

THE WATER RELAY

Overview

This game demonstrates the concept of plants (cottonwoods and tamarisk) competing for a resource (water). It also introduces the effects of a predator (beavers and tamarisk beetles) and asks students to figure out how to change the scenario to favor one species over the other.

Time

30 minutes

Grades

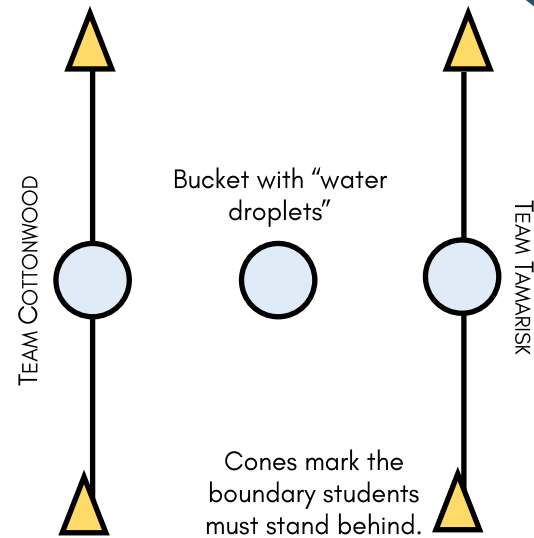
2-8

Materials

- Paper or stone water droplets
- 3 buckets
- Something that students can wear that symbolizes a cage for protection (e.g. silver pipe cleaner tied together to look like a cage) - Optional
- 4 cones
- Tamarisk beetles - Optional

Set Up

- Divide students into 2 teams. Assign one group as cottonwood trees and the other group as tamarisk trees.
- Have students line up side by side on either side of an open space, with one team on each side for a relay.
- Place a bucket near the center of each team and the third bucket containing the water droplets in the center.
- Cones at either end of each team's side will help keep students from inching forward during the relay. See figure above.



Round I – Cottonwood Roots vs. Tamarisk Roots

- Talk with the students about the differences between the two trees using information provided in the background section.
 - Discuss with students the advantages that tamarisk has over cottonwoods
 - Instruct students that each team must run to the bucket filled with stones (water droplets) in the center, one student at a time like a relay. Each student will pick up a water droplet and return the droplet into their team's bucket.
 - The team with the most water droplets in their bucket wins the round.
 - Explain to the students that tamarisk has longer roots than cottonwoods, so the tamarisk team can pick up two droplets at a time, whereas the cottonwood team members can only pick up one droplet at a time.
- Play the round, having students on each team count their collected droplets to determine who won. *Cottonwoods should lose.*
 - Ask students why the cottonwoods lost? (*invasive tamarisk's extensive root system and ability to grow in such dense thickets allows them to consume more water when compared to native cottonwoods*)

Round II – Here Comes a Cottonwood Predator

- Play the same way as round one but add another element. Now tell students that there is another "player:" the Beaver.
- Discuss with students how beavers act as predators of the cottonwoods and how tamarisk lacks natural predators, giving tamarisk another advantage in the game.
- Ask an adult to act as the beaver and instruct them to tag a few cottonwood trees when they are in route to the bucket with water droplets. Inform students that in this next round, the beaver may now cut down cottonwoods. If a student is tagged by this predator, they must sit the rest of this round out and cannot get a water droplet.
- Have students count droplets from each team to determine who won.
- Cottonwoods should lose again – ask students why the cottonwoods lost (*beaver chopped down some of the cottonwoods, tamarisk are still taking more water, and have no predators. Beaver don't like to eat tamarisk*)



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Brainstorm a Solution

- At this point, the cottonwood group will be discouraged. Brainstorm with the students ways that they can change the game so that cottonwoods have an advantage over tamarisk.
- Guide them through a discussion. For example, we could...
 1. Remove/cut down some of the tamarisk trees and plant more cottonwoods.
 2. Put cages around the cottonwood trees to protect them from beavers.
 3. Now that we've protected the cottonwoods from beaver, what about introducing a predator of tamarisk? Talk with students about the tamarisk beetle and how this biological control was introduced to help manage the spread of tamarisk.

Round III—Helping Habitat Thrive

- For the last round, tell the students that we will try out the recommendations from your brainstorm in an effort to help the cottonwoods survive.
 1. Inform the students that you will cut down some of the tamarisk and replace them with cottonwood trees. "Cut down" a few students from team tamarisk and tell them that they have now been replanted as cottonwoods. Instruct them to remain on the tamarisk side, but when they get water droplets from the bucket, they will continue across the field to team cottonwood and drop their water droplet into the cottonwood bucket instead. Ask a teacher or parent to help remind the new cottonwood students of their role during the next round.
 2. Place cages around the cottonwoods trees to protect them from predation (beavers) so the teacher who was acting as the beaver can sit out. (pretend to put cages around them or use prop e.g. silver pipe cleaner)
 3. Inform students that you introduced a natural predator of tamarisk, the tamarisk beetle, to help keep the tamarisk population in check. Assign an adult to be the tamarisk beetle and instruct them to tag a few tamarisk before they can reach the water bucket.
 - Cottonwoods should win.

Round IV

4. For the last round, explain that with fewer tamarisk taking up so much water, now there is more room for cottonwoods to get the water they need. As a result, the cottonwood group can go to the bucket in groups of two to collect their droplets rather than one person at a time.
 - Cottonwoods should win again.
 - Review with students what they changed in order to give the native cottonwoods a chance to outcompete tamarisk and compare this activity to what is happening in riparian areas today (*nonprofits like RiversEdge West work to protect and plant cottonwoods and other native plants, and remove tamarisk*).

Optional

- Ask to borrow live tamarisk beetles from the [Palisade Insectary](#) so the students can see them in person.

