

# The Railroad: A Case Study of Environmental Modifications

GRADE 4

# The Railroad: A Case Study of Environmental Modifications

By Brittany Roper

## Summary

Students will use task cards to study an area affected by the development of the railroad. They will identify the modifications humans made to the environment and discuss the side effects of their actions.

## Main Curriculum Tie

Social Studies – Standard 1.3a. Analyze how human actions modify the physical environment. Describe how and why humans have changed the physical environment to meet their needs.

## Additional Curriculum Ties

Reading - Information Text Standard 1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text.

## Time Frame

One time period that run 45 minutes

## Group Size

Small groups

## Life Skills

Communication, Social & Civic Responsibility, Thinking & Reasoning

## Bibliography

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## Materials

- Set of 6 task cards. You may want one set for each group or make one set and allow groups to rotate.
- The Railroad: Environmental Modifications Worksheet
- Exit Ticket

## Background for Teachers

Human modifications include paving over vegetated areas, constructing buildings, building bridges, draining wetlands, removing or adding trees, building dams, irrigating etc.

Discuss with students these examples of how the environment may be affected by human modifications:

- Logging: A loss of habitat for a variety of species, climate change, increased soil erosion, provides materials for building structures to support a growing community.
- Paving over vegetated areas: Habitat fragmentation, increased mortality rate for animals when they try to cross the road, migration barrier, increased pollution in the area, better and quicker access between towns/cities.
- Building Bridges: May change waterflow, may increase the risk of flood and erosion, increased pollution in the area, saves time when travelling.
- Constructing Buildings: A loss of habitat for native plant and animal life, plumbing and lawn care impact water levels, allows communities to grow and provides shelter for humans.

## Student Prior Knowledge

Students should know the different ways humans modify the environment and the effects they may have on the wildlife and community.

You may want to go over the definition/pronunciation of these words:

- modification: a change made to adjust or alter something
- nitroglycerin: used in explosives such as dynamite
- causeway: a raised road or track across low or wet ground
- magnesium: a metallic mineral
- lumberjacks: people who cut down trees
- ties: a horizontal piece of wood between the iron rails
- merge: come together
- rural: countryside
- commercial: businesses
- grade: taking dirt from a high area to a low area to help level the land

## Intended Learning Outcomes

Students will be able to look at a picture, read the text, and analyze how human actions modified the physical environment in six scenarios associated with the completion of the transcontinental railroad.

## Instructional Procedures

1. Hook: You could show a meme, tell a joke, or read a story like Paul Bunyan to open the discussion about human modifications to the environment.
2. Go over any vocabulary words that you think your class may not know how to pronounce or understand.
3. Split the class into small groups
4. Distribute one worksheet to each student
5. Distribute a task card(s) to each table. Allow time for them to read the information on the back, discuss the picture, and fill out the worksheet.  
Option 1: Give one task card to each group. Set a timer and once the timer goes off have them rotate the card clockwise. Do this until each group has had a chance to look at all six cards.  
Option 2: Give each group the set of 6 task cards to work through at their own pace.  
Option 3: Use the jigsaw cooperative learning strategy:
  - Divide the students into groups
  - Each member in a group is assigned a number 1-6
  - Each student meets with the members of the other groups with the same number.
  - Each new group analyzes the task card with the corresponding number and completes the specific section on the worksheet.
  - Once a designated time is over students return to their original groups to teach them about what they learned.
6. Class discussion: “How did humans modify the environment to build a railroad?” “What were the impacts on the environment from these modifications? Were they positive or negative?” What are the pros and cons of building railroad tracks and, later, roads, in a river canyon? – yes, it’s easier to follow the river’s path, but rivers flood.
7. Have students turn in worksheet.
8. Pass out the exit ticket. Have students draw a picture of one human modification that they see in their own town/neighborhood. It could be roads, traffic lights, light rail, train tracks, or even an airport.

## Strategies for Diverse Learners

Allow SPED or ESL students to work with an adult that can help guide the discussion and clarify words on the task cards.

## Extensions

Have students further examine the causeway on the Great Salt Lake and how it makes the lake so unique.

[https://www.up.com/aboutup/community/inside\\_track/causeway-6-14-2016](https://www.up.com/aboutup/community/inside_track/causeway-6-14-2016)

## Assessment Plan

There is no formal assessment with lesson. The exit ticket will serve as an informal assessment of how human modifications affect the environment.

**SIERRA NEVADAS: SUMMIT TUNNEL #1**



**LUCIN CUTOFF #2**



When going over or around the mountains was impossible, railroad crews had to find their own way through. Over a dozen tunnels were constructed to allow the Central Pacific to pass through the Sierra Nevada Mountain Range. Tunnel No. 6, the Summit Tunnel, which ran through the top of the Donner Pass was the most challenging tunnel built by the Central Pacific Railroad Company. They had to drill through 1,659 feet of rock. They also used an explosive called nitroglycerin. Blasting through the rock was much quicker than digging, but also much more dangerous. They used picks, shovels, and mules to move the blasted material.

In 1902 the Southern Pacific Railroad Company found a way to save time and money by making a shortcut. Instead of going north through the Promontory Mountains they decided to lay tracks across the Great Salt Lake.

In the beginning there were two earthen causeways, with a 12-mile bridge in between. In 1959, the bridge was replaced with a causeway made of rock. This big slice of land is known as the Lucin Cutoff and it stretches 20 miles across the Great Salt Lake.

In 2012, to keep the causeways from sinking, the two gaps that used to allow fresh water and boats pass through the barriers were closed. Over time, blocking the flow of water with a solid causeway has made the north arm of the lake to grow more salty, while the lake south of the causeway has become less salty.

The salinity of the lake matters to companies who mine magnesium from the lake's waters, and from companies who harvest brine shrimp. Brine shrimp can't survive if the water is too salty or too fresh. Utah supplies 1/3 of the world's brine shrimp.

**LOG DRIVE #3**



**OGDEN CITY (1934) #4**



In 1868-69 lumberjacks worked on the north slope of the Uinta Mountains to supply wood for the Union Pacific Railroad Company. They needed wood to tie the rails together and suitable wood was hard to come by.

The demand continued into the 1880s. Trees were cut down, dragged to the river bank, cut to the right length, and shaped, branded, and stacked. Then during spring runoff, the ties were floated down the Bear River. Ties could be floated over 100 miles downriver. Sometimes the river banks had to be built up to keep the ties from going into the meadows.

Ogden City is located near the spot where the Ogden and Weber rivers merge. It is the oldest American settlement in Utah. Miles Goodyear, a mountain man, established a fort there in 1845. He sold it in 1847, after Mormon settlers arrived in Utah.

Before the railroad arrived in Ogden, the area had several small farming settlements. After the transcontinental railroad was built through Ogden, the community changed dramatically. Many businesses came to Ogden, bringing workers and families with them. Ogden grew quickly and became a major railroad town and busy commercial center.



**DALE CREEK BRIDGE #5**



DALE CREEK BRIDGE, IN THE STATE PARKS SYSTEM OF ARIZONA.

**ECHO CANYON #6**



The Dale Creek Bridge in Wyoming was the highest bridge built by the Union Pacific Railroad Company during the construction of the transcontinental railroad. Tracks were laid 150 feet above the creek bed. It was originally built of wood and took 30 days to construct. The bridge would sway in the wind and the trains would have to slow to four miles per hour while crossing it. If a passenger looked out the window it would appear that the train was floating in mid air.

In 1876 the wooden bridge was replaced with an iron bridge. Today, the tracks have been moved and no longer stand above Dale Creek.

Bison, Native Americans and Euro-American explorers used Echo Canyon as a natural pathway between the grasslands of Wyoming and the deserts to the west. Later, the Mormon pioneers, the Pony Express, miners and others used this same route.

Echo Canyon was one of the most difficult sections of terrain that the Union Pacific had to lay tracks through. Tunnels were required in this narrow canyon, therefore they used explosives to help tunnel through rock formations and carve out roadbeds from steep, rocky hillsides. At times floods would wash out both grading and bridges.

Eventually, roads were paved through Echo Canyon: first the Lincoln Highway and later, Interstate 80.

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

# The Railroad: Environmental Modifications

**Directions:** Complete the form for each task card. Remember to use complete sentences when filling out the effects on the environment and an interesting fact. This includes starting with a capital letter, having a subject and a predicate (verb), and ending with the correct punctuation mark.

## 1. Sierra Nevada Mountains: Summit Tunnel

- Human Modification: \_\_\_\_\_
- What effects might this have on the environment? \_\_\_\_\_  
\_\_\_\_\_
- One interesting fact: \_\_\_\_\_  
\_\_\_\_\_

## 2. Lucin Cutoff

- Human Modifications (2): \_\_\_\_\_
- What effects might this have on the environment? \_\_\_\_\_  
\_\_\_\_\_
- One interesting fact: \_\_\_\_\_  
\_\_\_\_\_

## 3. Log Drive

- Human Modification: \_\_\_\_\_
- What effects might this have on the environment? \_\_\_\_\_  
\_\_\_\_\_
- One interesting fact: \_\_\_\_\_  
\_\_\_\_\_

#### 4. Ogden City

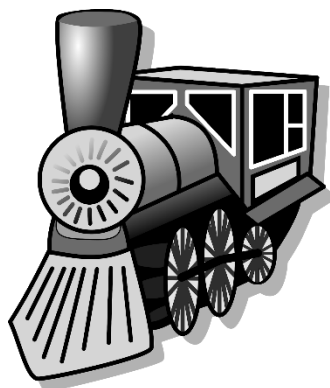
- Human Modification: \_\_\_\_\_
- What effects might this have on the environment? \_\_\_\_\_  
\_\_\_\_\_
- One interesting fact: \_\_\_\_\_  
\_\_\_\_\_

#### 5. Dale Creek Bridge

- Human Modification: \_\_\_\_\_
- Would you have wanted to travel across this bridge? Why or Why not? \_\_\_\_\_  
\_\_\_\_\_
- One interesting fact: \_\_\_\_\_  
\_\_\_\_\_

#### 6. Echo Canyon

- Human Modification(s): \_\_\_\_\_
- What modification did the environment make on these modifications? \_\_\_\_\_  
\_\_\_\_\_
- List some pros and cons for building tracks through a river canyon:  
Pros: \_\_\_\_\_  
Cons: \_\_\_\_\_



# EXIT TICKET

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

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

Caption: \_\_\_\_\_  
\_\_\_\_\_

Caption: \_\_\_\_\_  
\_\_\_\_\_

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

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

Caption: \_\_\_\_\_  
\_\_\_\_\_

Caption: \_\_\_\_\_  
\_\_\_\_\_



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