



Learning Activity:

FRESHWATER DAM DEBATE

Activity Type	Research and Persuasive Argumentation
Focus Area	Social Studies, Language Arts
Duration	Two class periods

Overview

The [Living Planet Report 2020: Youth Edition](#) highlights the importance of freshwater systems and how they are vital to life on land. Even though these freshwater habitats are important, they are some of the most threatened ecosystems on our planet. Habitats, including rivers, streams, wetlands, and lakes, are being damaged by human activities such as poorly planned dams. A global team of scientists and policy experts has recommended a six-point Emergency Recovery Plan, based on proven measures, to reverse the dramatic decline in freshwater biodiversity and ecosystem health. One of these measures focuses on dams and how to prevent the negative effects that dams cause. In this activity, students will learn about the pros and cons of dams from the perspectives of various stakeholders and will engage in debates to discuss the environmental, community, political, and business impacts of building dams to control freshwater.

Learning Objectives

At the completion of the activity, students should be able to:

- Build and deliver a persuasive argument from the perspective of a fictional stakeholder.
- Participate in educated discussions with peers to defend a given viewpoint.
- Understand the importance of freshwater and the benefits it provides.
- Learn the positive and negative impacts of freshwater dams.



H. Neely Henry Dam on Coosa River, Alabama, United States.



● Standards

C3 Framework for Social Studies State Standards:

- D2.Civ.2.6-8. Explain specific roles played by citizens (such as voters, jurors, taxpayers, members of the armed forces, petitioners, protesters, and office-holders).
- D2.Civ.6.6-8. Describe the roles of political, civil, and economic organizations in shaping people's lives.
- D2.Civ.10.6-8. Explain the relevance of personal interests and perspectives, civic virtues, and democratic principles when people address issues and problems in government and civil society.
- D2.Civ.11.6-8. Differentiate among procedures for making decisions in the classroom, school, civil society, and local, state, and national government in terms of how civic purposes are intended.
- D2.Civ.13.6-8. Analyze the purposes, implementation, and consequences of public policies in multiple settings.
- D4.1.6-8. Construct arguments using claims and evidence from multiple sources, while acknowledging the strengths and limitations of the arguments.

Common Core Standards: English Language Arts and Literacy in Science

- SL. 6.1/7.1/8.1: Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on topics and texts, building on others' ideas and expressing their own clearly.
- WHST.6-8.7: Conduct short research projects to answer a question (including a self-generated question), drawing on several sources and generating additional related, focused questions that allow for multiple avenues of exploration.
- WHST.6-8.8: Gather relevant information from multiple print and digital sources, using search terms effectively; assess the credibility and accuracy of each source; and quote or paraphrase the data and conclusions of others while avoiding plagiarism and following a standard format for citation.

● Materials Needed

- Printed copies of or digital access to the [Living Planet Report 2020: Youth Edition](#)
- Access to reference materials, including websites, articles, and credible news media
- Display board (such as dry erase, chart paper, or smart board)
- Writing utensils
- Paper for note-taking and brainstorming
- Copies of the stakeholder debate cards (included)
- Copies of the Brookham case study (included)



Vocabulary

- **Biodiversity:** all the different kinds of life found in one area, including animals, plants, fungi, bacteria, and genetic material
- **Dam:** a barrier constructed to hold back water and raise its level, forming a reservoir used to generate electricity or as a water supply
- **Ecosystem:** the living (plants, animals, other organisms) and nonliving (air, water, soil) components of an area that interact with each other in an interconnected way
- **Living Planet Report:** a comprehensive analysis of the state of our planet that is released every two years by WWF and other leading organizations and uses research findings of various biodiversity studies, including the Living Planet Index, to determine how nature is doing, what threats it is facing, and what that means for humans
- **Stakeholder:** a person with an interest or concern in something

Activity Procedure

Part 1: Engage

- To familiarize students with freshwater ecosystems and their importance, create an anchor chart to display throughout the activity as a reference. Organize the chart into three columns about freshwater: Where (is freshwater found), Who (uses/needs fresh water), and Why/How (is freshwater used). Have students contribute answers and compile their responses in the chart. See the example below:

WHERE (is freshwater found)	WHO (uses/needs freshwater)	HOW (is it used/needed)
Rivers	People	Drinking
Lakes	Fish	Bathing/brushing teeth
Marshes	Amphibians	As a habitat for animals
Wetlands	Reptiles	Cleaning
Streams	Birds	For machines
Bogs	Plants	To grow crops

- Now that students understand the numerous ways freshwater is relied upon by so many, share the fact that only 3% of the world's water is freshwater, and two-thirds of that is tucked away in frozen glaciers or otherwise unavailable for our use. This means that freshwater ecosystems—required for life on Earth and home to more than 100,000 species—account for less than 0.01% of the planet's total surface area.

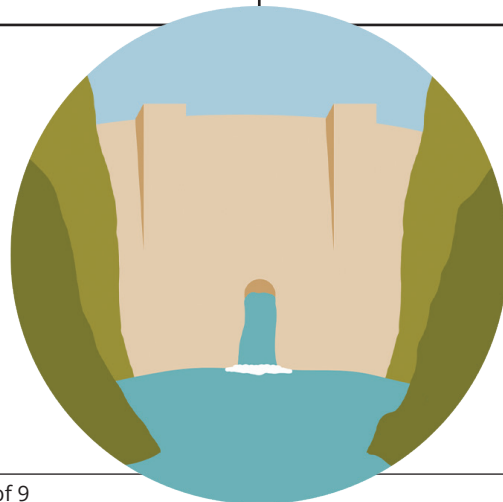


- Because freshwater is so limited, it is massively important to protect it. Unfortunately, human activities are threatening freshwater health. Have students brainstorm current threats they think are facing freshwater ecosystems. Possible answers could include climate change, pollution, and overuse/wasting of water.
- Determine your students' current comprehension of dams by asking them to share what they know. Introduce this activity by presenting the key question that students will be tasked with answering:
 - **Key Question:** *What are the social, economic, and environmental impacts of freshwater dams?*
- Have students generate additional questions they would need to address to answer the key question. Advise students to devise their lists by considering possible benefits and consequences associated with constructing freshwater dams. Have them refer to their lists during the activity's procedure.

Part 2: Explore

- Begin with students building upon their lists of questions by researching the pros and cons of freshwater dams. Make sure that students cite the references they use to find their information, sticking to credible sources such as scientific studies or science-based websites. Below is an example of possible answers.

Pros of Dams	Cons of Dams
They provide a renewable energy source. Hydroelectric power is created when water passes through a dam via a turbine. Hydroelectric power plants provide clean energy with low operational costs.	Poorly managed dams can divert and disrupt the natural flow of rivers, thereby affecting wildlife and people. Migrations of species such as fish and river dolphins are disrupted, which affects their ability to breed and feed.
Dams can control waterways, which can reduce flooding by diverting water into the dams.	About a quarter of the world's river basins run dry before they reach the sea because so much water has been taken from them due to damming.
Dams create reservoirs, which can be used for industrial and farm activities.	Dams can cause a risk of sediment buildup. When water passes through a dam, it can trap sediment and create sediment layers that can disrupt the freshwater habitat and pollute the water.





Part 3: Explain

- Ensure that each student has a printed copy of or digital access to the fictional Brookham case study. Allow them several minutes to read and review the fictional scenario.
- Prompt students to consider who might be affected if a new dam were to be built in this town and who the decision makers are (these are the stakeholders who would be involved in the debate).
- Split the students into small groups of two or three. Assign each group one of the stakeholder cards. If there are not enough groups for all of the cards, then ensure that there are stakeholders who represent both the pros and cons of dams.
- Inform students that they will be participating in a town-hall style debate and that, as a group, they will be role-playing, defending the position of their assigned stakeholder.
- Have students research basic facts about their stakeholders. Here are some examples of factors they can consider:
 - What role do they play in the community?
 - What are the social and economic factors involving their stakeholder? What are their basic interests in the conflict?
 - Whom does your stakeholder represent?
 - What other groups in the community are their stakeholders involved with?
- Students should discuss their stakeholder's opinion on the building of the dam, weighing the pros and cons based on what the individual has to gain or lose. Here are some prompting questions to form their debate:
 - How will their stakeholder be affected by the dam?
 - What does the stakeholder feel are the pros and cons of the dam?
 - What is the stakeholder's main motivation for their argument?
 - What does the stakeholder stand to lose or gain from this scenario?
 - How does the dam affect (1) the town of Brookham, (2) livelihoods in the area, (3) freshwater wildlife, (4) other wildlife and biodiversity, and (5) the local environment and landscape?
- Encourage students to be creative when developing their argument and to use demonstrations and/or visual aids if it will help build their case. As part of their argument, students should include what their stakeholder would propose as the best scenario/solution for the future of Brookham. Reinforce that they should be prepared to answer any arguments or questions that others might pose to them.



Part 4: Elaborate

- Hold a town-hall style debate around the dam proposal for Brookham, giving each group/individual a chance to present their argument without interruption. Instruct students to take notes as other groups present their arguments, as they will have a chance to respond.
- The debate will be broken into two parts. A time limit for arguments may be assigned, if desired.
 - First, have each group/individual present an overview of their specific stakeholder’s opinion on the potential construction of the dam. This section should focus on presenting arguments either for or against the dam.
 - Second, after all stakeholders have presented, provide the students with an opportunity to respond to their classmates’ arguments. Ensure that students are still speaking as their stakeholder. During this portion, they may respond to other people’s claims and support or question other arguments.

Part 5: Evaluate

- Have each student/group cast a vote on the dam proposal. Votes should be based on the points raised by themselves and their classmates.
- Conclude the activity with a group discussion highlighting the points raised in the debate. Here are some discussion questions to consider:
 - What were some of the strongest arguments? Which ones needed more information to support them?
 - Which scenario seemed the most feasible for Brookham?
 - Which stakeholders had similar opinions? Which had different opinions?
 - How did students form their arguments, based on their given stakeholder? What types of sources did they research?
 - What were some noticeable trends between specific stakeholders and their opinions?
 - Were the students’ personal opinions about freshwater dams similar to their stakeholders’ opinions? Why or why not?
- To tie the activity back to the key question, ask students which factors seemed to prevail in the debate. Did the arguments focus on social, economic, or environmental impacts? Or did the arguments focus on a combination of these factors? What does this say about other environmental decisions that include these three categories?
- Ask students the following questions:
 - How did this debate feed into the issues presented in the [Living Planet Report 2020: Youth Edition](#)?
 - How does taking part in this debate make you feel about the challenges set out in the [Living Planet Report 2020: Youth Edition](#) and the solutions needed? Because each biome is part of a world that



works together, it is imperative that we do not damage part of our natural systems, as doing so will have dire consequences on Earth.

– If this scenario were to happen in your town, how do you think your community would react? Whom do you think would win? How would the decision affect your community?

- Discuss actions that everyone can take to help achieve global change and work to restore biodiversity.

Extended Learning Options

- Have students watch the [Our Planet](#) episode about freshwater. This episode is free to stream on YouTube. After the episode, lead a guided discussion about the main points in the episode, with the help of the [Our Planet guide to Our Fresh Water](#).
- Students can use this [interactive globe](#) to explore freshwater systems and take a journey across our amazing planet.

Additional Resources

- Article: [4 Species Impacted by Dams](#)
- Article: [Scientists find over 500 dams are planned in Protected Areas](#)
- Article: [Freshwater habitat](#)
- Video: [Biome tour of our freshwater](#)
- Video: [How to Save Fresh Water Flow](#)

For more fun classroom activities with a focus on wild species and conservation, visit wildclassroom.org.



Dead trees drowned by Itaipu lake, created by the Itaipu dam in the Atlantic rainforest, Brazil.

Photos: page 1 © Kevin Schafer/WWF; page 4 © WWF-INT; page 7 © Michel Gunther/WWF

© 2020 WWF. All rights reserved by World Wildlife Fund, Inc. WWF® and ©1986 Panda Symbol are owned by WWF. All rights reserved.



● Case Study: An Imagined Town—Brookham

Brookham is a small town next to the Pebblebank River. It is famous for its delicious crayfish, and many tourists visit each year to sample the fresh fish. There is also a large wetland reserve that provides a home to species such as otter, kingfisher, and water vole. A large dam was built near the town ten years ago, and planning permission has been given for another dam to be added just outside of Brookham, near the wetland reserve.

“This dam is being built to provide renewable energy and prevent flooding, and is in accordance with Damdirect’s 10-step plan to improve the environment for a more sustainable future.”



“This is an outrage. The new dam proposal is so close to my house that I will have to move.”

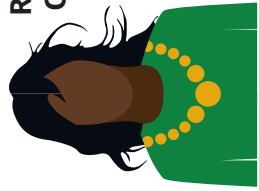


**NICK BRINE,
RESTAURANT OWNER**



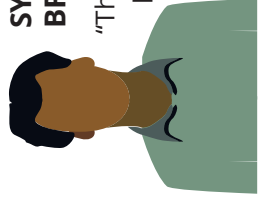
"My customer base relies on stocks of locally caught freshwater crayfish, salmon, and trout. We are famous for our fresh and local catch, and I am worried about anything that might affect that. Also, the new dam will spoil the view from our balcony area, which is packed in the summer and known as the best viewing spot in town."

**ROWENA RUSH, MAYOR
OF BROOKHAM**



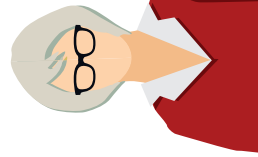
"I have received many letters and a petition with over 300 signatures from local residents asking me to ban the development of the new dam. Many of the residents are very unhappy that the building of the dam will cause noise disruption, and they fear that it may damage Pebblebank Wetland Reserve."

**SYED NAVEED,
BROOKHAM RESIDENT**



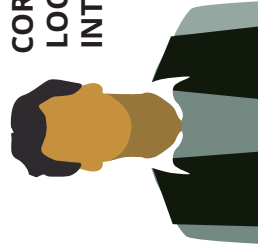
"This is an outrage. The proposed new dam is so close to my house that I will have to move. The price of my property has plummeted, and I remember the disruption that the other dam caused, ten years ago. I cannot go through that again; the dam development must be stopped."

**SUSAN SALMON,
TEACHER AT BROOKHAM
ELEMENTARY SCHOOL**



"I am worried that the treasured wetland area will be damaged and will no longer be accessible to families and schools that enjoy the area. I have asked my school community to write to our mayor to oppose the development."

**COREY STEVENS,
LOCAL FARMER AT THE
INTENSIVE BARLEY FARM**



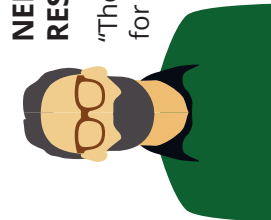
"I need a lot of water for my crops, and the dam will provide me with regular water flow, which is vital. All I want to do is make sure that the people in our community are fed and I have enough money to keep my farm going."

**VANESSA VALLEY,
DIRECTOR OF
DAMDIRECT, THE
DAM CONSTRUCTION
COMPANY**



"This dam is being built to provide renewable energy and prevent flooding, and is in accordance with Damdirect's 10-step plan to improve the environment for a more sustainable future. The resulting reservoir is essential for providing necessary fresh water to thousands of people."

**NED REED, WETLAND
RESERVE MANAGER**



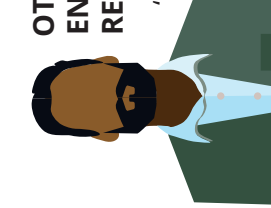
"The new dam will be disastrous for local species, as it will disrupt freshwater flow and will affect migratory patterns of fish. This dam development could result in the disappearance of birds on our floodplains and the extinction of fish and other aquatic species. The new dam should not be built, and the old dam should be removed to restore river flow and allow the wetland area a chance at recovery."

**MIKE MEANDER, STATE
REPRESENTATIVE**



"Concerned residents have raised important issues with me about noise pollution and damage to the wetland area. A small number of residents will be displaced. But building the new dam is cheaper than repairing the old one, and the dam will provide a range of economic benefits as well as provide our town with hydroelectric power and improved waste management."

**OTTO HUTCHENS, STATE
ENVIRONMENTAL AGENCY
REPRESENTATIVE**



"The development of this dam would be devastating to the freshwater ecosystems not only of the Brookham area but also further afield. Dams disconnect rivers from wetlands and floodplains, resulting in land erosion and sediment buildup. Reduced sediment load is essential for freshwater habitats."

