Carson River: An Oasis in the Desert

Grade Level: 6th - 8th

During this 60-70 minute classroom lesson, students analyze images and texts from past events in the Carson River Watershed. They explore why so many people settled in the Carson River Watershed area as well the risks and causes of flooding. Students then design solutions that reduce the risks of flooding.

Materials

Invitation

- Carson River Handout

Concept Invention

- Individual computers for each student

Essential Questions

- What risks does flooding pose?
- What causes flooding?
- What are solutions to reducing flood risks?

Objectives (Integrated Content and Practice)

1. Students will analyze images and texts to design solutions that reduce the risks of flooding.

NGSS

- MS-ESS3-2: Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.

Key Vocabulary

- Flooding
- Watershed
- Pollution
- Agriculture

Introducing the Lesson (5 minutes)

1. Explain to the students that they are going to work as engineers by analyzing photos and texts about past events in the Carson River watershed and then using their research to design solutions that reduce the risks of flooding.

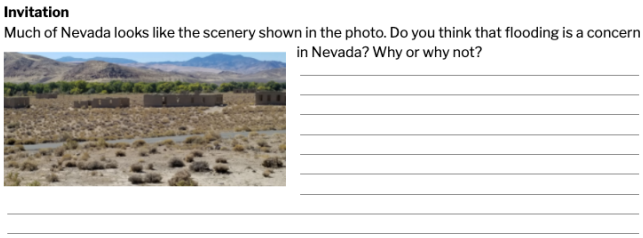
2. Tell the students they will be recording their ideas on a handout throughout the lesson (these may be kept in their notebooks).

Invitation (10 minutes)

1. Share the first photo from the Carson River story map. Students can also look at their handouts to see the image.

2. Ask students what they notice about the picture. Take a few hands.

3. Give students independent time to answer the question in the "Invitation" section of the Carson River Handout.



4. Take a few hands and ask the students to include their reasoning when they share. Tell students that Nevada is the driest state in the country, but it is still prone to flooding. The students will be engineers working to design solutions that reduce the risks of flooding.

5. Tell them an engineer is someone who designs and builds anything from a code for people to play video games like a software engineer to an entire building like a civil engineer. Ask the students if they have any examples of projects that engineers might do.

6. Tell students environmental engineers help to design solutions to the problems created by floods. Engineers are good at defining the problem before designing solutions.

Exploration (15 minutes)

Tips and Tools:

You may choose to organize this activity according to the needs of your students. If it is too distracting to have them get up and move then you may choose to have them pass the photos instead. Some classes may benefit from the opportunity to get up and walk around.

Having a visible timer running will help students with managing their time on each photo.

You may adjust the time according to how quickly or slowly your students are finishing with each photo.

1. Tell students they will be going on a gallery walk and making inferences about a series of photos to collect evidence for their recommendations as engineers.
2. Tell students to answer the questions with each photo on the "Gallery Walk" section of their handout.

Gallery Walk

Answer the questions with each photo.

A	
B	

3. Have students spend 2-3 minutes on each photo in groups. You may have students rotate in groups and move to each new photo or have students pass the photos to the next group.
4. Have a few students volunteer to share their responses and record their responses on a poster or the white board.

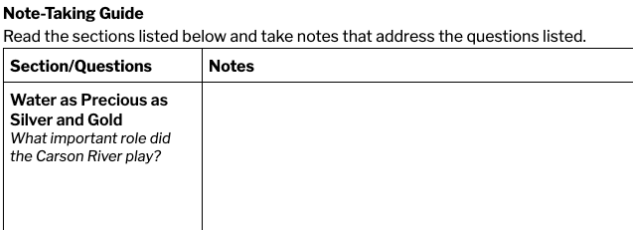
Concept Invention (15 minutes)

Tips and Tools:

1. Tell students they will collect evidence to support their recommendations on dam improvements by reading sections of the Carson River: As Oasis in the Desert story map and taking notes. They may recognize the photos from the gallery walk and find answers to the questions they answered. The story map can also be accessed from http://nevadafloods.org/library.htm under **STORY MAPS**.

Some students may require additional support to take notes and you may provide them with sentence starters or cloze notes. Additional supports may also include working in pairs or reducing some of the required sections.

2. Have students read the sections listed on the "Note-Taking Guide" and take notes as they read that address the questions listed for each section.



Note-Taking Guide

Read the sections listed below and take notes that address the questions listed.

Section/Questions	Notes
Water as Precious as Silver and Gold *What important role did the Carson River play?*	

3. Ask for volunteers to share their responses to the questions on the note-taking guide. Record the responses onto the handout using a document camera or onto a whiteboard.

Application (15 minutes)

Tips and Tools:

1. Discuss with students some of the complications related to flooding from the readings in the story map. They will be focusing on just one aspect of the challenges associated with flooding which is the damage caused by floods. Tell students they will use information from the story map to choose a solution and include it in their designs as engineers. Their design must show how the solution they have chosen reduces flood risks by drawing the area with and without the design.

Keep the images from the gallery walk and computers out on the tables so that students may see examples of dams that were built as well as how flooding looked before and after the dam was built.

2. Refer back to the "What Can Help Reduce the Flood Risk?/Success of "Big Dig" Fallon" section of the story map and note-taking guide. Reiterate sections of the text that explain the purpose and function of levees and dams. Remind students of the solutions in their notes and reading

such as dams, levees and digging channels. Use the images in the story map to help students visualize their designs. You may also want to include photos of levees, digging channels and dams in your area as you discuss them with students.

3. Show the students the images on the story map from the section on the Lahontan Dam. Focus on the images that show the site prior to construction and the image during construction of the dam. Ask the students how the images compare and take a few hands.

Some students may need additional support to create designs. You may assign students a specific solution, have them work in pairs or give students a template of a river where students add their design to the river.

4. Have students discuss possible solutions to flooding at the Lahontan Dam site prior to the building of the dam at their tables and share at their tables which solution they will include in their design. Students may also create their own solutions that were not discussed in the story map.

5. Give students independent time to complete the drawings of their designs.

6. Have students share their designs with each other at their tables or with a partner before asking for a few volunteers to share with the whole class.

Reflection (10 minutes)

1. Review the images from the gallery walk and the student responses to the questions.
2. What are some of the costs and benefits of the flood reduction measures?
3. Do we have any new questions or observations?