

LESSON TITLE	The Impact of Dams on the Environment				
SUBJECT (S):	Biology, Earth Science, Environmental Science				
GRADE LEVEL:	6-12	AUTHOR:	James Stockdale, MS		
TYPE OF LESSON (activity, lab, project...)	Literacy Activity		DAY(S):	3 days	

OBJECTIVE	
<p>Students will read and analyze informational pieces on pros and cons of dam projects and discuss with the group the environmental tradeoffs of using such systems, including water storage for human and agricultural uses, power generation, damage to ecosystems, decreased greenhouse gasses, etc. Students will write their recommendation for or against the Three River Gorge project using evidence to support their claims. They will discuss as a class how smaller dam projects are similar and different to larger projects and how that information affects their opinion on those projects.</p>	
NGSS/CC STANDARDS	ASSESSMENT(S) & GRADING/RUBRIC
<p>NGSS Science and Engineering: 1, 7, 8 Crosscutting Concepts: 1, 2 Core Ideas: LS2</p> <p>PERFORMANCE EXPECTATIONS Life Sciences: HS-LS2-6, HS-LS2-7; MS-LS2-1, MS-LS2-4, MS-ESS3-3</p> <p>CC ELA/LITERACY HS - SL.9-10.1; RST.9-10.2, RST.9-10.8, RST.9-10.9; MS – SL.8.1, WHST.6-8.1, WHST.6-8.9, RST.6-8.1, RST.6-8.8, RST.6-8.9</p>	<p>Rubric is provided</p>
SUBJECT AREA(S):	
<p>This project could be used in life science, biology, earth science, or environmental science courses when discussing ecosystems and effects of human activities.</p>	
TEXTS/MATERIALS/TECHNOLOGY/AUDIO-VIDEO/OTHER RESOURCES:	
<p>Articles from online sources (links provided) Projector linked to computer with internet and speakers Printed worksheets & rubric</p>	

INSTRUCTIONAL STRATEGIES/PROCEDURES/GROUPING:

DAY 1: In this lesson students will be asked to step out of their comfort zones and be stretched. It is important to set the tone for that and one fun way to do that is with a little video clip from “Kid President”- <http://youtu.be/RwlhUcSGqgs>

Activity 1

CASE STUDY: Wolf Wars: America’s Campaign to Eradicate the Wolf

<http://www.pbs.org/wnet/nature/the-wolf-that-changed-america-wolf-wars-american-campaign-to-eradicate-the-wolf/4312/>

After watching the video, have students read the first case study using an expressive reading technique. The way this works is that one student does a quick read aloud of a paragraph, followed by a partner reading the same paragraph expressively, then they switch roles and repeat.

If you are not familiar with expressive reading, here is a clip that demonstrates it:
http://youtu.be/DBjl3F_ldvk

You could model the practice for them or show this video. Either way, give the students an exemplar of what is being asked of them.

Following the expressive reading, have students write a 2-3 paragraph response on whether or not they feel wolves should be reintroduced into regions where they have been killed off, giving specific details to support their positions.

Activity 2

Close this day by showing one final clip, How Wolves Change Rivers

<http://youtu.be/ysa5OBhXz-Q>

Discuss with students the clip and how it demonstrates the interconnectedness of ecosystems in ways that we might not predict, unintended consequences, and how human interactions can play a significant role in nature. Here are a few questions that could be used in the discussion:

- Where are the wolves on the food chain? Consumer or producer? Predator or prey?
- How can soil erosion impact the shape of rivers?
- How did the wolves change the rivers?
- Why do you think humans could not control the size of the deer population as well as the wolves?

DAY 2: Now that students have a bit of experience with seeing the interconnectedness of ecosystems, we are going to give them a chance to predict the effects of a more recent change to the Yangtze River area of China. To begin the lesson, have students identify and name as many dams as they can throughout the world and write them on the board. Then have them try to rank them by size, largest to smallest. Following this activity, show them this clip of dams of the world: <http://youtu.be/JkadTXeCxEl>

Tell students that the largest of these dams is the Three Gorges Dam on the Yangtze River in China. Today students will be evaluating, individually and in small groups, the pros and cons of this renewable energy project.

Assign an article to each student.

<http://www.scientificamerican.com/article/chinas-three-gorges-dam-disaster/>
<http://www.greeniacs.com/GreeniacsArticles/Energy/Three-Gorges-Dam.html>
<http://news.nationalgeographic.com/news/2006/06/060609-gorges-dam>.
<http://iopscience.iop.org/1748-9326/8/4/041006/article>
http://www.nytimes.com/2007/11/19/world/asia/19dam.html?_r=0

They need to individually read their assigned article (The articles are intentionally chosen at varied lengths and levels of difficulty so that the teacher can vary instruction based on student capabilities within groups. You may use some of the articles or all, have some students do more than one if they finish early or whatever works best for the setting in your room). As they read the article they will fill in the associated Pro & Con worksheet.

After students have finished quietly reading their assigned article and started their pro/con worksheet, have them come together in small groups of 2 to 5 students and share with their group a summary of the article they read. As they do so they should continue to fill in their pro/con worksheet with any points that they did not include from their own article.

Homework

With a completed pro/con worksheet of the Three Gorges Dam project, have students write a minimum 5 paragraph essay to the following prompt: *What should be done about the Three Gorges Dam?* They need to support their position with as many details as possible from their reading. This can be completed in class, the computer lab, or as homework depending on what is the most appropriate for your setting.

The following Persuasive Writing Rubric can be used to guide their writing:

<http://www.readwritethink.org/files/resources/printouts/Persuasion%20Rubric.pdf>

DAY 3: Prior to students turning in their essays, have them exchange with another student and read their responses. It is best if they exchange with a student who has taken an opposing position, but if that is not possible, then at least a student from another group. They should give 1-2 sentences of meaningful feedback on the back of the paper and return it to the student to read before it is turned in.

This is the largest dam project in the world. For a lesson for applying this lesson's information to a case study on a dam removal project, please see the Cal-Am San Clemente Dam Removal Webquest Lesson.

SAFETY/SECURITY ISSUES:

Remind students about plagiarism and what type of sharing is appropriate and what is not.

References:

Video links

<https://www.youtube.com/watch?v=RwlhUcSGqgs> – Kid President

https://www.youtube.com/watch?v=DBjI3F_Idvk – Expressive Reading

<https://www.youtube.com/watch?v=ysa5OBhXz-Q> – How Wolves Change Rivers

<https://www.youtube.com/watch?v=JkadTXeCxEl> – Dams of the World

Link to Articles in lesson

Activity 1: <http://www.pbs.org/wnet/nature/the-wolf-that-changed-america-wolf-wars-america-campaign-to-eradicate-the-wolf/4312/>

Articles for individual reading

<http://www.scientificamerican.com/article/chinas-three-gorges-dam-disaster/>

<http://www.greeniacs.com/GreeniacsArticles/Energy/Three-Gorges-Dam.html>

<http://news.nationalgeographic.com/news/2006/06/060609-gorges-dam>.

<http://iopscience.iop.org/1748-9326/8/4/041006/article>

http://www.nytimes.com/2007/11/19/world/asia/19dam.html?_r=0

Persuasive Writing Rubric

<http://www.readwritethink.org/files/resources/printouts/Persuasion%20Rubric.pdf>

San Clemente Dam Information

<http://www.sanclementedamremoval.org/>

Dams - Pros & Cons

Investigating the Three Gorges Dam and Analysis

While reading your assigned article, fill in the following chart with as many pros and cons to the project as you can identify in the literature. Then, come together with your group and have each person summarize their article to the group and share their list of pros and cons. Add any listings to your chart that you do not already have from your article in order to acquire as much information as possible.

DAMS	
PRO – Do the benefits outweigh the disadvantages?	CON – Do the disadvantages outweigh the benefits?

Persuasive Essay Rubric

Teacher Name: _____ Per: _____ Date: _____

Student Name: _____

CATEGORY	4	3	2	1
Organization & Structure	A solid introduction with thesis, and overview followed by supporting ideas that are logically presented and engaging with a strong conclusion.	Includes and introduction with thesis, support, and conclusion, but flow is not always logical and engaging to audience.	Introduction, support, and conclusion are present, but logic difficult to follow and personal opinion or writer is unclear.	Organization and structure of essay mostly ignored, and opinion of writer not known.
Engaging Opening & Clear Thesis	Opening of essay immediately attracts the reader and thesis of essay is clear and strong from the beginning.	Thesis is clear and the opinion of the writer is easily discerned.	Writer attempts to introduce issue but fails to clearly state personal opinion and thesis.	No clear introduction to issue or thesis of writer's personal opinion.
Support & Evidence	Multiple pieces of evidence are referenced as support and tied to writer's personal opinion with evident thought to the issue.	Multiple pieces of evidence are referenced, but their relation to the issue and opinion stated are questionable.	Only 1-2 evidences are used and they are somewhat weak arguments to support writer's opinion.	No evidence is given or evidence cited has little or no relation to the issue.
Audience & Level of Writing	Voice, word choice, and essay layout indicate awareness of target audience and appropriate level of complexity in writing level.	Voice, word choice, and essay layout indicate an attempt to connect to audience and is somewhat complex.	Writer appears to be unaware of their target audience or writes at a level not appropriate for expected complexity.	No thought is taken for target audience and complexity of writing is below expected level.
Grammar, Mechanics, & Spelling	Very few or no spelling, grammar, or mechanics errors are found in the essay.	Only a moderate amount of errors in spelling, grammar or mechanics are found, and they do not infringe on understanding of essay.	A fair amount of spelling, grammar, and mechanics errors are found and they cause difficulty in readability and understanding of essay.	A large amount of errors in spelling, grammar, and mechanics are found making the document incomprehensible in many areas.