



# EcoStax

## Overview

Climate change impacts ecosystems in a multitude of ways. In this game, participants will be able to simulate changes to one part of an ecosystem, with the goal of developing systems-level thinking about the broader impacts of climate change.

## Learning Goals

1. Gain an understanding of trophic levels and food chains.
2. Understand how abiotic components impact organisms within an ecosystem.
3. Observe how changes in climate alter ecosystem stability and organismal interactions.

## Materials

- 50 blocks
  - 24 green
  - 15 blue
  - 8 yellow
  - 3 orange
- EcoStax playing cards
- North/South Arrows
- Additional Resources (Available for printing in the EcoStax folder)

## Set-up

1. Lay out the North and South arrows approximately 10 inches apart.
2. In the EcoStax playing card stack, find the block color guide and position it so participants can read it. Place the other cards face down so participants can reach.
3. Construct a pyramid using 16 green blocks, 9 blue blocks, 4 yellow blocks and 1 orange block.
4. Place additional blocks just out of reach of participants.

## Procedure

1. Ask participants whether they've heard of an ecosystem before. Have a brief conversation based on their level of understanding (see guiding questions below), helping the visitor identify producers and consumers in an ecosystem of choice.
2. Set the scene. Tell participants that you are going to model what happens to their ecosystem under climate change and their goal is to keep the ecosystem balanced.

3. Have one participant draw a card from the stack and follow the instructions. In general, we suggest using Jenga rules (no touching other blocks) and not allowing any blocks placed during gameplay to be subsequently removed.
4. Have subsequent participants draw cards and follow the instructions until everyone has taken a turn or the ecosystem has collapsed.
5. Have a discussion about what was hard. Point out that all of these scenarios are actually happening. Connect back to their own ecosystem whenever possible.

### *Definition of Success*

Participants who complete this activity will be able to:

- 1) Give examples of ways that climate change is currently impacting ecosystems
- 2) Explain why a small change in an ecosystem can have a ripple effect
- 3) Make predictions about the future impact of climate change

## **Modifications and Guiding Questions**

### *For Younger Visitors*

Visitors below reading age may struggle with using the cards and may get frustrated with some of the harder challenges. For these visitors we suggest using the cards as inspiration and helping them play through a story of your own creation.

### *For Deeper Engagement*

Once the pyramid falls, challenge the participants to construct a different ecosystem using 30 blocks. Help the participants describe their ecosystem (maybe there are many primary consumers, but almost no secondary consumers). Once this is constructed, take inspiration from the cards and challenge them to keep their ecosystem balanced with harder and harder challenges. You'll notice that the blocks contain many different shades of each color. This is a way for you to help them understand how homogenous ecosystems may be more vulnerable than heterogeneous ones.

## **Further Resources**

### **NGSS Standards**

#### **3-LS4-4 Biological Evolution: Unity and Diversity**

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.\*

#### **MS-LS2-5 Ecosystems: Interactions, Energy, and Dynamics**

Evaluate competing design solutions for maintaining biodiversity and ecosystem services.\*

**MS-LS2-1 Ecosystems: Interactions, Energy, and Dynamics**

Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

**MS-LS2-4 Ecosystems: Interactions, Energy, and Dynamics**

Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

**HS-LS2-6 Ecosystems: Interactions, Energy, and Dynamics**

Evaluate the claims, evidence, and reasoning that the complex interactions in ecosystems maintain relatively consistent numbers and types of organisms in stable conditions, but changing conditions may result in a new ecosystem.

**HS-LS2-2 Ecosystems: Interactions, Energy, and Dynamics**

Use mathematical representations to support and revise explanations based on evidence about factors affecting biodiversity and populations in ecosystems of different scales.