

Seventh Grade: Native Bee Habitat and Nesting Spaces

Standard

S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.

- Construct an explanation for the patterns of interactions observed in different ecosystems in terms of the relationships among and between organisms and abiotic components of the ecosystem. (Clarification: The interactions include, but are not limited to, predator-prey, competition, mutualism, parasitism, commensalism.)
- Develop a model to describe the cycling of matter and the flow of energy among biotic and abiotic components of an ecosystem. (Clarification statement: Emphasis is on tracing movement of matter and flow of energy, not the biochemical mechanisms of photosynthesis and cellular respiration.)
- Analyze and interpret data to provide evidence for how resource availability, disease, climate, and human activity affect individual organisms, populations, communities, and ecosystems.
- Ask questions to gather and synthesize information from multiple sources to differentiate between Earth's major terrestrial biomes (i.e., tropical rain forest, savanna, temperate forest, desert, grassland, taiga, tundra) and aquatic ecosystems (i.e., freshwater, estuaries, and marine).

Background

Students will upcycle waste materials to create native bee habitats. Upcycling reuses, recombines, or repurposes waste materials in recognizable forms rather than breaking down and forming new materials, as recycling does. Consider background information about reasons for native bee decline such as Pollinators in Peril by the Center for Biological Diversity. https://www.biologicaldiversity.org/campaigns/native_pollinators/pdfs/Pollinators_in_Peril.pdf or consult the National Native Bee Inventory and Monitoring Program for possible solutions: <https://www.usgs.gov/centers/eesc/science/native-bee-inventory-and-monitoring-lab>

Teaching Tips

Preparation Obtain used, clean containers and hollow stems or similar items (paper straws, sheets of paper that can be rolled into artificial stems, drill for making holes in wood, etc.) Collect other supplies on the Materials list.

Directions for this lesson and design challenge (on next page) are written for teachers. Provide students with the Eco-Engineering Challenge Lab Report Form from the appendix. Break students into groups of 3-4 for the Challenge.

Phenomenon: Present phenomenon in lesson without explanation before or after students view it.

What Do you Notice? Engage students in writing a tentative explanation (or making a labeled drawing)

What Do you Wonder? Engage students in asking their own questions, which will form the basis for their research.

Student Research After each student writes a question, consider placing each question on a sticky note, grouping them in categories, and allowing students to learn more in small groups according to their interests (worms and food waste). A curated collection of articles is provided for use in small groups, using the Jigsaw protocol. <https://www.jigsaw.org/>

Teacher-Directed Activity Show one or more explainer videos to students such as Monga Bay's "Solitary Bees" film: https://youtu.be/G6_xXQk6o28. Encourage the class to collectively make a rubric for evaluation of their bee habitats and nesting spaces.

Zero Heroes Lesson Activity This lesson is an Eco-Engineering Challenge to make native bee nesting spaces.

Revised Explanation Allow students to return to and revise their initial explanations of the phenomenon. Clear up any misconceptions about native solitary bees vs non-native honey bees that live in hives. Encourage students to provide examples of how the following factors affect bee populations: resource availability, disease, climate, and human activity in terms of effect on individual organisms, populations, communities, and ecosystems.

Extension Students may restore native bee habitat by planting appropriate nectar and hollow stem plants for nesting. The Data Nuggets activity: "To Bee or Not to Bee Aggressive" allows students to interpret data to determine whether aggression contributes to survival: <https://datanuggets.org/2017/06/bee-aggressive/> and "Do Insects Prefer Local Foods?" explores the impact of non-native species: <http://datanuggets.org/2014/01/do-insects-prefer-local-or-foreign-foods/>



Eco-Engineering Challenge: Build an Air Bee 'n Bee

The Phenomenon



What do you notice? (tentative explanation)

Show the image and engage students in writing about what they notice. This will serve as their tentative, initial explanation. At the end of the lesson, allow students to revise and refine their explanations to reflect what they have learned. Explanations may take the form of labeled drawings. Distribute copies of the Eco-Engineering Challenge lab report template in the appendix.

What do you wonder? (student questions)

Engage students in asking their own questions about the unexplained phenomenon. These questions will form the basis for student research. Use copies of the student lab report template in the appendix.

Curated Articles on Bees' Needs for [Research Jigsaw](http://www.jigsaw.org) www.jigsaw.org

Are Honey Bees Native? by USGS

<https://www.usgs.gov/faqs/are-honey-bees-native-north-america#news>

What is the Role of Native Honeybees in the US?

<https://www.usgs.gov/faqs/what-role-native-bees-united-states>

The Bee n Bee in Your Garden or How to Help Solitary Bees by Urban Pollinator Project: N Mitschunas

<http://urbanpollinators.blogspot.com/2012/08/the-bee-bee-in-your-garden-or-how-to.html>

Kids Abuzz to Save Bees by Washington Post adapted by Newsela

<https://newsela.com/read/kids-save-bees/id/2001011316/>

Insect Hotels: Refuge or Fad?

<https://entomologistlounge.wordpress.com/2017/09/18/insect-hotels-a-refuge-or-a-fad/>

Creating Pollinator Nesting Boxes to Help Native Bees by UGA Extension

<https://extension.uga.edu/publications/detail.html?number=C1125&title=Creating+Pollinator+Nesting+Boxes+to+Help+Native+Bees>

The Horrors of Mass-Produced Bee Houses by Colin Purrington

<https://colinpurrington.com/2019/05/horrors-of-mass-produced-bee-houses/>

Guide to Building a Mason Bee House by Colin Purrington

<https://colinpurrington.com/2019/05/guide-to-diy-mason-bee-houses/>

Eco-Engineering Challenge: Restore or Create Habitat for Native Solitary Bees

Native solitary bees are in decline due to lack of nesting spaces, resulting from loss of plants and habitat fragmentation. Design a way to create nest spaces or to restore habitat that meets the needs of native bees, according to your research.

Constraints

Time Allotted: _____

Materials: Students must upcycle or reuse waste materials to create healthy habitats or nesting spaces for native, solitary bees. For clarification of upcycling (reusing waste materials in existing form) vs recycling (breaking down waste materials to form new materials) see this article: <https://www.diversitech-global.com/post/recycling-vs-upcycling>

Materials Needed

- Waterproof container such as clean, used soup or coffee can; glass jar; metal container; wooden box; or solid piece of wood
- Hollow stems or similar items such as paper straws, rolled paper, cylindrical pasta, reeds, wood drilled with holes, etc.
- String or other materials to mount or fasten nesting space or habitat in an appropriate location for bees
- Tape for fastening rolled paper into artificial stems
- Drill, bits, safety glasses, and power source for making hollow spaces in solid blocks of wood (optional)

Revised Explanation

Allow students to return to and revise their initial explanations of the phenomenon.

