



Beavers: a Town Hall Role-Play Activity

LESSON

Introduction

This lesson will allow students the opportunity to learn about beavers and their importance to an ecosystem. Students will also learn about how ecosystem management has no simple answers. There are many perspectives from different community members, and everyone should play a role in making decisions within their community.

Learning Objectives

After the lesson, the students should be able to:

- Understand how beavers affect an ecosystem.
- Take the role of different community members in determining what is best for a community.
- Come up with ecosystem management solutions for beavers.

Key Terms

- ecosystem
- restoration
- habitat
- beaver dam

Time Requirement

Minimum 3 class periods (could be on separate days).
With extensions: up to 4 class periods

Grade Level

Grades 6-9

Teaching standards

NEXT GENERATION SCIENCE STANDARDS:

MS-ESS3-3

Apply scientific principles to design a method for monitoring and minimizing human impact on the environment.

MS-LS2-4

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

HS-ESS3-1

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-2

Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

HS-ESS3-1

Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and changes in climate have influenced human activity.

HS-ESS3-2

Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.

Materials

- Optional: drawing supplies (paper, colored pencils, markers)
- A smartboard or a laptop, projector, and whiteboard
- Computers with Internet access for research
- Slips of paper with the various town hall roles
- Printed article **Would beavers make good firefighters?** published in *Science Journal for Kids* (if reading in class)
- Printed copies of the handout: "Town Hall: What Should We Do About the Beavers?"
- A hat or box for drawing out the roles

Lesson Plan

1 GETTING STARTED

- Invite students to draw what they think a healthy river looks like. Depending on what supplies students normally have with them, you may want to provide drawing utensils.
- Ask students to swap drawings with someone sitting close to them and then discuss in what ways their drawings are similar and different.
- Based on the partner discussions, ask students to identify key features of a healthy river. Create a brainstorming list on the board.
- Show students one or both of the following videos:
 - **All About Stream Restoration** from Baltimore County
 - **Brougham Creek-Restoration** from Toronto Region and Conservation Authority
- Discuss what stream, creek, or river ecosystems need to be healthy, like:
 - A variety of species living and thriving there
 - Low levels of pollution
 - A suitable temperature range for the environment
 - Many obstacles, like fallen logs or rocks, that slow the water and cause air to mix with it, increasing the oxygen content for fish and other organisms living in the water. These also create a mix of deep pools and shallower areas, which create preferred habitats for a variety of organisms.

- A watershed with areas of vegetation. When the drainage area has too much concrete, the water flows very quickly and cuts deeply.
- The ability for the stream to overflow its banks at times (not confined in a deep channel). These overflow areas create temporary ponds and puddles that are excellent habitat for some organisms, including bacteria that convert nitrates to nitrogen gas (which is a healthy part of the atmosphere, whereas nitrates from fertilizers are harmful to the ocean when large quantities are washed out to sea).

You could ask them to modify their drawings or create new ones to illustrate what they've learned.

- Ask what students know about beavers. Where do they live? What are they known for? How do their dams affect the local ecosystem? Provide some information to fill in any gaps. Beavers help restore stream and creek ecosystems and provide important habitats for plants and animals that can't thrive when water moves too quickly. It would be helpful to show students one or more pictures of what a beaver den looks like in the wild; for example, [the main beaver pond at Schwabacher's Landing](#) on Google Earth.

Duration 15 min, depending on grade level

2 READING ASSIGNMENT

- Individually or in groups, have the students read the article [Would beavers make good firefighters?](#) published in *Science Journal for Kids*.
- Answer the assessment questions at the end of the article (teacher's key available on the same page).
- Discuss as a class. How do beavers help with wildfires? What is a beaver's habitat? What can you do to help prevent wildfires?

Duration 15 min, depending on grade level

3 ROLE-PLAY ACTIVITY: TOWN HALL

Students will be working together to determine what to do with the following situation:

A family of beavers has recently moved into a stream in the town. On one side of the stream is a nature park with lots of trails and places for outdoor recreation. On the other side of the stream is private farm/ranch property. As the beavers began building their dams and digging canals, some of the trails in the park started flooding. In addition, the farmers and ranchers are having their trees chewed down by the beavers, which they don't like. The town is in a fire-prone area that is currently experiencing a drought.

At the town hall, everyone will have a vote on what they want to do with the beavers according to the following options:

- | | |
|---|--|
| A | Lethal management: Get a permit to lethally trap the beavers and remove the dams. |
| B | Assertive in-place mitigation: Install pond-levelers, put wire wraps on important trees. |
| C | Passive in-place mitigation: Build boardwalks in the nature park where the trails have flooded, plant more trees. |
| D | Do nothing: Let the beavers be beavers. |

Give each student a copy of the handout: "Town Hall: What Should We Do About the Beavers?" Go through the situation and the options carefully with the students. Make sure they understand the vocabulary terms and the pros and cons of each of the options. They should then answer questions 1 and 2 on the handout.

Term	Definition
Pond-leveler	A pipe that extends through a beaver dam to prevent excessive flooding upstream from it
Passive	Not active
Lethal	Resulting in death
Drought	A long period of dryness
Prone	Having a tendency or increased possibility of something
Wire wrap	Woven metal fence used to protect tree trunks from damage
Assertive	Confident, active
Mitigation	Making something less damaging

Strategy	Pros	Cons
Lethal management	Results can be fairly quick.	New beavers will still be attracted if this is a good habitat for them, so the problem can start again. The ecosystem loses all the benefits of beavers.
Assertive in-place mitigation	The beavers aren't harmed. The ecosystem will still receive some of the benefits of beavers being present.	These interventions require professional installation and can be costly depending on how many are needed. The beavers are likely to continue expanding their habitat, which means the town will need to continue monitoring and installing more as needed. The benefits of the beavers' presence will be reduced.
Passive in-place mitigation	Recreational use will still be possible. The ecosystem will still receive nearly all of the benefits of beavers being present.	The boardwalks may need to be replaced over time. Some trails will probably still be lost. The ranchers and farmers affected by the beavers will have to wait a long time for new trees to grow.
Do nothing	The ecosystem will receive all of the benefits of beavers being present.	The community will have to accept all of the losses and damage caused by the beavers.

Write or print the following roles onto slips of paper and have students draw them from a hat or box. You can have multiples of the same role or include fewer roles depending on your classroom situation. While the handout is set up for students to work individually, you could also have them work with a partner or in groups.

- a) Farmer
- b) Rancher
- c) Outdoor recreation enthusiast
- d) Fisher
- e) Hunter
- f) Mayor
- g) Department of Transportation employee
- h) Department of Fish & Game employee
- i) Park employee
- j) Local student
- k) President of the birdwatching club

Once they have their role, students will need to research their role in the community and the effects they would likely be experiencing as a result of the beavers' presence. Questions 4-9 on the handout will help guide their research. Remind students of what kinds of online sources can be considered credible.

Explain to students how a town hall meeting serves to help communities make decisions that take into account the differing needs of various community members. Go over the expectations for how they should communicate with each other (being quiet during each other's presentations, raising their hands to ask clarifying questions after each student has finished, using respectful language, etc.)

Then assign the students to write a one-page summary (or for higher-level students, perhaps an argumentative essay) that includes their position and their research. Explain that this is what they will share during the town-hall presentation in an effort to convince the other community members. (This would also work well as a homework assignment.) An extension would be to have each student group create a short presentation via PowerPoint or Google Slides.

On the day of the town hall, pull the roles out of the hat or box to determine the order of the speakers. Each student (or group) will make their presentation and then answer questions from the other community members. You may want to empower the students to call on their peers to take questions and take a minimal moderating role, or more actively guide the discussion by calling on students. Question 11 on the handout will help students attend to their peers' presentations and prepare their questions. You may want to require students to write down a certain minimum number of questions, even if they don't ask them during the meeting.

At the end of the town hall meeting, students will vote on their final resolution. (See the appendix for ballots.) Explain to the students that they should vote on what they believe to be the most convincing solution that will not only help them (in their role), but also the most community members.

Tally the votes and then discuss the results with the students. Ask who voted for an option other than the one they presented on and why. You could also consider discussing to what extent they think that this simulated a real-life situation. How might a real-life situation have been different?

Duration 2-4 class periods, depending on grade level

Writing Extension

- **Reflection essay**

How do you feel about the way the town hall went? Did you identify with the role you were assigned or did your personal opinion differ? Which community member(s) did you find most persuasive? What were the results of the vote? Do you agree with this resolution?

- **Letter**

Write to a local council member or state representative. Describe the importance of beavers and their dams. Suggest possible steps to protect beavers or even reintroduce them in places where they've lost habitat.

- **Research report**

Research another animal that provides special benefits to the local ecosystem. Describe the animal, its habitat, and its needs (food, shelter, etc.) Then explain how other organisms in the ecosystem rely on it.

Credit

Special thanks to Dr. Emily Fairfax, who helped us create this lesson plan. You can follow her on Twitter [@EmilyFairfax](https://twitter.com/EmilyFairfax) or check out her original research here:

Emily Fairfax and Andrew Whittle (2020) *Smokey the Beaver: beaver-dammed riparian corridors stay green during wildfire throughout the western United States*. Ecological Applications.

<https://doi.org/10.1002/eap.2225>

Appendix: Ballots

A	Lethal management: Get a permit to lethally trap the beavers and remove the dams.
B	Assertive in-place mitigation: Install pond-levelers, put wire wraps on important trees.
C	Passive in-place mitigation: Build boardwalks in the nature park where the trails have flooded, plant more trees.
D	Do nothing: Let the beavers be beavers.

A	Lethal management: Get a permit to lethally trap the beavers and remove the dams.
B	Assertive in-place mitigation: Install pond-levelers, put wire wraps on important trees.
C	Passive in-place mitigation: Build boardwalks in the nature park where the trails have flooded, plant more trees.
D	Do nothing: Let the beavers be beavers.

A	Lethal management: Get a permit to lethally trap the beavers and remove the dams.
B	Assertive in-place mitigation: Install pond-levelers, put wire wraps on important trees.
C	Passive in-place mitigation: Build boardwalks in the nature park where the trails have flooded, plant more trees.
D	Do nothing: Let the beavers be beavers.

A	Lethal management: Get a permit to lethally trap the beavers and remove the dams.
B	Assertive in-place mitigation: Install pond-levelers, put wire wraps on important trees.
C	Passive in-place mitigation: Build boardwalks in the nature park where the trails have flooded, plant more trees.
D	Do nothing: Let the beavers be beavers.

NAME: _____

DATE: _____

Town Hall: What Should We Do About the Beavers?

A family of beavers has recently moved into a stream in the town. On one side of the stream is a nature park with lots of trails and places for outdoor recreation. On the other side of the stream is private farm/ranch property. As the beavers began building their dams and digging canals, some of the trails in the park started flooding. In addition, the farmers and ranchers are having their trees chewed down by the beavers, which they don't like. The town is in a fire-prone area that is currently experiencing a drought.

You are going to take part in a town hall. Your teacher will be giving you a role to research and play. There are four options about what to do with the beavers. You must determine which option you are going to support based on the research you conduct. After completing your research, you will write a one-page summary that you will share at the town hall. Be prepared for questions from the other members of the town hall.

1. Write the correct vocabulary term next to its definition.

prone, drought, lethal, assertive, mitigation, passive, pond-leveler, wire wrap

Term	Definition
	A pipe that extends through a beaver dam to prevent excessive flooding upstream from it
	Not active
	Resulting in death
	A long period of dryness
	Having a tendency or increased possibility of something
	Woven metal fence used to protect tree trunks from damage
	Confident, active
	Making something less damaging

2. Consider each of the following options for dealing with the beavers. In the table on the next page, write down at least one pro and con for each.

A. Lethal management

Get a permit to lethally trap the beavers and remove the dams.

B. Assertive in-place mitigation

Install pond-levelers, put wire wraps on important trees.

C. Passive in-place mitigation

Build boardwalks in the nature park where the trails have flooded, plant more trees.

D. Do nothing

Let the beavers be beavers.

Strategy	Pros	Cons
Lethal management		
Assertive in-place mitigation		
Passive in-place mitigation		
Do nothing		

3. What is your role in the community? (Write the role assigned to you.)

4. What role do the beavers play in your life? How are the beavers affecting you?

5. Why are beavers important to the environment?

