Lesson 2: What Can We Do?

Unit: Saving Carson River

Grade Level: 5th **Site:** Classroom

Summary

Now that students have identified the disturbances in the Carson River Ecosystem, they will be asked how they can restore the River Fork Ranch ecosystem. The difficulties of restoration will be demonstrated by a hands-on activity. This will be followed by a discussion about the restoration project at River Fork Ranch. Finally, they will end the lesson by writing their own letter to the Nature Conservancy about the restoration project.

Materials

- Science notebook
- About 6-7 Ceramic pots (or another object)
- Mid-sized bin
- River Fork Ranch before video
- River Fork Ranch after trees video

Essential Questions

- What ecological benefits have been achieved through restoration activities?
- What are the challenges of restoration ecology?
- What are the methods that restoration ecologists are using to repair the Carson River and River Fork Ranch ecosystems, and why have they chosen these methods?

Objectives (Integrated Content and Practice)

1. Students will learn about restoration practices that the local environmental scientists are using to restore the Carson River riparian ecosystem and River Fork Ranch.
2. Students will be able to write a letter to the Nature Conservancy describing what they discussed and learned about and what they are still curious about.

NGSS

5-ESS3-1 Obtain and combine information about ways individual communities use science ideas to protect Earth's resources and environment.

Common Core

- CCSS.ELA-Literacy.W.5.8 – Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work and provide a list of sources.
- CCSS.ELA-Literacy.W.5.9 –Draw evidence from literary or informational texts to support analysis, reflection, and research

Key Vocabulary:

- Restoration Ecologists
- Restoration
- Invasive Species
- Native Species

Invitation

Summary: *Students will be asked about an object that matters to them and asked to think about how they would feel if it were broken or degraded to the point of not being able to use it. This is an activity meant to add a personal perspective to why fixing the environment matters and lead into the exploration activity.*

Tips and Tools:

This is an activity meant to add a personal perspective to why fixing the environment matters and lead into the exploration activity.

1. Ask the students to think about an object that matters a lot to them, something they believe has a lot of value. TPS: Have students turn and talk to a partner to talk about their item and why it matters so much to them. Then come back as a class and have a few students share what they discussed.

2. Now, tell students that their item has been degraded or broken and they can no longer use it, it is not functional. Ask them how they feel about that. Have a few students share, you can also use the TPS method again. The answers should generally be about not feeling good about their item breaking.

3. Tell students that, for animals, their habitat means this much to them but in some places (like Carson River) it has stopped being functional. Discuss how this parallels their important object not working.

Exploration

Summary: *Students will be given the broken pieces of a ceramic pot or clay model and asked to put it back to its original form using only a reference object or picture of the reference object.*

Tips and Tools:

The dollar store is recommended for finding the ceramic pot, the broken pieces should be dull enough for students to safely handle.

To make this challenge easier, you may paint each pot (or other

1. Students now are going to try to fix something, just like ecologists try to fix the environment for the animals. However, just like ecologists struggle to restore the animal's habitat, fixing their object will not be as easy as it seems.

2. Previous to the exploration either gather the same ceramic pot (or other ceramic object or clay model), one for each group in your class as well as one that will not be broken and be used as a reference. Break all the other objects, taking 1-2 pieces from each object and separating them from the others. Then put all of the remaining pieces together into one bin. Place this bin and the reference object somewhere in your classroom accessible to all students. You can also take a picture of the reference object and give the picture to all the groups.

3. Split your class into groups and give each group a separated piece, each group should have a piece belonging to a different

object) a different color, so the pieces are distinguishable from each other. You can also make two bins and have each bin containing only the pieces from two or three objects, telling students which bin their pieces will be in.

object. This will determine which of the broken objects they must find the pieces to in the bin.

4. Split your class into groups and tell them they must reconstruct the broken object using a shared bin and find the right pieces to their specific object. They may use tape or glue to reassemble their object. Give them a time limit of 20 to 30 minutes.

5. At the end of their time limit, stop the class and have groups who finished reassembling the object correctly stand up or raise their hands. Ask them how they did it.

6. Ask the entire class how it went, was it frustrating or difficult? Was it easy? What challenges did they face?

7. Tell students that just like they struggled to fix their broken object, ecologists come across similar difficulties when fixing habitats and must be incredibly careful and think hard on what methods they use to fix the habitat, so they have the best chance of succeeding.

Concept Invention

Summary: *Students will learn about the restoration project currently happening at River Fork Ranch and other restoration methods. Methods include removing invasive species, planting native species, restricting livestock grazing, restricting farming, relocation of animals, thinning for wildfires, limit human activity, and removing toxic materials.*

1. Introduce River Fork Ranch - RFR is an 800-acre preserve owned and operated by the Nature Conservancy. It is located on the Carson River near Genoa. It is a nature preserve and a working cattle operation. The ranch's habitats include riparian-wetlands, meadows, and pastures. These habitats support wildlife including bald eagles, sandhill cranes, leopard frogs, monarch butterflies and mule deer. A legacy of unrestricted grazing, irrigation diversions, and dredging of the river channel resulted in degraded ecological conditions including impaired movement of sediment, introduction of invasive plant species, and reduced health of the wetland.

2. Show the class the before video of River Fork Ranch. Ask students to give you a thumbs up when they see a problem with the ecosystem, or if they have a solution to a problem. After watching the video, have students TPS what issues they noticed and solutions they may have to any issues.

3. Facilitate a conversation about possible solutions that can solve the issue(s) at River Fork Ranch. Example answers – planting native trees and plants, restricting livestock grazing, restricting farming, relocation of animals, thinning for wildfires, limiting human activity, and removing toxic materials.

4. Have the class discuss what they think the Nature Conservancy has done to restore River Fork Ranch. Ask for explanations as to why those restoration practices would be useful.

5. Show them the video of River Fork Ranch after planting trees. Ask students to give you a thumbs up when they see what solution the nature conservancy went with.

6. TPS: have students discuss the differences between the videos and what ecosystem changes they noticed after watching the second video. After TPS, have them share their ideas with the class.

7. Tell students that the Nature Conservancy had some of the same ideas as they did to restore River Fork Ranch. They have transplanted cottonwood trees and moved them from McCarran Ranch Preserve in Sparks to River Fork Ranch to give shade along the river, reduce the temperature of the area, hold the river banks in place to help prevent sediment pollution from entering the river, to allow the water to come up and out of the riverbanks during high water events from spring snowmelt, and to spread out over the floodplain. This slow filtration of water allowed cottonwood seeds to have access to water long enough for them to develop into mature trees.

8. Tell students that now they will have the opportunity to write to the Nature Conservancy in Reno about their thoughts and any questions they may have about the restoration project at River Fork Ranch.

Application

Summary: *Students will be asked to write a letter to the Nature Conservancy describing what they learned about the River Fork Ranch restoration project and any questions they still have about the project.*

1. Tell students they will be writing a letter to Lori Leonard at the Nature Conservancy Northern Nevada office about what they learned about the River Fork Ranch restoration project and any questions they have about the project.

2. Sample questions for students to answer - What did you learn about habitat restoration? What was your favorite thing you learned about? Was it easy or hard to come up with solutions to restore River Fork Ranch? What other solution ideas do you have that could help preserve RFR and the Carson River?

What can you do to protect rivers and wetlands? What are your questions for the Nature Conservancy?

3. Letters will be sent to Lori Leonard at the Nature Conservancy:
   1 East first street, suite 1007, Reno, NV 89501

Reflection

1. Ask them why they believe the scientists chose their methods for restoring River Fork Ranch. **TPS**: Have students share their ideas with a partner and then bring the class back together and have a few students share what they discussed.