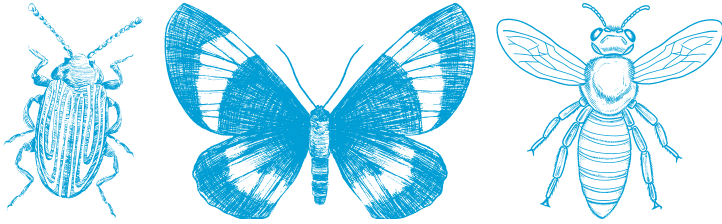# ACTIVITY 4: INDICATOR SPECIES SIMULATION

The purpose of this activity is for students to explore how certain bugs can reveal crucial insights about the health of our environment by modeling a typical Midwestern wooded area.

Materials:
- Species Identification Chart
- Ecosystem Health Chart
- Common bugs cards, (including indicator species, with name and photo of each on them, with multiple pre cut copies of each)
- Fake foliage, wildflowers, etc. to simulate wooded area
- Potting soil
- Blue construction paper
- Scissors
- Disposable aluminum half-sheet pans

First, inform students that they will be modeling how indicator species work to inform observers of the health of an ecosystem by conducting a simulation with a diorama. They will accomplish two goals during this activity:

1. **Design a model ecosystem** to reflect specific health conditions using an intentional distribution of common bugs and indicator species.
2. **Observe and investigate an ecosystem** from another group to determine its health based on species populations.

Then, have students form groups of 3-4 and gather the materials needed to design a model ecosystem. They can design their ecosystem however they like, but it should have materials distributed throughout the tray to included wooded areas and a freshwater source (e.g., a stream made of blue construction paper). They are making a diorama of the ecosystem first and then they will determine which species—and how big a population of each species—to include in their ecosystem.

Next, have students review the **Species Information Chart** and the **Ecosystem Health Chart** data to learn about the different possible species that they can include in their diorama. Once they have decided on which species, and how many of each they would like to include, they should obtain/create the common bug cards they need and distribute them throughout their diorama to simulate the populations of various bug and indicator species in their ecosystem models. Remind them that they need to think about which ecosystem health conditions they will be simulating with the species and populations they are selecting to put in their dioramas:

- Healthy Conditions
- Moderately Healthy Conditions
- Unhealthy Conditions

Last, once the ecosystem models are prepared, have groups trade dioramas and use their **Species Information Chart** and the **Ecosystem Health Chart** data to discern the health of another group's ecosystem that they made. Groups should take time to consider all the factors that the diorama contains, record their observations, and form a conclusion about the health of the ecosystem diorama. Once they have their analysis completed, they should craft a summary statement that includes a claim, evidence, and reasoning (CER) in order to communicate the health conditions they've determined for the model ecosystem. Review the CER format, or provide templates, if needed. They should spend time presenting to their partner group what they concluded about the health of their ecosystem and the creator group should reveal what their design intended to communicate and why that was the case. After all the groups have presented their models to another group and discussed their conclusions with one another, engage the entire class in a discussion to summarize key findings about indicator species and ecosystem health.

> *Teaching Tip: To save time and paper, have students research and prepare their own bug cards ahead of time.*