



Reclamation Rangers

Abstract:

“Reclamation Rangers” is an activity introducing students in grades 3-5 to the process of reclaiming formerly mined land. Students play the roles of reclamation biologists, miners, a regulator, native and non-native trees and grasses, a bird, a hiker, and community members attending a public meeting to decide on a mining permit. Students act out planning for a site, mining and reclaiming it, and invasive plants’ struggles with native plants for control of a habitat.

Facilitators explain that, no matter how carefully reclamation biologists plan or how hard they work, it is difficult to control invasive plants in Florida. Invasive species grow fast here--there is so much sunlight and rain-- and crowd out native plants. Still, getting disturbed land to be habitat again for native species of plants is worth the struggle. Native plants require less water and care, and they share space with other species, promoting biodiversity--the survival of different kinds of plants that appeal to a variety of native animals. Finally, facilitators give each student a Reclamation Ranger card and explain how students can take responsibility to help preserve unique Florida native habitats.

Standards:

SC.B.2.2.2	SC.D.1.2.1	SC.D.1.3.4	SC.G.1.2.2	SC.G.2.1.2	SC.G.2.2.3
LA.3.1.7.5	LA.3.5.2.1	LA.4.1.7.5	LA.4.5.2.1	LA.4.2.1.2	LA.4.2.1.4
LA.5.2.1.7	LA.5.2.1.2	LA.5.1.7.3			

Objectives:

- Students will be able to explain native and invasive species
- Students will be able to explain what reclamation is
- Students should be able to identify and explain plot structure, exposition, setting, character development, problem/resolution, and theme.

Vocabulary:

phosphate	permit	invasive
fertilizer	overburden	native
reclamation	rhizome	biologist

Materials:

Jar of phosphate rock to pass around (Be sure to specify unbeneficiated or concentrate rock)
Berries (Styrofoam balls painted red)
Velcro or tape
3 parasols (two for planted trees, one for a Brazilian pepper tree).
Mockups of dragline, earth-moving equipment, grass, house.
3 rope segments (rhizomes)

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Clipboards and papers for Reclamation Biologists
 Role signs in large print and boldface for each actor
 Reclamation Ranger cards

Activity:

Roles (16 or more, depending on size of group)

Reclamation Biologists	2
Regulator	1
Miners	2
Native Grass	3
Native Trees	2
Cogongrass	3
Brazilian pepper tree	1 (moves from first location to second location)
Hiker	1
Bird or other animal	1

Script:

NARRATOR: (Suggest multiple speakers)

Hi! I/We are _____. I/We work for the Florida Industrial and Phosphate Research Institute. The Institute –we call it the FIPR Institute--was set up by the State of Florida. At our office, scientists look for ways to make phosphate mining and fertilizer manufacturing more efficient, so less land has to be dug up, fewer animals lose their homes, and there is less unwanted material stored out of doors in the environment, on land we want to use for other things.

Some of what the research FIPR Institute scientists do is figure out how to make the land, after mining is finished, look and function more like land that was never mined. The process of making disturbed land useful again is called reclamation.

We are inviting you to become Reclamation Rangers. Rangers observe their environment, notice if there are any problems, and talk to family and friends before and after problems occur, to alert them to damage that can take place in a habitat and how to deal with damage. We'll demonstrate ways that problems occur in Florida's environment, and what people can do to solve those problems.

We need volunteers. **[Give kids signs to indicate their roles.]**

One of you will be a Brazilian pepper tree.

One of you will be a hiker.

One of you will be a bird.

Four of you will be rhizomes.

Two of you will be reclamation biologists.
Two of you will be planted trees.
The rest of you will be the audience.
All of you will be reclamation rangers.

Today, you will act out roles to help us show how mining and reclamation takes place. Some of you have a sign. Read your sign and wear it around your neck. If you have two signs, wear them both.

Let's start.

Does anyone know what phosphate is? [Give students time to try to answer.] It's a mineral dug up from the ground. Years ago, when there were oceans where we are standing, tiny sea creatures left behind their skeletons and their wastes. This material was reworked by ocean currents. When the oceans moved away and were replaced by dry land, this phosphate was left behind. [Pass around jar.] We use it in making fertilizer that makes plants grow faster and more abundantly. It has many other uses too.

To get the phosphate, mining companies dig 30-50 feet below ground. They leave big holes and big piles of dirt called overburden. Years ago, when mining ended at a site, some companies left the land alone and moved on to dig somewhere else. The land they left behind looked ugly, like this [show picture of moonscape]. Unwanted plants spread to these areas. Native animals, the ones that are supposed to live here, ran or flew away. Some of the land could not be used again. But back in 1975, the State of Florida passed a law requiring mining companies to reclaim the land—to work on making it look and function very much like it did before mining took place, so the land would be useful again.

Reclamation Biologists, come to the site. Biologists are scientists who study how things grow. These particular biologists work in the field of reclamation, taking disturbed land and making it useful again. They may work for a mining company or for an independent firm hired by a mining company.

RECLAMATION BIOLOGISTS:

(Phase One): The mining company thinks there's lots of phosphate here. The company has bought the land and wants a permit from the county and the state to dig it up. My job is to study the land now and plan what the company will do with the land after mining is through. If the county and the state like my plan, the company will be allowed to dig.

After mining, I'll smooth out the piles, fill in the holes with sand and overburden, and plant native grass and trees.

Reclamation biologists, go study what the land looks like before mining. [They go off with clipboards.]

Regulator, comes to the site. A mining company wants permission to dig holes and dump overburden, in order to bring up phosphate rock. [Read the Regulator's sign.]

REGULATOR:

It's my job to make sure that the land is reclaimed so that it is usable after phosphate mining is over. We want native plants and animals to live here. Invasive plants drive off native animals and take over habitats. It takes a lot of work to keep the land ready for native plants.

If I don't think a company's reclamation plan will work, I can refuse to permit mining at a site.

The mining company's reclamation biologists have prepared a reclamation plan. [RBs hand clipboards to Regulator, who studies them.]

NARRATOR:

The Regulator holds a public meeting to see what members of the community think. You are the community. Do you think the plan will work? Yes (thumbs up) or No (thumbs down)?

The Regulator considers what the community thinks and makes a decision.

If the decision is no, the mining company may change its plan and try again to get a permit.

[Miners, come to the site. Read the miners' sign or let the miner read it.]

MINER:

Samples dug up on this property show there may be lots of phosphate here.

I'll take the dragline to this spot and dig a hole 50 feet deep, and then dig other holes, there, there, and there.

[Looks at charts. Moves model dragline to different locations and "digs."]

NARRATOR:

Now that the Regulator has approved your reclamation plan for this property, miners can start digging. Dump out piles of overburden, the dirt you dug through before you found phosphate in the matrix layer.

Now mining is over.

Reclamation Biologists, smooth over the piles. Fill in the holes with sand. You are ready to plant grass, then trees.

[Native Grass, come to the site. Read sign or let native grass read.]

NATIVE GRASS:

I'm the first thing a reclamation biologist plants. My roots hold the soil.

If I can grow here, it may be harder for invasive plants to take over. I also provide food to grazing animals and protection to smaller animals.

[Grass, put down your roots and grow.]

NARRATOR:

Why is the grass planted first? That's right, to hold the soil and work to keep invasive plants out.

[Native Trees, come to the site. Read sign or let trees read.]

NATIVE TREES:

I am a tree planted by a reclamation biologist. My roots hold the soil. I offer a nesting space for birds and shelter to animals. Once I have grown, my canopy of leaves can shade out unwanted invasive plants.

[Put down roots. As you grow, raise your parasols to indicate a spreading canopy (the leaves that shade an area under the tree). FIPR is doing research to see if tree canopies shade out unwanted plants.]

BIRD

[As these native plants are getting established, a bird flies overhead. Read sign or bird can read]

BIRD

I am looking for a place to perch while I eat this yummy red berry.

Oops!

NARRATOR:

The bird dropped a berry, which is a seed from a Brazilian pepper tree. Brazilian pepper is an invasive tree. It grows very rapidly in central Florida.

Invasive/exotic plants are plants that were brought into a habitat from some other place, either outside the U.S. or outside Florida. In their native habitats, these plants had to struggle to survive. But in a new central Florida habitat, they don't have to struggle against insect enemies, diseases, or environmental stresses they experienced in their own native ranges.

Florida has lots of sunshine. It is warm. In the rainy season, there can be lots of moisture. Plants new to a Florida habitat may reproduce in large numbers, crowding out native species. Animals may die or leave for other habitats that better meet their needs. The water level may drop and the fish population decline. The land becomes weed-choked and unvaried. No people want to fish, hunt, picnic, or make a home there.

BRAZILIAN PEPPER:

[Brazilian pepper, come to the spot where the berry dropped]

BRAZILIAN PEPPER:**[Phase One]:**

I'm invasive. My seed was brought to this habitat from somewhere else. I take moisture, sunlight, and space away from native plants. Birds and other animals like to eat my berries. When they do that, they spread my seeds.

[Put down roots. Slowly, raise your canopy.]

NARRATOR:

Invasive plants are spread in many ways.

Sometimes, people import plants because they look appealing. People may not think that a new plant can cause much damage. But several species spread in this way have caused lots of damage, by taking soil and water that native plants need in order to survive.

Brazilian pepper fights native trees for access to sunlight, soil, and water—and it often wins the fight!

While native grasses are still getting established, cogongrass invades the habitat. This time, the wind spread its seeds from property across the road.

COGONGRASS:

Lots of sunshine! Enough rain for me to grow! I'm stronger than these other wimpy plants! It's *MY* habitat now!

NARRATOR:

Cogongrass spreads two ways, by seed *and* by rhizome. A rhizome is a kind of underground stem that grows horizontally. To show how a rhizome works, the one of you in the center hands ends of the rope to one on your left, one on your right. No native animals eat cogongrass—it's too scratchy—so without enemies it grows very fast.

[This reclaimed land is a park. Along comes a hiker. You have always wanted to hike here. Read Hiker's sign or let hiker read sign]

HIKER:

I'm tired. I'll sit down under this tree. Okay. Now I'm ready to move on. [Attach berry to foot]

NARRATOR:

Many exotic/invasive plants cost the state, or mining companies, or homeowners thousands, even millions of dollars to control. Some seem impossible to get rid of.

Sometimes, animals can spread invasives. (Remember that human beings are animals.)

When you move on, you don't notice that a berry has attached itself to your shoe. You did not mean to spread the seed of this invasive plant, but you have taken a seed to another part of the property.

HIKER:

(Brush the berry off somewhere else and resume your seat.)

NARRATOR:

It can take several years—five or eight or ten—for reclamation biologists to get land into the condition the company promised in its reclamation plan. While the grasses and trees they planted are getting established, the biologists check on the land and maintain it.

The Reclamation Biologists return and sees that Brazilian pepper and cogongrass have spread.

RECLAMATION BIOLOGIST:

(Phase Two): After I plant grass and trees, I keep checking to see that invasive plants/weeds aren't crowding out what I planted. In order to kill or control invasive plants, I may cut them back. [Hack at the Brazilian pepper tree.] I may start little fires and then go through with weed-killer, to eliminate invasives and give native plants a better chance to survive.

[Burn the cogongrass, to get it to germinate, and then spray an herbicide on the cogongrass to kill it.]

RECLAMATION BIOLOGIST:

Reclamation biologists, push down half the cogongrass.

BRAZILIAN PEPPER:

Brazilian pepper, lower your parasol. (This tree has been cut down.) Move to the site where the hiker left the berry, put down roots, and start to grow there. [Slowly raise your parasol.]

BRAZILIAN PEPPER:

[Phase Two]: I'm still invasive. My seed was brought to this part of the habitat from somewhere else. As I spread I take more moisture, sunlight, and space away from native plants. Birds and other animals like to eat my berries. When they do that, they spread my seeds in their droppings or when they attach to their fur or feathers.

BIRD:

The bird flies back onsite and goes to the new Brazilian pepper tree.

BIRD:

[Phase Two]: Hmmm! More red berries! I'm still hungry. Oops!

[Drops a berry beyond the shade of the Brazilian pepper tree.]

NARRATOR:

No matter how hard reclamation biologists work, it is difficult to control invasive plants in a Florida habitat. The abundant sunshine and rain and the absence of predators allow plants to grow without limits and take over a habitat from native plants. When invasive plants take over, the animals that lived here leave to find food and shelter elsewhere. But, as frustrating as it can be to reclaim land, getting disturbed land to be habitat again for native species of plants and animals is worth the struggle.

Whether you work for a mining company or you are planning what to put in your own yard or schoolyard, it is important to plant native species of grass, shrubs, and trees. Native species usually require less water and care. They share a habitat with other plants, so there is diversity—lots of different kinds of plants that appeal to different animals.

Be observant. Become aware of which plants are native and which plants have invaded from another habitat. Learn how to properly dispose of dead plants and other yard waste.

Pick up your own Reclamation Rangers cards from us as you leave the room. Fill in your name later. The card will remind you of what reclamation involves. It is the responsibility of all of us to protect Florida's unique environment. You are now Reclamation Rangers!

What the Land Looks Like Now and How It Will Look Later

(You don't have to be a good artist; draw quickly and use stick figures if you want.)

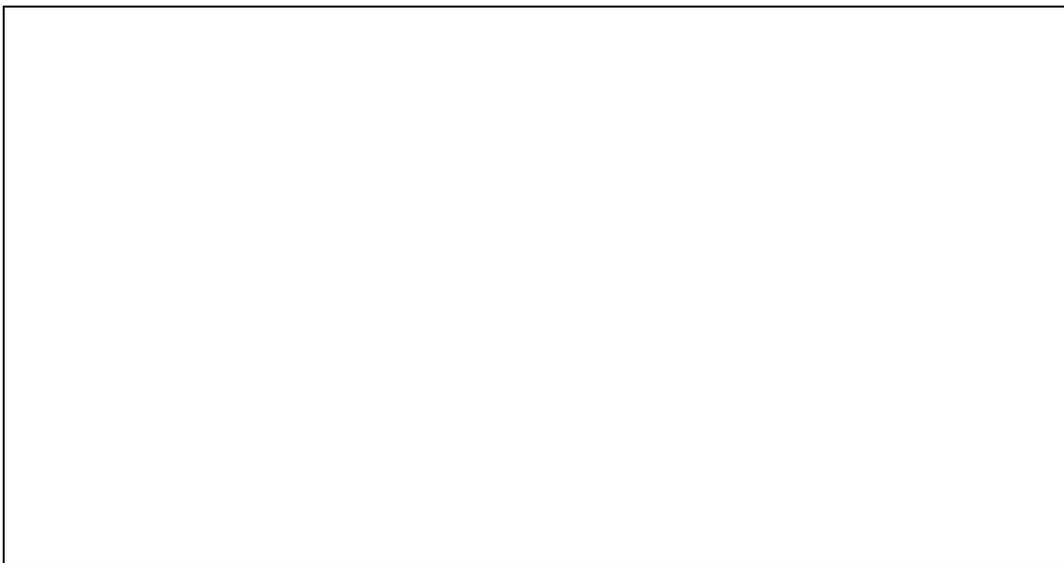
When a mining company wants a permit to mine for phosphate, it writes a reclamation plan. A reclamation plan tells how the land will look, and how it can be used after mining. You will help write the plan.

In the top square, draw how you imagine the land looks now, before mining. Are there lots of tall trees? Low plants and grass? Streams? Animals?



Below, draw what you think the land will look like later, after mining is over and the land is reclaimed. (Your two pictures probably won't look exactly the same.)

What will the land be used for? Pasture? Houses? A park? A golf course?



Extensions:

1. Students will be able to listen to information presented orally and show an understanding of key points.
2. Use graphic organizer to compare and contrast the plants in the activity.
3. Use graphic organizer to demonstrate cause and effect.
4. Use graphic organizer for sequencing of events.
5. Have students recall, interpret, and summarize the information presented orally in order to show understanding of key points.
6. Go on a field trip to visualize the native and invasive species.
7. Read a story about, and show pictures of, invasive species and do a class project on trying to save Florida's land from invasive species.
8. Have students build a model of what they think the land will look like once it is reclaimed.
9. Do further research on common native and invasive species in Florida and add them to the script above.
10. Create your own skit about post-reclamation and what can be done to ensure the land is preserved once restored.
11. Students can create a conservation program for their class to do their part for the environment.