

Natural Change

Overview

Students play a card game to learn about natural change in an ecosystem. During the game, students will keep a record of the results of the changes in an ecosystem.

Concepts

1. Ecosystems change, often independently of humans.
2. Natural changes occur continually.
3. Natural changes can occur at a slow rate over millions of years, at a medium rate over hundreds of years, or at a fast rate over a few days or months.
4. Natural changes impact both the human and natural components of ecosystems.

Time

1 hour and 30 minutes

- Introduction: 20 minutes
- Natural Change Game: 45 minutes
- Journal Exercise: 15 minutes
- Closure: 10 minutes

Materials

For each student:

- Ecosystem Worksheets
- Ecosystem Explorations Journal

For each team:

- Change Cards
- Results Sheet

Teacher Preparation

1. Copy one set of Change Cards for each team.
2. Copy one Results Sheet for each team.
3. Copy one Ecosystem Worksheet for each student.
4. Cut out Change Cards and label appropriately on back as Fast Change, Medium Change, or Slow Change. If possible, you may want to color code the words Fast Change, Medium Change, and Slow Change. (You can have your students do this instead.)



Background

Ecosystems are continually changing, with or without human involvement. For example, meadows naturally change to forests, streams carve new or deeper channels, and animals migrate to new habitats. The processes of natural change include geologic changes, plant and animal succession, and change as a response to weather. Geologic change refers to the way the land may be altered as the result of erosion, uplift, or volcanism. Succession refers to plant and animal changes in an ecosystem over time. For example, a small lake may fill in with sediment causing aquatic plants to disappear and grasses to grow. Weather forces a change in the connections within ecosystems. For example, flooding due to a large amount of rain or rapid snowmelt can cause plants to grow more than normal. Changes occur at different rates, from slow to fast. For instance, geologic changes can be slow, as in sea level rise, or very fast, as in a landslide.

Each change results in specific responses within the ecosystem. Some responses are evident over short time scales and other responses happen on longer time scales. For example, when a volcano erupts, in the short term it may wipe out all plants and animals near the volcano. However, it may also deposit a fertile layer of ash. Thousands of years after the eruption, the ash provides a rich nutrient supply for a large diversity of plants in the area.

Procedure

Illustrate each step on the board when explaining the procedure to the students. Model how to fill in the information in the appropriate places on the Ecosystem Worksheet.

1. Divide students into teams.
2. Pass out one set of Change Cards and one Results Sheet to each team, and an Ecosystem Worksheet to each student.

Directions to students:

1. Place the Change Cards face down on the table in three piles: the “Fast change” cards in one pile, the “Medium change” cards in another pile, and the “Slow change” cards in a third pile.
2. Place the Results Sheet where everyone can look at it.
3. Draw a card from the Fast Change pile (each person draws one card).
4. On your Ecosystem Worksheet find the first blank box (upper right corner). Fill in the “Change” and “Rate” lines in this box with the information from your “Fast Change” card.
5. Look at the possible results on the Result Sheet and choose three possible results that could happen in response to your Change Card. Write the three results on the Results lines at the bottom of that first blank box. (Students may also develop their own results.)
6. In the same box draw the ecosystem (shown in the upper left section of the worksheet) as it might look after this change.



7. Explain the changes in your ecosystem picture to another person in your team.
8. Draw a Medium Change card from the Change pile and repeat steps 4-7 in the next blank box. For round #3, draw a Slow Change card and complete the last blank box.

Note: For each round draw the original ecosystem with the results of the change for *that round only!* Each round is independent of the others.

Closure

Display all students' ecosystem change drawings. Every student began with the same ecosystem. Ask students the following question.

How similar are the results of the changes?

What are the differences?

Adaptations for Students with Limited English Proficiency

Preview the natural change game with LEP students before introducing the game to the whole class; discuss (or act out) the importance of each change and result to ensure comprehension. In this way the LEP students become experts who can help others with learning the Natural Change Game. Have available translations (provided) of the change cards and results for LEP students to refer to as needed.



Key Words: natural changes: los cambios naturales; geologic changes: los cambios geológicos; succession: la sucesión; response to weather: la reacción climatológica

Journal Exercise

Have students choose one of the three change pictures she or he drew. Have the students write a short paragraph explaining what changes and results occurred in the picture and why.



Assessment

The finished drawings and the journal exercise serve as an evaluation tool.

Extensions

1. Plan a field trip to one or more of the following places.
 - New Mexico Museum of Natural History & Science. The museum exhibits illustrate the changes that have taken place in New Mexico over many millions of years.
 - Sandia Mountains. Return to the Sandia Mountains during another season to compare changes noticed over a short time. Suggested areas to visit include Canyon Estates Trail (good fossils, too), Doc Long Picnic Area, and Tree Springs Trail.
 - Albuquerque Volcanoes. Examine how the ecosystem has changed over the past 150,000 years since the last eruptions.



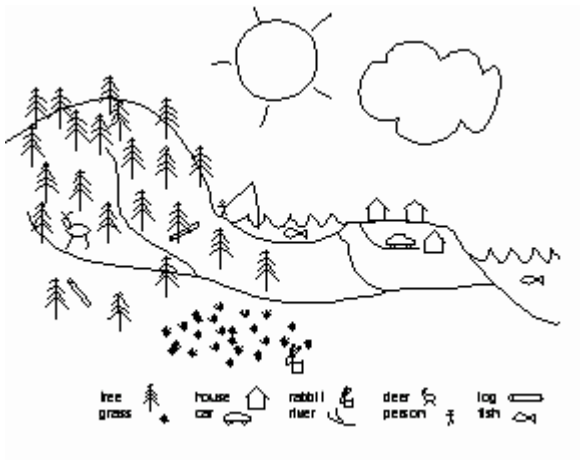
2. Have students bring in pictures and newspaper articles of ecosystems that are changing on a global scale and also in their local community.
3. Discuss with the students changes that are always happening that have not been discussed (e.g. weather, seasons, etc.).
4. Have students write a story from the viewpoint of some part of the Ecosystem affected by the change both immediately and in 10 years. (i.e. animal population).

On the Field Trip

Have the students look for examples of change during the field trip.



Ecosystem Worksheet



Change _____ Rate _____

Ecosystem picture

Results:

- 1.
- 2.
- 3.

Change _____ Rate _____

Ecosystem picture

Results:

- 1.
- 2.
- 3.

Change _____ Rate _____

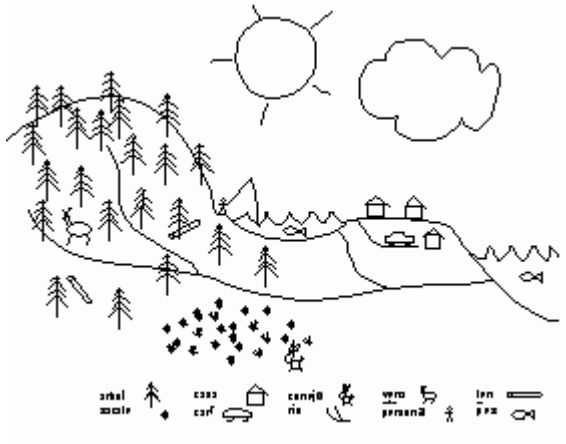
Ecosystem picture

Results:

- 1.
- 2.
- 3.



La Hoja del Ecosistema



Cambio _____ Rapidez _____

El retrato del ecosistema

Resultados:

- 1.
- 2.
- 3.

Cambio _____ Rapidez _____

El retrato del ecosistema

Resultados:

- 1.
- 2.
- 3.

Cambio _____ Rapidez _____

El retrato del ecosistema

Resultados:

- 1.
- 2.
- 3.



Change Cards

Forest Fire FAST CHANGE	Meadow Changes into a Forest MEDIUM CHANGE	Land Uplifts SLOW CHANGE
Landslide FAST CHANGE	Lake Changes into a Meadow MEDIUM CHANGE	Mountains Erode SLOW CHANGE
Volcanic Eruption FAST CHANGE	Climate Cools Down MEDIUM CHANGE	Sea Moves onto Land SLOW CHANGE
Flood FAST CHANGE	Drought MEDIUM CHANGE	Sea Dries Up SLOW CHANGE



Tarjetas de Cambio

<p>Fuego Forestal</p> <p>CAMBIO RÁPIDO</p>	<p>Las Praderas se Transforman en Bosque</p> <p>CAMBIO MEDIO</p>	<p>Elevación de los Suelos</p> <p>CAMBIO LENTO</p>
<p>Derrumbe Deslizamiento</p> <p>CAMBIO RÁPIDO</p>	<p>Los Lagos se Transforman en Praderas</p> <p>CAMBIO MEDIO</p>	<p>Erosión de Montañas</p> <p>CAMBIO LENTO</p>
<p>Erupción Volcánica</p> <p>CAMBIO RÁPIDO</p>	<p>El Clima se Enfría</p> <p>CAMBIO MEDIO</p>	<p>Los Mares Invaden las Tierras</p> <p>CAMBIO LENTO</p>
<p>Inundación</p> <p>CAMBIO RÁPIDO</p>	<p>Sequía</p> <p>CAMBIO MEDIO</p>	<p>Los Mares se Secan</p> <p>CAMBIO LENTO</p>



Natural Change Results Sheet

Plants are cleared out.	New types of plants move in.	New plants grow.	Houses and buildings are destroyed.
Land is covered with fertile silt. Silt is good for growing plants.	Stream channels change shape and size.	New types of animals move in.	Plants and animals are wiped out.
Rocks and soil are moved.	Land is covered with fertile ash. Ash is good for growing plants.	Land is raised to a higher elevation.	Land is covered with salt water.
Land surface is worn down by water.	Land is covered by mud and rock.	More snow and rain fall each year.	Soil gets drier.
Temperature is warmer each year.	Streams carry less water.	Streams carry more water.	Temperature is colder each year.



Natural Change Hoja de Resultados

Las plantas muertas son removidas.	Se mudan nuevos tipos de plantas.	Crece nuevas plantas.	Casas y edificios son destruidos.
Los suelos son cubiertos con agua y cieno. El cieno es bueno para crecer plantas.	Las corrientes cambian de tamaño y de forma.	Nuevas clases de animales se mudan.	Las plantas y los animales se extinguen.
Las piedras y la tierra se mueven.	La tierra está cubierta con ceniza fértil. La ceniza es buena para crecer plantas.	Los suelos toman mayor elevación.	Los suelos son cubiertos con agua salada.
La superficie terrestre es desgastada por el agua.	La tierra es cubierto por lodo y roca.	Cada año cae más nieve y lluvia.	La tierra se seca.
La temperatura se entibia más cada año.	Las corrientes llevan menos agua.	Las corrientes llevan más agua.	La temperatura se enfría más cada año.

