Biodiversity

Grade Level(s)

Middle school

Estimated Time

30 minutes

Purpose

Students will be introduced to the concept and importance of biodiversity.

Materials

Links

Virtual resources: www.linncoag.com 2020/21 virtual learning-April

Instructional video: Seed diversity - YouTube

Ecosystems video: Understanding Ecosystems for Kids: Producers, Consumers, Decomposers - FreeSchool - YouTube

Recommended: Story of Seeds Amazon.com: The Story of Seeds: From Mendel's Garden to Your Plate, and How There's More of Less to Eat Around the World (9780544320239): Castaldo, Nancy: Books

Other

Natural vs managed signs

Seeds to identify

Seed identification worksheet

Optional: Growing letters Matrix Companion Resource (agclassroom.org)

Vocabulary

biodiversity: diversity among and within plant and animal species in an environment

biotic: relating to living things in an environment

ecosystem: a biological community of living organisms interacting with the nonliving parts of their environment

food chain: a hierarchical series of organisms each dependent on the next as a source of food

sustainable agriculture: farming practices and methods that are economically profitable, environmentally sound, and good for communities

Background

An **ecosystem** is a biological community of **living** organisms interacting with the **nonliving** parts of their environment. There are two main components of an ecosystem. The **biotic** factor is made up of living organisms like plants, animals, fungi, and bacteria. The **abiotic** factor is made up of nonliving components like soil, weather, water, and rocks.

Natural ecosystems consist of many species of plants and animals while managed ecosystems have fewer species that are selected by humans and are limited in diversity. Natural ecosystems are self-sustaining as opposed to managed ecosystems that require the assistance of humans. Humans control many of the interactions in an agricultural ecosystem, including soil condition, soil erosion, water quality, and animal habitats. While sunlight is the energy source for both natural and managed ecosystems, managed systems may supply additional fertilizer and nutrients to the soil. Food chains in a natural system are more complex than in a managed system.

There are many techniques farmers can use to protect agricultural ecosystems, including managing water wisely; building and maintaining healthy soil; minimizing air, water, and climate pollution; and promoting **biodiversity**. **Sustainable agriculture** refers to farming practices and methods that are economically profitable, environmentally sound, and good for communities. Sustainable farming practices include rotating crops, planting cover crops, reducing or eliminating tillage, applying integrated pest management (IPM), integrating livestock and crops, adopting agroforestry practices, and managing whole systems and landscapes.

Interest Approach – Engagement

What is an ecosystem and why is it important? Watch Understanding Ecosystems for Kids: Producers, Consumers, Decomposers - FreeSchool - YouTube

Lead a discussion about ecosystems. Include the following points in the discussion:

- Ecosystems are communities of living things interacting with the nonliving things in their environment.
- The nonliving parts of an ecosystem include sunlight, temperature, air, weather, water, rocks, and soil.
- The living parts of an ecosystem are the plants and animals living in it. There are three main types of living things in an ecosystem—producers, consumers, and decomposers.
- Producers make their own food typically through the process of photosynthesis.
- All animals are consumers that rely on producers and/or other consumers for food.
- Decomposers consume dead plants and animals and break them down into nutrients that are released into the soil. The nutrients are used by plants to help them grow.
- We can protect ecosystems by cleaning up trash, planting trees, conserving water, and electricity, and creating habitats for wild animals.

Procedures

1. Watch the instructional video
2. Prior to this activity, place one of the *Four Corners Signs* into each corner of the classroom.
3. Show the students the *Definition Signs*. Ask them to match the words with the definitions. Match the words and definitions together on the board:
    a. natural: existing in or caused by nature; not made or caused by humankind
    b. manage: to take charge or care of
4. Provide each student with an *Ecosystem Card.* Ask the students to determine the corner in which their card fits—Natural Ecosystems, Managed Ecosystems, Both Natural and Managed Ecosystems, or Neither Natural nor Managed Ecosystems—and move to stand in that corner.
5. Have each student share with the class why their card fits with the corner they chose.
6. Discuss the differences between natural and managed ecosystems. Include the following points in the discussion:
    a. Natural ecosystems consist of many species of plants and animals. Species in managed ecosystems are selected by humans and limited in diversity.
    b. Natural ecosystems are self-sustaining. Managed ecosystems require the assistance of humans.
    c. Humans control many of the interactions in a managed ecosystem, including soil condition, soil erosion, water quality, and animal habitats.
    d. While sunlight is the energy source for both natural and managed ecosystems, managed systems may supply additional fertilizer and nutrients to the soil.
    e. Food chains in a natural system are more complex than in a managed system.
7. Ask students to discuss the importance of the diversity in natural ecosystems. How do we make our managed ecosystems like farms more diverse? How do we mimic natural ecosystems? Seeds play a large role in increasing diversity! Farmers will often follow crop rotations. This helps increase diversity in the soil.
8. What crops do we primarily grow here in Iowa? What do those crops provide us?
    - Field corn is used in over 4000 different products including corn starch, corn tortillas, and corn syrup. Field corn is also fed to livestock and made into ethanol (fuel).
    - Soybeans are fed to livestock, made into biodiesel, and made into products we eat and use every day like soymilk, tofu, vegetable oil, crayons, candles, car seats, etc.
9. Distribute the seed samples and seed identification worksheet. Explain to the students that they will be learning about common seeds grown here in Iowa. Investigating similarities and difference.
10. Review
11. Optional fun activity: growing letter (supplies: seeds, paper, glue and water) Matrix Companion Resource (agclassroom.org)

Organization Affiliation

National Ag in the Classroom and Morgan Hibbs with Linn County Farm Bureau

Original lesson plan: Matrix Lesson (agclassroom.org)

Agriculture Literacy Outcomes

T1.6-8.a Compare and contrast the advantages and disadvantages involved when converting natural ecosystems to agricultural ecosystems.

T4.6-8.b. Describe how biological processes influence and are leveraged in agricultural production and processing.

Iowa/ Common Core Standards

MS-LS2-1. 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. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.