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Lesson Topic: Biodiversity and Health of Ecosystems

Objective:
Students will be able to:

1. Predict patterns of interactions among organisms.
2. Propose a solution to modifying an imbalance in an ecosystem.
3. Evaluate solutions for maintaining biodiversity in the ecosystem.

Time Required: 90 minutes

Materials Needed:

- Access to online videos
- Teacher computer with internet access
- Projector, SmartBoard/Promethean Board, or 1:1 student devices for audio visual needs
- Claims, Evidence, Reasoning Handout (attached)

Teacher Preparation:

- Assign a Legends of Learning Instructional Quick Play playlist for the day(s) you will be teaching the lesson.
    - Instructional - Middle School - Biodiversity and Health of Ecosystems
- Assign a Legends of Learning Content Review Quick Play playlist for the day after the lesson.
    - Content Review - Middle School - Biodiversity and Health of Ecosystems
- Prepare copies of Claims, Evidence and Reasoning Handout
- Ensure audio-visual and technology are ready to use.

Engage (10 minutes):

1. Ask students to describe an ecosystem (review of previous learning) and explain how they know whether or not it is a healthy ecosystem.
    a. Answer: It is an area in which plants and animals live together and interact. If the animals and plants are thriving, the ecosystem is healthy. If too many are dead or sick, the ecosystem is not healthy.
2. Focus the students on the biodiversity of a region. In general, do we think of an ecosystem as healthy if there are many species or few species?
    a. Answer: Many species

Explore (30 minutes):

1. Students should watch the Zoom video, An Everglades VIsit. (3 minutes)
2. Discuss the biotic and abiotic factors in the everglades and how they interact.
    a. Answers: Biotic are living factors (plants and animals) and abiotic are non-living factors (rainfall, temperature, soil type, etc.). The everglades have a lot of rainfall which helps provide freshwater for plants and animals. Some of the animals eat plants and others eat animals, so the conditions they live in (temperature, soil type, etc.) is important in the ecosystem.

3. Show the NBC News video on the invasive Burmese Python in Florida Everglades. (2 minutes)
4. Ask students to think about the implications of adding this species and how that could affect other organisms in the ecosystem.
    a. Answers: The pythons will eat too many of the animals from the ecosystem and offset the balance; therefore making the ecosystem have less diversity and become less healthy.
5. Have students complete the Legends of Learning Instructional Quick Play playlist.

Explain (30 minutes):

1. Give students the Claims, Evidence and Reasoning Handout.
2. Ask them to work with a partner to evaluate each situation and use evidence and reasoning to support their claims.
3. Students select one of the three scenarios and propose a solution to share with other students.
4. Students will evaluate each other's proposed solutions and determine which one, for each of the scenarios, the class would recommend to wildlife officials.

Elaborate (10 minutes):

1. Students should list other issues that affect biodiversity sustainability such as government funding, pollution, habitat destruction, etc. These can be further studied.

Evaluate (10 minutes):

1. Evaluate the reasoning and evaluative skills of students through the Claims, Evidence and Reasoning Handout.
2. Have students complete the Legends of Learning Content Review playlist (day after the lesson).

Additional Lesson Strategies:

- To use Legends for additional instruction, create a custom playlist with an instructional game and pre and post assessment.
- To use Legends for a quick formative assessment, create a 5-question assessment in a playlist.
- To use Legends for a student-directed experience, create a targeted freeplay playlist.
- Encourage students to play on their own at home in Legends of Learning: Awakening for a student-driven experience including avatars, battling, and quests all centered around topics they are covering in class.

Claims, Evidence and Reasoning:
Biodiversity and Health of Ecosystems

Name: _____

Part I Directions: For each scenario, write a ***claim***- a sentence stating whether or not the ecosystem is stable and healthy or not stable and healthy. Also state ***evidence***- scientific data from the scenario to support your claim. Finally, provide your ***reasoning***- why the evidence supports your claim.

Scenario A: Overpopulation of white tail deer led to the deer having more accidents with vehicles, more starvation and more diseases. Therefore, wildlife management officials have authorized specific hunting seasons to reduce the number of deer and non-hunting seasons to allow for rebound in numbers.

Claim:

Evidence:

Reasoning:

Scenario B: Bumblebees are important in the pollination of plants, enabling the plants to reproduce. However, the bumblebee population is being reduced due to loss of bee habitat, pesticide use, and disease. There is concern about reduction in crops, such as blueberries and apples, that rely on pollination by bees.

Claim:

Evidence:

Reasoning:

Scenario C: The venomous cane toad was released into a new environment in an effort to control the destructive cane beetle population. Unfortunately, the toads did not reduce the numbers of beetles. The toads became very successful at reproducing themselves, in part because they have no natural predators. Now there are fewer plants due to the destructive beetles, large numbers of beetles and large numbers of cane toads.

Claim:

Evidence:

Reasoning:

Part 2 Directions: Select one of the three scenarios above and propose a solution to the problem observed or modify the current solution. Be prepared to share your proposal and evaluate those of your classmates.

Answer Key:

Scenario A:

- Claim: The ecosystem is fairly stable now that there is managed hunting.
- Evidence: The number of deer is reduced, but time is allowed for them to grow in population.
- Reasoning: Too many deer were a problem and could be again if the population is allowed to go unchecked.

Scenario B:

- Claim: This is not a stable or healthy ecosystem.
- Evidence: The bumblebee numbers are lower than before due to loss of habitat, pesticide use, and disease.
- Reasoning: If the bumblebees don't pollinate the flowers on the crops, there could be a reduction in food production.

Scenario C:

- Claim: This ecosystem is not stable or healthy.
- Evidence: There are still too many beetles, and too few plants. Now there are too many frogs.
- Reasoning: The beetles were hurting one population and when the toads were brought in to reduce the beetles, the plan failed. Now we have additional problems with the frogs.