



# Every Little Thing

Meera Sethi

## Overview

The *Every Little Thing* card game engages 1 or more players in making biologically realistic connections between **plants**, **animals**, and **climate variables** in a mountain ecosystem. In the long-form version, everyone wins when the game ends with all the cards on the table. The more relationships that individual players can create or identify, the more points they gain. The short-form tabling version of the activity engages participants in building the ecosystem one or two cards at a time, or in solving challenges when a full or partial ecosystem is already on the table.

## Learning Goals

1. Every organism on earth interacts with other species as it goes through life. It is common for people to be familiar with pairwise species interactions (e.g. predation, pollination) but less easy to see how relationships knit species together in a complex web. By physically connecting all the species represented in the deck, participants will be able to build their understanding of this concept and learn about specific types of interactions that take place in a mountain ecosystem.
2. Climate affects species directly, and also affects their relationships. Since species respond differently to climate, changes like earlier snowmelt or rising temperatures will affect individual organisms in unique ways, often leading to shifts in their relationships. Participants will gain an appreciation for how powerfully climate dictates the success or failure of life on earth.

## Materials

- 35 game cards, each representing a species, a climate factor, or a challenge
- Informational handouts (see Further Resources below)
- Notepad for keeping score in long-form activity (not included)

## Set-up

1. Set up the activity by laying out about 15-20 of the species cards on the table in

whatever set of relationships you like (use the facts on the cards themselves and the additional resources, as well as your own knowledge, to do so—there is no right way to do this). Aim to tile the cards using multiple connections wherever possible (i.e. don't just create one long linear chain of interactions).

2. Keep the challenge cards, climate cards, and additional species cards to the side, but visible.

## Procedure

### Short Form

1. When visitors approach, there are multiple ways for them to engage with the activity. It's easiest to offer one at a time, and invite additional participation depending on interest.
2. Looking at the cards as they are currently laid out, they can take one of the three challenges (finding certain types of interactions or explaining indirect links between species). You can show the challenge cards or just do this verbally: "Can you find some relationships where everyone benefits?" "What's the longest chain you can find of one animal eating another?"
3. They can add additional species to the network: "Do you want to help me build this ecosystem? Here is a black bear. Where could we put it?"
4. They can remove species from the network by playing a climate card: "What do you think would happen to grasshoppers if snow melted earlier? Let's look at what it says on the grasshopper card and on the snow card."
5. They can rearrange the network. "Do you think there are other ways to connect these cards?"

However visitors choose to engage, the goal is to encourage close observation and discussion.

If

people play a card or take a challenge, invite them to explain the thinking behind their choices. It is likely that just offering participants the opportunity to look at all the photos and facts will elicit many questions and comments on its own, even without any structured activity.

*Definition of Success: Participants will be able to observe some of the many ways living things interact with each other in both positive and negative ways. They will make some age-appropriate observations about the ecological importance of these relationships and the way climate affects them.*

## Long Form

1. **Engage:** Review types of species interactions using the Species Interactions Vocabulary handout or your own resources. Ask students for examples of each type of interaction that they are familiar with, have directly observed (e.g. they may have seen birds digging up insects from the ground, or bees visiting flowers), or read/seen something on television about. Discuss how these interactions affect each species, for better or worse. Optional: Use the Climate and Mountain Ecosystems and Overview of Species Types handouts to introduce mountain ecosystems and the idea of them being particularly vulnerable to climate change.
2. **Explore:** Divide the group into 4-5 teams and have them play the *Every Little Thing* card game using the rule sheet. If it seems like there are too many people for the teams to be tractable, additional roles for participants to play include timekeeper (if you want to set any limits on how long a turn can last), scorekeeper, and moderator. Encourage lively discussion during every turn; this is the real goal of the activity!
3. **Explain:** Have students reflect on what they learned through playing the game. What surprised them the most? Broaden the conversation about the game back to the idea that every living thing has relationships with different species that affect how it goes through life. Explain how climate affects individual organisms directly, but also affects their relationships with each other (e.g. if flowers bloom earlier when snow melts earlier, fruit may ripen at a different time than usual and affect the diet of animals that eat fruit). Discuss the idea of indirect interactions (one species affecting another even though they may never physically meet, e.g. grasshoppers affecting pollinators by feeding on plants and reducing their energy to produce flowers).
4. **Elaborate:** In groups, ask students to research a different ecological habitat (e.g. forest, desert, grassland, marine, urban) and build their own game involving at least 25 different species and climate factors (these can be different from the ones in *Every Little Thing*; e.g. rain instead of snow, wind, ocean currents, atmospheric pollution).
5. **Evaluate:** Have groups present their games to each other, exchange them for testing, and give each other feedback using a rubric.

*Definition of Success: Participants will understand how a community of living things is connected to each other through both direct and indirect relationships, and how changes in climate have the potential to disrupt these interactions and the community as a whole. They will have discussed these ideas with each other and learned from each other's knowledge and questions. Even if they are unfamiliar with the specific organisms in the game deck, they will be able to relate some of the types of interactions they have learned about to experiences they have had with plants and animals more common within their own communities.*

## Modifications and Guiding Questions

**Short Form:** The challenge cards mention earning points, something associated with the long-form activity. However, the short-form activity could be made competitive by keeping a scoreboard for the day on an easel by the table. Use the rule sheet to assign points for engagement or make up your own system. New visitors can try to beat previous high scores.

**Long Form:** Have students research specific species before playing the game. Later they can serve as experts to moderate disagreements about card placement involving “their” species.

## Further Resources

- Climate and Mountain Ecosystems
- Overview of Species Types

## Vocabulary

### **+/+ Relationships: Mutualism, positive for both:**

- Pollination, where flowers exchange food resources for help with reproduction.
- Ant-tending, where ants protect other insects like aphids and caterpillars) in exchange for food resources (the “honeydew” they excrete).

### **+/- Relationships: Exploitation, positive for one, negative for one:**

- Predation, where one party completely consumes the other (a spider preying on a grasshopper; a bird preying on a small mammal; a small mammal preying on a seed\*).
- Herbivory, where an animal feeds on plant tissues o Parasitism, where one species lives in or on another and depends on it.\*

### **-/- Relationships: Competition, negative for both:**

- Interspecific: different species that both use the same resource (e.g. two predators with the same prey, two herbivores that eat the same plant) competing with each other.
- Intraspecific: Members of the same species competing with each other .

### **+/0 Relationships: Positive for one, neutral for the other:**

- Facilitation, where one species benefits others just by going about its business (e.g. Nitrogen- fixing plants adding nitrogen to the soil that other plants use, decomposers recycling organic material into nutrients, ants aerating soil so water and nutrients can move through it more easily, ground squirrels making nests that bumble bees use later, spiders protecting plants from herbivores by preying on them)

\* You could also call seed predation a type of herbivory \* Blood-feeding mosquitoes don't live in or on their hosts, but most people think of them as parasites!

## NGSS Standards

**K-ESS3-1. Interdependent Relationships in Ecosystems** Use a model to represent the relationship between the needs of different plants and animals (including humans) and the places they live.

**3-LS4-3. Interdependent Relationships in Ecosystems** 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.

**MS-LS2-2. Interdependent Relationships in Ecosystems** Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

**HS-LS2-6. Interdependent Relationships in Ecosystems** Evaluate 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.

## Rules

This game challenges players to make biologically factual connections between **plants, animals, and climate** in a mountain ecosystem while encouraging lively discussion.

### Components

1. 36 game cards representing a species, a climate factor, or a challenge.
2. Notepad for keeping score (not included)

### Basic Setup

1. Shuffle the cards.
2. Draw a starter card and place it face up in the center of the table. Any **species** card can be a starter. Place the other cards face down in a stack. **OPTIONAL:** Designate a moderator (e.g. the teacher or facilitator) to make the final call on any disputed play.

## Starting the Game

1. The first player (or team) draws a card from the stack. If it is a species card\*, they try to make a logical connection between it and the starter card. If everyone playing agrees the relationship is plausible, the second card is placed next to the first (on any side). They receive 1 point. If the player cannot make a connection, they keep the card and earn 0 points.

\*If the first player draws a non-species card, they should cut the stack at a random point and place the card back.

## The Second Turn And Beyond

1. The game continues with each player/team drawing a card and attempting to connect it to those on the table, or keeping it if they cannot.
2. New cards must go next to an “open” side of one or more existing cards. If a new card touches multiple existing cards, the player can earn 1 point for each connection, but must also make a case for each connection.
3. Players holding cards when their turn comes again must still draw a new card from the deck, but can then place up to 2 cards on the table.

## Winning and Losing the Game

1. The game is complete when all the cards have been drawn.

## Rules for Every Little Thing

Scores are tallied by adding the points each player earned and subtracting the number of cards they are still holding. The player with the most points wins.

## Additional Instructions

***Making Connections:*** The facts written on the cards should be the baseline information used to make connections, and the group must accept any connections clearly based on these facts. Players can also use information they know from outside the game, AS LONG as they can convince a majority of the group that their argument is biologically plausible. For example, the cards do not say that humans sometimes destroy wildflowers by picking them, but someone could certainly make the case that they do!

***Climate and Challenge Cards:*** Climate cards are worth 2 points. They can displace any species card on the table; displaced species cards go back to the bottom of the deck.

To play a climate card, players make a case for how it affects the species they want to remove. E.g. Snow could displace a creature that hibernates because less snow with climate change=milder winters, so the animal may wake up to forage for food when none is available. Hints: 1) Temperature

and snow affect every species in some way! 2) Climate can displace a species via an INDIRECT interaction (e.g. higher temps mean subalpine firs move up into meadows, and a meadow plant is displaced). Both climate and challenge cards can either be discarded after being played or put back in the deck, depending on how long you want the game to last.

### **Alternate Rules**

1. **Speed:** Set a timer for 30 seconds (or your preferred length); players must play by the limit or keep their card.
2. **Groups:** If more than 5 people want to play, groups can take turns drawing cards and earning points.
3. **Gin Rummy:** For 2-3 players. Remove climate cards. Deal 3 cards each & keep the rest face down in a stack. Players take turns discarding a card and drawing a new one from the stack or discard pile. The first player to arrange all their cards into sets of 3 or more linear interactions (e.g. Lacewing eats Aphid, Aphid feeds on Lupine, Lupine enriches the soil for Anemone) wins.
4. **Who Am I?:** For a large group, especially after you have gotten to know the cards. Each player gets a card but cannot look at it. Players hold their cards face out to their foreheads and take turns asking other players questions to figure out what card they hold.