Lesson 1 ECOSYSTEMS and HABITATS

Teacher Guide

Learning Objectives:

- Students will understand what constitutes an ecosystem.
- Students will be able to describe how energy flows through a food web.
- Students will be able to list the major insect pollinated plants in our diet.
- Students will be able to distinguish between highly stable ecosystems and ecosystems with low stability.
- Students will be able to explain how their lives would change if insect pollinators were not present.
- Students will be able to discuss the differences between habitat and niche.

Question:

How do biotic and abiotic factors interact to make an ecosystem good for pollinators?

Introduction:

Living organisms depend on one another and on their environment for survival. Each organism in an ecosystem must fill its own niche if it is to survive. This introductory activity will help students develop the cognitive skills needed to understand the importance of conserving pollinator ecosystems.

Facilitating the Activity:

Day 0 - “Pre Work”

- Assign students to learn all they can about food webs and energy flow through a food web. They should be prepared to share the things they learned from their research the next day (Day 1).
    - INFORMATION
        - This can be a group discussion (3-5 students) or a homework assignment.
        - Give as little guidance as possible to allow students to research the topic. Encourage them to use different resources and “research” at different levels. Discuss trustworthy sources.
        - The activity focus is the process of learning what is important to know about food webs and how energy flows through them, rather than getting the correct answer.

Day 1 - CONNECTIONS

SHARE OUT

- Share – ask each student (or group) to share something that they learned through their research and write it on the board (or use padlet.com)

NOTES:

- If you find that many students did not complete the assignment or the “research” is limited to definitions have them help you construct a food web on the board.
- \When developing the food web bring attention to the idea that different consumers can get their energy from the same plant in different ways.
    - EXAMPLE: Clover (Deer eat them for energy while bees use their nectar for energy. Also, clover, a legume, fixes soil nitrogen.)

DISCUSSION

The Sun is THE source of energy.

Guide students to an understanding that energy ultimately comes from the sun and is transformed by plants and “consumers” eat them

You and pollinators are part of the same food web.

Discussion of food web Connections - Bring in a variety of foods: fruits, vegetables, and animal products to your classroom (See Attachment 1).

1. Reveal the array of **vegetables** – DO NOT discuss pollination at this point
    - Animal Pollinated
    - Other Pollinated

2. Ask the students to raise their hand if they have ever eaten each one of the vegetables.
    - If there is a vegetable that no one has eaten remove it from the table.

4. Reveal an array of **fruits** – do not discuss pollination at this point
    - Animal Pollinated
    - Other Pollinated

5. Ask the students to raise their hand if they have ever eaten each one of the **fruits**.
    - If there is a fruit that no one has eaten remove it from the table.

6. Reveal an array of animal/food products – do not discuss pollination at this point
    - Animal Pollinated
    - Other pollinated
    - Direct animal product (meat, cheese, etc)

7. Ask the students to raise their hand if they have ever eaten each one of the animal/food products . If there is a animal/food products that no one has eaten remove it from the table.

Assignment: The Web of Your Food

8. Have the students diagram a food web based on the products revealed and what they eat in a week.

Day 2 - ECOSYSTEM STABILITY

NOTE: Display the food items that you used on Day 1 of this activity.

SHARE OUT

- Have students share the food webs they created.
    - They could either hold them up or you could display submitted food webs using your Learning Management System (LMS).

DISCUSSION

Keystone species and their role in the stability of complex and simple food webs.

1. Ask the students “What is your definition of a keystone species.” Ask the students to identify what they think are keystone species in their food web.

2. Ask what they think would happen if they keystone species is removed from their food web.

3. Remove all of the animal pollinated products from your display.
    - Do not discuss the relationship to pollinators at this point.

4. Have the students cross out all animal pollinated products from their food web.

5. **PARTNER/NEIGHBOR**:Have student partners share what happened to their ecosystem when the animal pollinated foods were removed.

6. Ask the students to discuss with their partners what they think could be the possible causes of the loss of pollinators.

7. Sample some of those causes as a class.

8. Ask the students to discuss the possible consequences of the loss of pollinators.

ASSIGNMENT: 5 MIN QUIZ

9. Short quiz over the topics covered in the class discussion. (See attachment 2)

DAY 3 - Niche and Habitat

DISCUSSION

1. Show video(s) focusing on different types of pollinators.
    a. Suggestions
        i. Introduction to Solitary Bees
        ii. Secret Life of Orchids: The Pollinators
        iii. Tube-Lipped Nectar Bat-Untamed Americas

2. Guiding Question: What is the difference between an organism's niche and its habitat?
    a. Allow them to present their own ideas of what those things mean.
    b. **GUIDE** them to the correct concept of each with questions like:
        i. Did any of the pollinators live in the same habitat?
        ii. Now that you know what habitat is, and I'm telling you that habitat and niche are different, what could the possible explanations for niche be?

ASSIGNMENT: Wikipedia scavenger hunt

NOTE: Wikipedia is a crowd sourced information _____

1. Go to Wikipedia.com

2. Search for "Pollinator".

3. Click "Types of Pollinators" on the left.

4. Students will read through the Bee section. When they find something that interests them, write down the linked word and why it was interesting on their answer sheet.

5. Click on that link.

6. On the page that they went to read through it. When they find something that interests them, write down the linked word and why it was interesting on their answer sheet.

7. Click on that link.

8. Do this a total of 5 times.

9. Return to “Types of Pollinators.

10. Students will read through the Other Insects section. Repeat steps 5 - 10.

11. Students will read through the Vertebrates section. Repeat steps 5 - 10.

TEACHER APPENDICES

Classroom Discussion: This activity has many opportunities for classroom discussion to help students understand the relationship between pollinators and their food. This should lead to a discussion of the importance of good habitat and ecosystems for pollinators (and all animals).

Additional Information: Could reference Purdue Extension publications that address the topics of habitat and ecosystems. See, for example, www.edustore.purdue.edu, and search on either word.

Next Generation Science Standards: TBD

Fly Higher:

1. Participate in the Wildlife Habitat Evaluation Career Development Event (offered to 4-H and FFA students in Indiana and across the nation. See www.asec.purdue.edu/natural_resources/WHEP/
2. Compete in Indiana Envirothon - http://www.eeai.org/page-1768307
3. Start a student chapter of Environmental Education Association of Indiana - http://www.eeai.org/studentchapters
4. Master Pollinator Game.

Glossary:

- Consumers – Organisms that consume other organisms for the energy they need for life processes.
- Ecosystem – The interconnectedness between the abiotic and biotic factors in a specified area.
- Habitat – The location in which organisms find the necessary resources to sustain life.
- Keystone Species – The organisms within an ecosystem that are vital for the success of the ecosystem.
- Abiotic Factors - nonliving components of the ecosystem.
- Biotic Factors - living components AND/OR the result of living components in the ecosystem
- Food Web - The organisms in an ecosystem and how they are related with regards to energy flow.
- Habitat - Where an organism lives. (location)
- Niche - How an organism lives long enough to reproduce. (process)