as many mice as snakes, and snakes as foxes (e.g. in a class of 26 students, there would be 2 foxes, 6 snakes and 18 mice).
3. Give each mouse a paper bag to represent its 'stomach'
4. Instruct the mice to enter the playing area and to quickly gather as many grass seeds (food) as they can in 30 seconds while the snakes sit out and watch.
5. After 30 seconds, while the mice continue to look for food, allow the snakes to enter the playing area to catch the mice by tagging them. If a mouse gets tagged they must give their bag to the snake and sit down.

   (This stage of the game should last a short amount of time – enough for some mice to be "eaten" – The right amount of time depends on the size of the playing field and number of students.)

6. While snakes are still trying to catch mice (and after a few have been caught), allow the foxes to enter the playing area to catch the snakes. The same rules apply - when a snake is caught it must give the bag of food to the fox and sit down.
7. End the game! You should time this so that there are still a few mice and snakes in the game. Ask students to come together and look at the food bags they have, or report if they were eaten.
8. Count the number of mice left and the grass seeds (both colors) in their stomachs.
9. Repeat the same with the snakes and the foxes.
10. Explain to the students that the yellow grass seeds represent seeds that were poisoned by DDT.
11. Have students who weren't eaten determine how many of the lower food-chain level students they ate, how many grass seeds they ended up with, and the number of yellow (poisoned) grass seeds that they acquired into their 'stomachs'.
12. Students can then brainstorm together how this demonstrated the effect on the whole food chain when one animal is affected by careless/harmful human activity such as DDT pesticide.

Foxes



Snakes

Mice