



## 22. Changing Landscapes, Changing Fires

**Lesson Overview:** In this activity, students envision how they would like a wildland area to look in the future and how that might be achieved. First, they study photos and read articles that describe changes over the past 100 years in landscapes, fire regimes, fire management, and other issues. Then they create art work that shows their own vision of a future landscape and write an editorial explaining their vision and what should be done (or not done) to achieve it.

**Subjects:** Science, Reading, Writing, Speaking and Listening, Arts

**Duration:** 2-3 class periods

**Group size:** Full class

**Setting:** Indoors

**Lesson Goal:** Students will understand that ecosystems change over time, sometimes due to changes in human needs and wants, and many forests from the northern Rocky Mountains to the North Cascades are now very different from past conditions. Students will be able to describe changes likely to occur in the future and how people’s actions may influence those changes.

### Objectives:

- Students can identify the main points in an article about changes in wildlands and fire management and recognize the level of authority of the authors or interviewees.
- Students can examine photographs of landscapes taken over 50-100 years, envision a desirable future for that landscape, and describe how that future condition could be achieved.

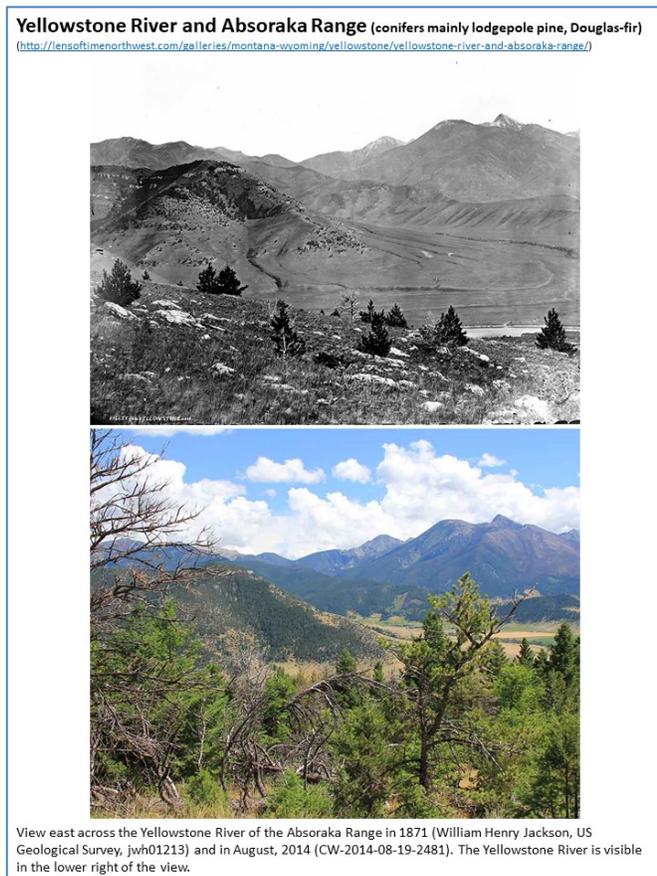
Standards:		9th	10th	11th	12th
<b>Common Core ELA</b>	Reading Informational Text	2, 4, 10		2, 4, 10	
	Writing Standards	2, 4, 8, 10		2, 4, 8, 10	
	Speaking and Listening Standards	1, 2, 4, 6		1, 2, 4, 6	
	Language	1, 2, 3		1, 2, 3	
	Reading Science/Technical Subjects	1, 2, 4, 9, 10		1, 2, 4, 9, 10	
	Writing Science/Technical Subjects	2, 4, 9, 10		2, 4, 9, 10	
<b>NGSS</b>	Ecosystem Dynamics, Functioning, and Resilience	LS2.C			
	Biodiversity and Humans	LS4.D			
	Developing Possible Solutions	ETS1.B			
	Weather and Climate	ESS2.D			
	Natural Hazards	ESS3.B			
<b>EEEGL</b>	Strand 1	A, E, G			

Strand 2.2	C
Strand 2.4	A, E
Strand 3.1	A, B, C
Strand 4	B, C, D

**Teacher Background:** A lot has changed on Planet Earth in the past few centuries. While we often think of forests as stable and unchanging, they are just as dynamic as other landscapes and seascapes on Earth, and they are strongly influenced by the choices people make in using and managing them.

We can identify many landscape-level changes in forests from the northern Rocky Mountains to the North Cascades by looking at photographs taken at different times from the same location. The website “Lens of Time Northwest” (<http://lensoftimenorthwest.com/>), developed by ecologist Dr. Cliff White of Canmore, Alberta, contains a collection of photo series that show changes in wildlands of the northwestern United States and southwestern Canada over the past 100-150 years. This collection provides striking documentation of changes in landscapes, vegetation, and human influence since the early 1900s. One example is given at right (from **PhotoSeriesForStudents.zip**).

This activity challenges students to select one photo series, envision how they would like that landscape to look 100 years in the future, and explain how that could be achieved. To prepare for this art/writing project, they read and report on at least 1 article that offers opinions on landscape change, fire regime change, and fire management policy. They learn about other articles from student presentations.



## Materials and preparation:

1. Decide:
  - a. How to provide the 9 articles for students to read (electronically from **Articles.zip** or from printouts). Unless you have a very small class, more than 1 student will read each article.
  - b. Whether to assign the articles as homework or in-class reading. This lesson is written assuming that students will read the articles as homework.
  - c. Whether to assign articles to students randomly or more deliberately. The articles vary in length from 559 words to 1105 words (length is given in bold print in the **Teacher's guide to Handout H22-1** below). The shorter articles are somewhat simplistic, and the longer ones are more complex and technical. The students who present the two articles by White may need a little extra time both for preparation and presenting – or perhaps they should break the article into sections so each student can present a different section.
  - d. How students will choose a photo series for developing their visions of the future (see Step 1 in **Assessment** below) - from the 8 series available in **PhotoSeriesForStudents.zip** and also on printouts in the trunk - or from browsing the “Lens of Time” website (<http://lensoftimenorthwest.com/>). If students can access the photos digitally, they will have the option of creating their vision of the future using either original art work or a photo editor.
2. Download all of the articles (**Articles.zip**) to your classroom computer so students can project any illustrations needed for their presentations.
3. Access the “Lens of Time Northwest” website (<http://lensoftimenorthwest.com/>). Try to find a browser that “fades” the images from one to another rather than changing the image suddenly. As of this writing (2018), the authors have had better luck with *OneDrive* and *Internet Explorer* than with *Chrome* and *Mozilla Firefox*. **NOTE:** If the website is not available, you can use the files in **PhotoSeriesForStudents.zip**.
4. Browse “Lens of Time” yourself to decide what photos to use for introducing the activity. Don't make it complicated. You can use any of the photo pairs featured on the homepage – or go to the map and find images from a location that your students may find interesting.
5. Make 1 copy/student of **Handout H22-1. Changing landscapes, changing fires** – OR – give students other instruct on taking notes during the presentations (see Step 8 under **Procedures** below).

## Procedures:

### DAY 1: Introduction:

1. Explain: To complete our study of the science of wildland fire, we're going to look at how landscapes have changed over the past century or so, and then we'll create our own pictures of how WE would like them to look in the future. We'll ask
  - How did the landscape get to be the way it is now?
  - How would we like it to look in another hundred years?
  - What could we do – or what must we avoid doing – to make that happen?
2. Open the “Lens of Time” website (<http://lensoftimenorthwest.com/>). If possible, use a browser that “fades” from one image to another. (See Step 3 under **Materials and preparation** above.) Ask students to describe the changes they see as the images go from past to present and back again. If the website is not available, you can use the files in **PhotoSeriesForStudents.zip**.
  - Try to draw out comments on the most vivid changes observed. These may have more to do with population change and people's actions than with vegetation change, and it is good for students to notice that.
  - When vegetation changes are mentioned, ask if they have anything to do with people's choices (decline in populations of American Indians, use of the land for grazing and farming and timber harvest, use of fire and fire suppression, etc.).
3. Explain: To get some ideas about how things have changed and why and possible ways to influence future changes, we'll read some articles and report on them to the class. Everyone will read at least 1 article. As you read, take some notes on:
  - Who wrote the article – or, in the case of news articles, who is interviewed – and what authority/credibility they have to speak about the issue.
  - What problem they address – perhaps change in a landscape or fire regime, perhaps actions by managers, perhaps other issues.
  - What they think can be done about the problem – or what actions should be avoided in the future.
4. Explain: During the next class, you will have a few minutes to work with other students who have read the same article, and then you will present it to the class as a team. This way, everyone will get to consider a variety of opinions on problems we have with wildland fire, how they originated, and what might be done about them.
5. Assign articles and explain how students will access them (electronically from **Articles.zip** or in printed form). See Step 1c in **Materials and preparation** for some notes on considerations about assigning articles.

### DAYS 2-3: Presentations on articles:

6. Get the students who have read each article to team up ( up to 9 teams). Give them about 10 minutes to prepare a presentation for the class.
7. Explain: Your presentations should be about 5 minutes long. You may display the article on the computer so you can show the graphics to the class. In your presentation, describe:
  - The author, date, and nature of the article (whether it is an editorial, news article, or technical article).
  - The credentials of the writer or – in the case of a news article – the people interviewed for the article.
  - The main points of the article, especially information about WHY there is a problem and WHAT SHOULD BE DONE or not done about it.
8. Give each student a copy of **Handout H22-1. Changing landscapes, changing fires** (or explain how to take notes on presentations). Explain: Black out the line for the article you're presenting. For every other article, take notes on what has changed or is changing, why the changes have occurred, and what might be done – or not done – to make things better. You will use these notes to develop YOUR OWN vision of a landscape a hundred years from now.
9. Have students present their articles in the following order (since some of the articles are responses to previous articles):
  - A. Wuerthner (2017)
  - B. Atkins and others (2017)
  - C. Chaney (2019)
  - D. Arno (2017)
  - E. Caton and others (2018)
  - F. White (a) (2018) (on Ross's Hole)
  - G. Cromwell (2017)
  - H. Erickson (2017)
  - I. White (b) (2018) (on the Yellowstone River)

### **Assessment:**

1. Explain: Now it's your turn to plan for the future. You will select a photo series and envision what you'd like that place to look like in 100 years.
2. Explain how to select a photo series – from digital copies in **PhotoSeriesForStudents.zip**, from printouts of these 8 files, or from the "Lens of Time" website (<http://lensoftimenorthwest.com/>). The 8 files in **PhotSeriesForStudents.zip** include the 2 already viewed in the articles by White (**YellowstoneRiver.jpg** and **RossHole.jpg**), but it's OK to use them in the Assessment too.

3. Explain: Think about what you would like that landscape to look like 100 years from now. Keep in mind that the vegetation will change during that time, with or without human intervention.
- Then figure out what should be done – or should NOT be done – to make the landscape look the way YOU would like it to look in another 100 years.
  - Then create an art work that shows how you envision the future of that landscape. If students have access to digital copies of the photos, they could use a photo editor to create the art piece. Use the same topography shown in the photo series, but show the vegetation – and possibly wildlife – as you’d like it to be 100 years from now.
  - Then write an editorial for a newspaper or web blog (500 words or less). In it, display your photo series and art work and explain:
    - how you would like your landscape to look in 100 years
    - why that would be good
    - what should be done – or should be avoided – to make it happen.

**Evaluation:** The main vehicles for assessment are the art work and accompanying editorial. If you want, you can also evaluate the students’ presentations and their notes from the presentations.

	<b>Excellent</b>	<b>Good</b>	<b>Poor</b>
<b>Team presentation</b>	Helped give clear, concise, accurate summary of important points in article.	Helped give accurate summary of important points in article.	Was not helpful or gave inaccurate information.
<b>Notes on presentations</b>	Recorded relevant information on 8 presentations (all except the one he/she participated in).	Recorded information on 6-7 presentations. Some information was not relevant.	Recorded information on fewer than 6 presentations. Some information was not relevant.
<b>Art work</b>	-Art piece showed similar topography to that of photo series. -Art piece showed reasonable changes in vegetation and other features, based on explanation in editorial. -Art piece showed creativity and attention to detail.	-Art piece showed similar topography to that of photo series. -Art piece showed reasonable changes in vegetation and other features, based on explanation in editorial.	Art piece did not use original topography OR showed changes that were not reasonable or conflicted with explanation in editorial.

<b>Editorial (≤500 words)</b>	Editorial gave thorough, logical explanation for anticipated changes, desired landscape, and actions that should (or should not) be done to achieve it.	Editorial explained the desired landscape and actions that should (or should not) be done to achieve it.	Editorial did not explain the desired landscape or did not explain steps needed to achieve it.
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## Handout H22-1. Changing landscapes, changing fires.

Name: \_\_\_\_\_

Author (date)	What's changing, why, what might be done
A. Wuerthner (2017)	
B. Atkins and others (2017)	
C. Chaney (2019)	
D. Arno (2017)	
E. Caton and others (2018)	
F. White (a) (2018) – Ross's Hole	
G. Cromwell (2017)	
H. Erickson (2017)	
I. White (b) (2018) – Yellowstone R.	

## Teacher's guide to Handout H22-1. Changing landscapes, changing fires.

Name of .pdf file	Author (date) - length	What's changing, why, what might be done	Authority, credibility
A-Wuerthner_170802-Missoulian-NoFuelTmt.pdf	Wuerthner (2017) - <b>636 words</b>	Fuel treatments have been suggested to make fires smaller and easier to control, but they are the same as logging. Fuel treatments do not work during extreme fire weather and are too small to make a difference in big fires anyway.	Author is ecologist and writer.
B-Atkins_170827-Missoulian-FuelTmt.pdf	Atkins and others (2017) - <b>674 words</b>	Fuel treatment is not the same as logging. Fuel treatments and past wildfires reduce the intensity of new fires and make them safer and easier to control, even though extreme fire weather reduces effectiveness of treatments.	12 authors, including managers, scientists, professors.
C-Chaney_180212-Missoulian-WhoOwnsFires.pdf	Chaney (2019) - <b>1024 words</b>	Communities need to work together to reduce impacts of wildfire, including smoke. Prescribed fire is needed.	Author interviews scientists and a county commissioner.
D-Arno_170831-Missoulian-ForestsNeedFire.pdf	Arno (2017) - <b>703 words</b>	Fire exclusion has led to current problems. Thinning and prescribed fire are needed, especially around private property on edge of wildlands.	Author is scientist, author, and land manager.
E-Caton_180103-Missoulian-ClimateChange.pdf	Caton and others (2018) - <b>716 words</b>	Climate change is affecting agriculture, tourism, and fire. Support measures to stop climate change.	5 authors, including scientists and professors.
F-White-a-LensOfTime-RossHole.pdf	White (a) (2018) - <b>921 words</b> – Ross's Hole	The change from open ponderosa pine forest to dense forest and then high-severity fire was caused by loss of Native American burning, which was followed by grazing and fencing by Euro-American settlers, which was then followed by fire exclusion.	Author is a biologist who studies fire and eco-cultural influences on the landscape. Article cites sources.
G-Cromwell_170906-Missoulian-PutOutFires.pdf	Cromwell (2017) - <b>559 words</b>	Every fire can be put out while small. Large fires (Lolo Peak, 2017) indicate negligence by managers.	Author is retired engineer. Does name calling ("bozos") give him a better claim to authority?
H-Erickson_171020-Missoulian-Safety.pdf	Erickson (2017) - <b>994 words</b>	Fires cannot all be put out safely while small. Lolo Peak Fire (2017) was too dangerous because of dense vegetation and steep, inaccessible terrain. This makes reduction of fuels around private property very important.	Author interviews IC team member and fire manager.
I-White-b-LensOfTime-Yellowstone.pdf	White (b) (2018) - <b>1105 words</b> – Yellowstone River	Historical landscape pattern was complex and strongly influenced by Native American burning. Fire regime is now mainly severe fire during very dry periods. The change is caused by loss of Native American burning, then fire exclusion, then proliferation of grazing animals in greater numbers than occurred historically.	Author is a biologist who studies fire and eco-cultural influences on the landscape. Article cites sources.