



Pest & Disease Control Department

Lesson 4 - Aliens Among Us!

Essential Questions:

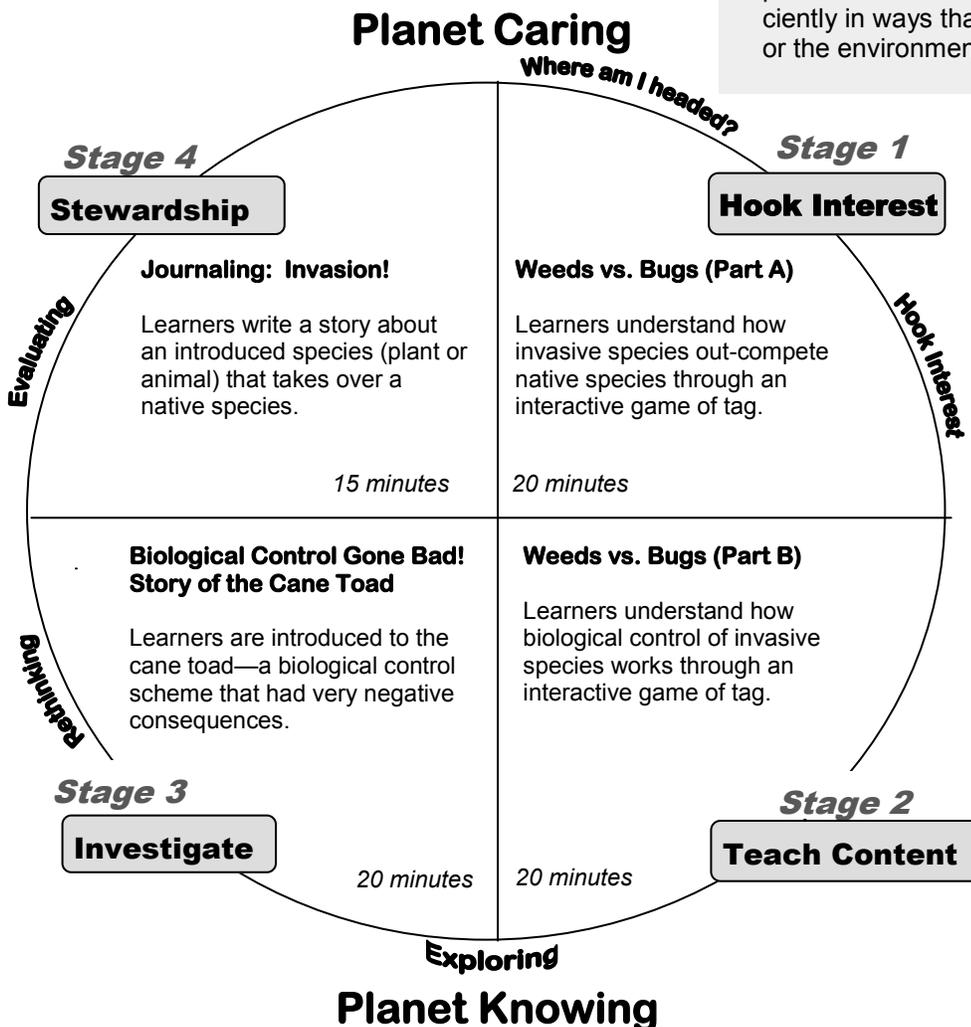
*What is biological control of invasive or pest species?
How do invasive animal and plant species impact ecosystems?
What can be some negative impacts of biological control?*

At a Glance:

Learners play a fun game of 'blog' tag to understand how invasive species easily out-compete native species; and how biological control can be used to help bring invasive species into balance. An example of biological control 'gone bad' shows the importance of research and understanding of both the invasive and the control species. The lesson ends with a journaling activity about an introduced species invading the habitat of a native plant or animal.

Concepts:

- Populations of most organisms are kept in balance by interactions with other species. This is called biological control.
- Some insects and invertebrates are clearly harmful to human health, crops, and livestock and/or animals and need to be controlled.
- It is desirable to restrict use of pesticides and other chemicals and utilize other means of control such as natural predators and attractants, where possible.
- Integrated pest management (IPM) is an approach that seeks to control pest insects efficiently in ways that do not harm human health or the environment.



Objectives

Learners ...

- 1) describe how invasive species can out-compete native species.
- 2) examine host-specificity and why populations of control agents decline as their host declines.
- 3) relate the dynamic relationship between host and control agent.
- 4) distinguish the difference between eradication and management.
- 5) name a biological control that did not work or had negative consequences.
- 6) explore creative aspects of journaling.
- 7) understand the negative impact of invasive plant introduction.

PROCEDURES IN BRIEF: Lesson 4—Aliens Among Us!

Stage 1. Weeds vs. Bugs

Procedure: NOTE: *In depth activity-Please see full write-up.*

Part A: Invasive Species Attack!

1. Provide background information on native plants, purple loosestrife, and leaf beetles.
2. Tell learners that everyone, except for one student, will begin as a native plant. Select and identify a student to play the role of purple loosestrife, a non-native plant
3. Explain the following rules for the game:
 - Tell learners to try to stay away from the purple loosestrife.
 - Explain that purple loosestrife converts native plants to more loosestrife by tagging them. When tagged, a native plant must join hands with the purple loosestrife. Joining hands represents purple loosestrife successfully out-competing a native species and spreading.
 - Hand in hand, both learners will search for more native plants to overcome. Only the outside hands on either end of the chain may tag learners. Learners who have been tagged must join the growing loosestrife chain.
 - Loosestrife may split into smaller groups. Loosestrife must have at least two people per group—no individual runners. The splitting and joining of loosestrife to best meet the needs of the game represents the plant's ability to adapt.
4. Once learners understand the rules, allow native plants to distribute themselves on the playing field.
5. Have the purple loosestrife enter the playing field and begin the game. Loosestrife will eventually take over the entire field of native plants.
6. Gather learners together. Ask learners to describe what happened.
7. Give examples of why loosestrife is so successful in real life (massive seed production, seedling survival rate, lack of native herbivores).

Supplies

- photos of purple loosestrife and beetles
- chalkboard/paper and chalk/marker

Stage 2. Weeds vs. Bugs

Procedure:

Part B: Introduce Biological Control

1. Designate one student as a beetle. Explain that it is easy to identify the beetles, because beetles must beat their wings. Demonstrate the role of a beetle by rapidly waving your hands at all times.
2. Begin the game as before. Allow native plants to enter the playing field first, followed by a purple loosestrife.
3. Allow purple loosestrife to grow to about 10 learners before introducing the leaf beetle. Explain the following rules for beetles:
 - The leaf beetle is host-specific; it feeds only on purple loosestrife, not native plant species.
 - When a beetle touches a loosestrife, the loosestrife is converted to a beetle, because the beetle has successfully met its nutritional needs and reproduced.
 - A beetle may tag only one plant at a time, and it must tag the loosestrife only at its active ends, where learners tag others. If it is only a pair (two learners) of loosestrifes, one will become a beetle and the other will become a native plant. This shows how native plants will be able to reestablish an area after the purple loosestrife is removed.
4. Play the game until the beetle population has increased.
5. Stop the game while there are still some native plants, loosestrife, and beetles.
6. Gather learners together and ask them to describe what happened.
7. Describe what happens to the populations of native plants, loosestrife, and beetles in real life. The native plants begin to reestablish themselves and the loosestrife and beetle populations go up and down cyclically, with the loosestrife remaining at levels lower than they were prior to introducing the beetle.

Stage 3. Biological Control Gone Bad! The Story of the Cane Toad

Procedure:

1. Review the problems facing ecosystems when invasive species are introduced (loss of habitat, competition, endangerment, and extinction) and review the use of biological control methods.
2. Tell learners 'The Story of the Cane Toad in Australia'. You may use the condensed/bulleted version and then add extra information from the background section. Show the pictures of the Cane toads and tell how they can grow up to 10" long and 4 pounds.
3. Ask learners what made this case of biological control turn out so bad. Write their answers on a chalk/marker board or large piece of paper.
4. If time permits, allow learners to develop a skit about the cane toad. For example, one child is a sugar cane stalk, holding their hands tall in the air. Another child is Cane toad trying to jump up to reach the beetles at the top of the sugar cane. Other roles may be native frogs, crocodiles, insects, pets, etc.
5. To conclude, ask learners to brainstorm how scientists can prevent this type of invasive species situation from happening.

Supplies

- Cane toad images
- chalkboard
- chalk

Stage 4. Journaling: Invasion!

Procedure:

1. Discuss the problem facing ecosystems when invasive plant species are introduced (loss of habitat, competition, endangerment, and extinction).
2. Give a brief overview of the 'Invasion!' journal entry.
3. Allow learners to find a quiet place outside with their journals and/or 'Invasion!' worksheet. To start, have learners record the date, time, and surroundings of their journal entry.
4. Give learners time to read through and complete the journaling activity (15 minutes).
5. Gather learners back together and allow those who want to share to discuss their journal entries.

Supplies

- journal or 'Invasion!' worksheet
- pencil or pen

Imagine that you are a native plant, happily living in your own habitat, then an invasive species is introduced. Maybe you get along well at first, both sharing the same plot of land. Or maybe this "big, bad" plant is scary from the very beginning. Write a story about the experience of a native plant being taken over by an invasive plant. Alternatively, write a story about an exotic animal that has become invasive and predated native species into decline or caused other problems.